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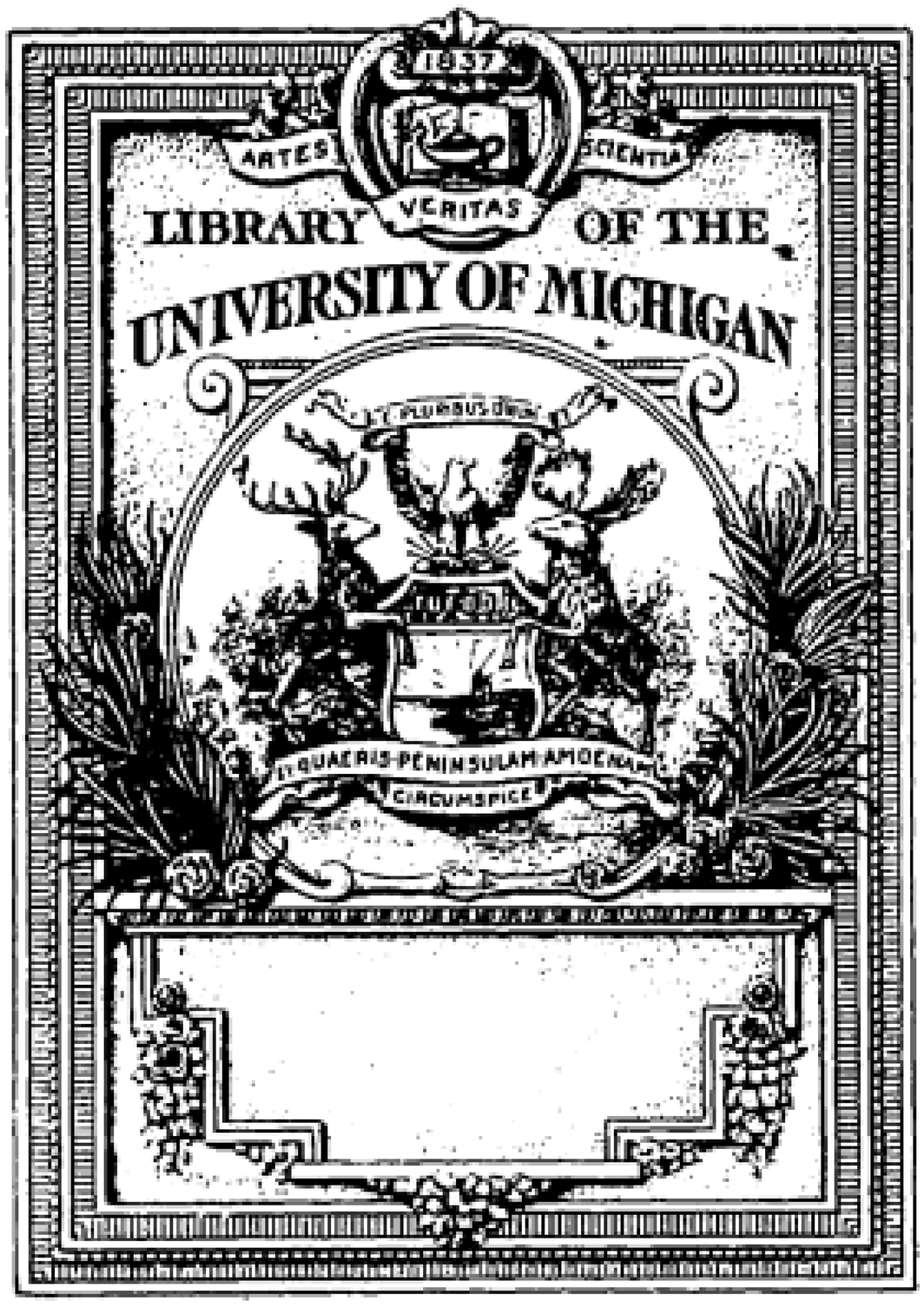

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THE

SCIENCE AND ART

OF

SURGERY,

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EMBRACING

MINOR AND OPERATIVE SURGERY:

COMPILED FROM STANDARD ALLOPATHIC AUTHORITIES,

AND ADAPTED TO

HOMŒOPATHIC THERAPEUTICS,

WITH

A GENERAL HISTORY OF SURGERY FROM THE EARLIEST PERIODS TO THE PRESENT TIME, FOR THE USE OF PRACTITIONERS AND STUDENTS OF THE HOMŒOPATHIC PRACTICE OF MEDICINE,

BY

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Illustrated by new and copious Engravings and many original Cuts from the Author's private Museum.

IN TWO VOLUMES.

VOL. I.

ST. LOUIS:

MISSOURI DEMOCRAT BOOK AND JOB PRINTING ESTABLISHMENT,

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TO THE

HOMŒOPATHIC PRACTITIONERS OF AMERICA, AND ESPECIALLY

TO THE

STUDENTS OF THE HOMŒOPATHIC MEDICAL COLLEGE OF MISSOURI,

THIS WORK IS RESPECTFULLY DEDICATED,

BY

THE AUTHOR.

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"Similia Similibus Curantur."

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PREFACE.

In preparing for publication the present treatise on the SCIENCE AND ART OF SURGERY, the author has endeavored faithfully and impartially to adapt the homœopathic law of cure to the treatment of surgical diseases, and to supply a desideratum long felt by practitioners and students in our surgical literature.

The rapid increase of homœopathy, the constant demand made upon the science for additional laborers in this field of practice, the multiplication of medical colleges, and the continually-augmenting classes of students that throng these halls of learning, are sufficient evidences of the exalted position and standing of homœopathy in the social scale.

Within the past few years, the adaptation of the law "similia" to the cure of surgical diseases has received a powerful and irresistible impulse by the labors of those who justly occupy a proud position in its ranks as accomplished and successful surgeons.

The jeers and hackneyed jokes of allopathic practitioners, and their coarse denunciations of this system, have, like chickens in the proverb, "come home to roost;" and homœopathic surgery, crowned with brilliant and successive triumphs,

Moves onward, still onward, a giant now—
"Excelsior" forever 'graven on its brow.

The records of the late rebellion, the statistics of thousands of cases both in civil and military service, the published transactions of its literature, potently attest that homœopathic surgeons can not only perform surgical operations skillfully, but results prove that the success attending operative interference is largely

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in favor of that system of practice. Besides this, a number of diseases that under allopathic remedies are pronounced incurable, are readily and permanently cured by the principle of similars. The unbeliever, if he will, can find in the literature of the homœopathic school, abundant and well-attested evidences of the truth of this statement.

It is the design of the author in the present work to keep pace with the onward march of surgical improvement, and to present practitioners and medical students a treatise in this department of medicine both plain and comprehensive — one that will obviate the necessity forced upon us, of employing allopathic text-books in the curriculum of study in our medical colleges.

In compiling, arranging, and systematizing this work to the requirements of the homœopathic practice, the standard surgical authorities have been largely consulted, and all improvements and valuable suggestions have been carefully appropriated. The description and pathological characteristics of disease are culled from the most approved authors. The treatment, however, is homœopathic, and embodies the researches and clinical observations of the most skillful practitioners of our art, as well as the practical teachings of twenty years' experience of the author.

It is regretted, however, in this connection, that a more willing response has not met the request for "communications from the profession touching the treatment of surgical diseases," as much precious and valuable information must necessarily be lost to practitioners of our school of medicine. The hope is still indulged, however, that such "communications" may yet be forwarded, to take their places in proper order in the subsequent parts of the work.

The publication of this treatise is a fixed fact, and the material is nearly completed, for which no apology need be offered, as it is the aim and ambition of the author solely to supply an acknowledged deficiency in this department of medicine.

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For the literary character of the work, however, he begs the indulgence of the profession, as it has been written during the intervals of leisure that occur amid the cares and perplexities of a large and increasing practice. The design of the work is to bring forward facts and practical observations that have stood the inexorable test of experience, in a clear and forcible manner, rather than drape them in the tinsel of mere literary display.

In conclusion, indebtedness is acknowledged to the following standard authorities, which have been largely and continually consulted throughout the progress of the work, viz: Smith's Principles and Practice of Surgery; Erichsen's Science and Art of Surgery; Gross's System of Surgery; Miller's Principles of Surgery; Druitt's System of Surgery; Geddings's Lectures on Surgery; Syme's Surgery; Mott's Velpeau; Hill and Hunt's Practice of Surgery; Helmuth's Practice of Surgery; Hemple's Materia Medica; Hale's New Remedies; Teste's Materia Medica; including the published volumes of the North American Journal of Homœopathy, American Homœopathic Review, the Monthly Homœopathic Review (London), British Journal of Homœopathy, United States Journal of Homœopathy; and the following periodicals: Medical Investigator (Chicago), Monthly Homœopathic Observer (Detroit), Western Homœopathic Observer (St. Louis), and others.

To Dr. W. A. Phillips, a former student, and to Dr. T. G. Comstock of St. Louis, for freedom of access to his large and well-selected library, and for many other courtesies generously bestowed by him on various occasions, is the author indebted for valuable assistance during the progress of the work.

To J. R. Buckingham and George A. Bauer, of St. Louis, lithographers and engravers, who furnished the wood-cuts, indebtedness is also acknowledged for correctness of design and artistic workmanship.

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BONY GROWTHS OR TUMORS.

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GENERAL HISTORY OF SURGERY.

A BRIEF HISTORICAL SKETCH OF SURGERY FROM THE EARLIEST PERIOD TO THE PRESENT TIME.

THE origin of Surgery is coeval with that of Medicine, and dates from the earliest periods of the history of man—the infliction of injuries and the occurrence of accidents rendering it imperative that something should be done to relieve human suffering and remedy deformity. During the Jewish dispensation surgical operations were performed with frequency and safety; and the Jewish law-giver, Moses, makes mention of the operation of circumcision, describing the procedure with minuteness and fidelity—so closely resembling the operation now daily practiced by that sect of Christians.

The embalming of Joseph, spoken of in the sacred writing, also proves that the study of anatomy was practiced in those earlier periods, as without a knowledge of the human structure it would be impossible to open the body for the purposes indicated.

CHIRON, the Centaur, who was supposed to have been born in Thessaly at an early period of the human race, is the first person spoken of in history as the reputed originator of the art of surgery.

Following him, mention is made of ÆSCULAPIUS, the son of Apollo, born 1142 B.C., who is supposed to have been a pupil of Chiron; and next in order follows the two sons of ÆSCULAPIUS, MACHAON and PODALIRUS, who, according to the writings of Homer, served in the Trojan war as surgeons of considerable distinction. It is said of Podalirus that he was the first surgeon to abstract blood as a means of combating inflammation, having opened a vein in either arm of the daughter of the King of Caria, and as a recompense for such successful treatment, it is said, he was given her hand in marriage.

The ASCLEPIADES, or reputed descendants of Æsculapius, are the only surgeons of whom history makes mention for the ensuing

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five hundred years; and succeeding these, PYTHAGORAS, who was born 608 B.C., follows in the natural order of time.

A cotemporary of Pythagoras, DAMOCEDES, is also mentioned as having treated King Darius for a sub-luxation of the ankle; also, his wife, Atossa, for mammary cancer.

Next follows HIPPOCRATES, the so-styled father of medicine and surgery, from whom all future surgeons are traced. Hippocrates, born 400 B.C., was the first surgeon of whom history makes mention as occupying a high rank in the chirurgic art. He performed many new and original operations; employed the actual cautery and moxa in overcoming disease; he first taught the use of issues and tents as means of producing counter-irritation; first operated for calculi in the kidney by incision. He also reduced dislocations, adjusted fractures, employed the obstetrical forceps for preternatural labor; used the trepan in depressed fractures of the skull; taught percussion as a means of investigating diseases within the thorax, and performed the operation for empyema or paracentesis thoracis. He was also the author of many valuable papers on the treatment of surgical diseases.

PRAXAGORAS, of Cos, succeeded him in the practice of surgery, and became an accomplished chirurgeon, being the originator of many surgical processes, some of which are employed at the present time. He pointed out the importance of scarifying the tonsils in inflammation of that organ; excised the uvula; operated for artificial anus, and opened the intestine in obstruction of that viscus. He first, it is said, taught the difference between *arterial* and *venous* circulation, and used the pulse as diagnostic of disease.

HEROPHILUS, who lived about 320 B.C., became an accomplished anatomist and surgeon, and was the first in the profession who practiced dissections as a basis of surgical knowledge.

ERASISTRATUS, who lived as a cotemporary of Herophilus, also pursued the study of dissections, and is said to have invented many valuable surgical instruments. He is reported to have reduced a dislocated humerus for Diodorus Cronus, and by this operation to have demonstrated the existence of *motion*, a fact hitherto denied by surgeons.

XENOPHON, who succeeded him in the order of time, was the first to use the tourniquet in arresting hemorrhage, by encircling the limb with a tightened cord.

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AMMONIUS is said to have been the first surgeon who performed the operation of lithotripsy, and devised an instrument for crushing stone in the bladder. A number of operations of this character were made by him, with considerable success.

CELSUS, who lived at the beginning of the Christian era, was the first to operate for calculi by external incision. He was the author of a treatise on the removal of cataract by depression; also, of the several species of hernia; operated for hare-lip; described the process of adjusting artificial pupil; improved the operation of trepanning, and also of amputation; and first recommended the application of ligature to wounded arteries. He was a cotemporary of Ovid, Virgil, and Horace, and largely imbibed the literature of that period. It may be proper here to remark that lithotomy, previous to this period, was practiced by *specialists*, surgeons being altogether opposed to the performance of this operation.

ARETÆUS, who practiced during the reign of Nero, A.D. 50, was the author of the application of blisters to diseased organs, and also originated the use of cantharides as a vesicant. He violently opposed the operation of tracheotomy upon the ground of the non-healing of the cartilages.

RUFUS, surnamed the Ephesian, who lived A.D. 100, during the reign of Trajan, the Roman emperor, first ligated the brachial artery for aneurismal varix at the elbow; he also described the peculiar characteristics of the diseases of the bladder and kidneys, and gave a distinctive history of these derangements.

GALEN, CLAUDIUS, about the period A.D. 150, attracted the attention of surgeons to dislocations *backward* of the femur, a luxation hitherto unknown, and described its characteristic symptoms as contradistinguished from other varieties of displacement of this bone. He also wrote a treatise on spontaneous luxations of the femur, and trepanned the sternum for empyema.

ANTYLLUS, who flourished A.D. 340, revived the operation of tracheotomy in threatened suffocation from diseases of the throat; taught the principle of opening arteries in diseases of great danger; and, to prevent hemorrhage, recommended the vessel to be entirely divided crosswise—instead of its division obliquely, as formerly practiced. In aneurism, he ligated the artery both on the cardiac and distal extremities, opening the sac lying between, in order that

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it should heal by granulation. He also originated the cure of nydrocele by a free incision.

ÆTIUS, A.D. 470, first proposed scarification in anasarca of the extremities; excised hemorrhoidal tumors; employed lithontriptics to dissolve calculi; wrote treatises on diseases of the testicle, hernia, and advocated castration.

Following him in the succeeding century, ALEXANDER, of Trallis, wrote on fractures and diseases of the eye.

PAULUS ÆGINETA, A.D. 670, used his finger, introduced within the rectum, as a sound to detect the existence of stone; advocated the lateral operation in the removal of calculi. He extirpated the breast for cancer by a crucial incision; operated for strangulated hernia; was the first to perform embryotomy, also to treat fracture of the patella. He advocated the theory that aneurism was caused by rupture of the arterial coats, and first advised copious blood-letting in calculous disorders. It is claimed by some historians that he first performed the operation of tracheotomy, though by others it is denied, the credit being given to the Asclepiadeæ.

CALIPH HAROUN, the Arabian, A.D. 790, had charge of a hospital at Bagdad, and first instructed students in the art of diagnosing and treating diseases at the bedside. His clinics were attended by large numbers of *Christians*, seeking admission into the ranks of the profession; and it is said over six thousand students received instruction in the wards of this hospital.

RHAZES, A.D. 924, first pointed out the diseases spina ventosa and spina bifida, and described the characteristics of each. He also opposed the operation for cancer hitherto indiscriminately employed, and recommended the operation in those cases only where the tumor was entirely detached from the surrounding textures. He also advised the cauterization of poisoned wounds.

AVICENNA, A.D. 1000, first taught the use of the flexible catheter; was the originator of the metacarpal saw, in operations about the hand, and almost identical with the one lately invented by Hey. He observed the distinction between cataract and closure of the pupil, and recommended appropriate treatment in each disease.

ALBUCASIS, who practiced A.D. 1100, is said to have been the first surgeon who observed the effect of clot in the arteries in arresting hemorrhage. He also invented an instrument for the cure of fistula lachrymalis, as well as a needle for the removal of cataract.

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The removal of tumors by ligature; the description of lithotomy as practiced on the female, and the lateral operation in the male; and also the operation for hydrocephalus — are attributed to him. Many other operations — such as closing wounds of the intestines by sutures, excision of the uvula and tonsils, removal of polypi — were practiced by him to a considerable extent.

Subsequent to this, the art of surgery for a century or two, especially in Rome, Egypt, and Assyria, seems to have made but little progress. About this period, Pope Innocent II. described the practice as degrading, and forbade the clergy to pursue it.

In England and France, however, it seems to have found some ardent advocates during the two succeeding centuries; for we find that in Paris, PITARD, who flourished A. D. 1270, established the College of Surgeons, and gave an impetus to the art. In England, too, JOHN OF GADDESDEN and GILBERTUS ANGLICANUS advocated the practice of surgery, and gained great distinction by the performance of many interesting and important operations.

During this period the Cæsarean section was first carefully described and recommended as a procedure to be adopted under certain contingencies.

In the year 1460, GERMAIN COLOT revived, by legal enactment, the operation for stone (which previously had fallen into disuse), being hitherto almost exclusively practiced by non-professionists in medicine.

During the fourteenth century, coeval with the discovery of printing, the progress of surgery became more marked, its influence more widely disseminated, and its position in the social scale more elevated. The origin of syphilis is attributed by some European writers to the expedition of Columbus and the discovery of America, which took place in 1492. It may be proper here to remark that syphilis was known and described by surgeons a long time anterior to this period. Thus, ALBUCASIS, in the eleventh century, makes mention of the disease, and recommends certain remedies for its cure; also, JOHN OF GADDESDEN, A.D. 1300; and VALESCO DE TARANTA, who practiced at Montpellier A.D. 1410, nearly a hundred years before the expedition of Columbus. In face of these declarations, it is obviously unfair to attribute its origin or to connect the first knowledge of the disease to the expedition of Columbus to the hitherto unknown shores of America.

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AMBROSE PARE, in the fifteenth century, occupied a very prominent position in the profession, both by his practice and writings. He inaugurated a new period in surgery; wrote on gunshot wounds; first used the twisted suture in hare-lip; and employed ligatures in preference to the actual cautery so much in vogue among his predecessors. He gave an impetus to the art unsurpassed by any surgeon before his time.

During this century, TALIACOTIUS, an Italian, revived and systematized the different processes of plastic surgery, or "Taliacotian" operations, which previous to this time were performed by non-professionists, or empirics, in a very unsatisfactory and irregular manner.

FABRICIUS, A. D. 1610, the preceptor of the immortal Harvey who discovered the circulation of the blood, invented and employed the trephine, in injuries of the skull; and also introduced to the profession the use of the curved canula, now so extensively used after the operation of tracheotomy.

During this century many brilliant names were added to the profession, among whom were: WISEMAN, of England, who first taught the propriety of *immediate* amputation in military surgery; JAMES YOUNG, also of England, who first proposed the flap operation in amputations of the extremities. FABRICIUS HILDANUS, of Germany, and SCULTETUS, added to the list of surgical armamentaria many new and improved instruments, a number of which are used at the present day.

During the seventeenth century, surgery in the United States made considerable advancement, and numbered among its followers many names of distinction and honor.

M. LEVRETT, a distinguished French accoucheur, in 1743, first made known to the profession the process of examining diseases of the throat by means of instruments which "reflected the luminous rays in the direction of the tumor."

In 1752, the first general hospital in this country was founded at Philadelphia. Its surgical wards were presided over by Drs. PHYSICK, PARRISH, HARTSHORNE, and BARTON, who gave an impetus to the exercise of this art in the United States.

In 1765, the medical department of the University of Pennsylvania was organized at Philadelphia, and was the first incorporated medical school in this country. That of Columbia College, founded

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under the name of King's College, in 1768, was the second medical institution organized in the United States. The names of many brilliant practitioners, during this century, have found an honored position in the annals of surgery, by their advancement of the profession and the development of new and valued processes in the chirurgic art. Among these may be mentioned, as occupying the foremost rank, Drs. SHIPPEN, WARREN, PHYSICK, MOTT, NATHAN SMITH, STEVENS, HARTSHORNE, PARRISH, and BARTON.

DESAULT, of France, first taught surgical anatomy, A.D. 1730. He was distinguished not only as a surgeon, but as an instructor and teacher of the chirurgic art. Many improvements in surgery were advocated by him, among which was the substitution of the *straight* amputating knife, for the curved one then in general use. The cure of artificial anus was first proposed by him, by removing the septum between the extremities of the gut; as was also the ligature of the artery on the distal side of an aneurismal tumor.

Dr. BOZZINI, of Frankfort-on-the-Main, in 1807, published a work on the subject of his invention, entitled "The Light-Conductor; or, Description of a Simple Apparatus for the Illumination of the Internal Cavities and Spaces in the Living Animal Body."

Dr. BENJ. GUY BABINGTON, in 1829, invented the laryngoscope, similar to the one now in use, and may with justice be regarded as the author of endoscopic surgery.

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HISTORY

OF

SURGERY IN THE UNITED STATES.

MANY European surgeons of distinction, both military and civil, have, since the preceding period, shed lustre upon the profession and exalted its practice to the dignity of a science. Among these may be mentioned the COOPERS, the HUNTERS, LARREY, BELL, LISTON, VELPEAU, ANDRAL, SEDILLOT, and FERGUSSON, who have so improved and perfected this art that it forms one of the brightest pages in the history of human progress and human achievement. In the United States, too, as a science and art, it has been exalted and dignified by the genius and skill of American surgeons until it has reached, if not perfection as a science, at least a position coequal with that of the natural sciences. During the present century its progress has been more marked, its position more elevated, its practice more honored, than at any previous time during the world's history; and this, in a great degree, is due to the tireless energy, the boundless ambition, and the consummate skill of its American representatives.

WATERHOUSE, in 1800, was the first physician who vaccinated in the United States, being only one year after its discovery by Jenner.

Dr. PHYSICK, of Philadelphia, in 1802, was the first in the United States who proposed the cure of false joint, by introducing a seton between the fractured extremities of bones. The succeeding year he ligated the brachial artery for aneurism in the bend of the arm.

Dr. MASON F. COGSWELL, of Hartford, Conn., the same year ligated the carotid, for removal of a tumor in the neck.

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Dr. JOHN C. WARREN, of Boston, in 1803, ligated the femoral artery for aneurism of the leg.

Dr. MCCLELLAN, of Pennsylvania, in 1805, extirpated the parotid gland.

Dr. WALTER BRASHEARS, of Kentucky, in 1806, made the first successful amputation at the hip-joint in the United States.

Dr. SAMUEL WHITE, of New York, in 1808, successfully removed the parotid gland. He also, in the same year, successfully extracted a tea-spoon lodged in the intestines, by cutting into the abdomen and opening the bowel.

Dr. MCDOWELL, of Kentucky, in 1809, removed successfully *three* ovarian tumors through the abdominal parietes—the first operation of the kind ever performed. Since then, Dr. McD. has operated on *ten* other cases.

Dr. DORSEY, of Philadelphia, in 1810, first ligated, in the United States, the external iliac.

Dr. DEADERICK, of Tennessee, the same year, resected the entire half of the lower jaw—the first operation of the kind ever performed up to this time.

Dr. WILLIAM GIBSON, of Baltimore, in 1812, ligated the primitive iliac in a patient with a wound in his groin. The same year, Dr. MCDOWELL, of Kentucky, lithotomized successfully James K. Polk, subsequently elected President of the United States.

Dr. WRIGHT POST, of New York, in 1813, successfully tied the common carotid artery.

Dr. CHARLES MCCREARY, of Kentucky, in 1813, first in the United States, successfully exsected the entire clavicle, the patient living thirty-five years after the operation, and having good use of the limb.

Dr. BOWEN, of Providence, in 1814, amputated at the shoulder-joint.

Dr. VALENTINE MOTT, of New York, in 1815, first performed the herculean operation of ligating successfully the arteria innominata, the patient living twenty-six days thereafter.

Dr. HUBBARD, of Connecticut, in 1815, ligated successfully the axillary artery.

Dr. WRIGHT POST, of New York, in 1817, tied the subclavian artery, *without* the scaleni muscles, being the first successful operation of this vessel ever performed in the United States.

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Dr. GLOVER, of Charleston, in 1818, first, in this country, tapped the head in a case of hydrocephalus.

Dr. JOHN C. WARREN, of Boston, in 1820, first in America, performed the operation successfully for staphyloraphy.

Dr. MOTT, in 1821, removed half of the lower jaw, being the second operation of the kind performed in the United States, but the *first* one published.

Dr. GEORGE MCCLELLAN, of Philadelphia, in 1823, resected the anterior portion of the lower jaw from its angles, for an osteo-sarcoma of the bone.

Dr. A. H. STEVENS, of New York, during the same year, resected successfully nearly the entire upper jaw.

Dr. DAVID L. ROGERS, of New York, in 1824, also extirpated almost the entire upper jaw.

Dr. GEORGE MCCLELLAN, of Philadelphia, in 1825, ligated the carotid artery *three* times successfully. In the same year he removed the parotid gland.

Dr. BUTT, of Virginia, in 1825, resected successfully the *entire* radius.

Dr. RHEA BARTON, of Philadelphia, in 1826, resected the head of the femur for anchylosis, and established a false joint, which the patient used advantageously.

Dr. MOTT, in 1828, extirpated the entire clavicle successfully. The same year, he tied the primitive iliac artery, the patient doing well.

Dr. JOHN C. WARREN, of Boston, in 1828, resected half of the lower jaw.

Dr. MOTT, the same year, for the *second* time, removed the entire clavicle successfully.

Dr. J. KEARNEY ROGERS, of New York, in 1829, resected a portion of the femur, thereby remedying the deformity attendant upon an anchylosed hip.

Dr. MOTT, in 1829, operated successfully upon an anchylosed jaw, by dilating and incising the soft tissues.

Dr. GILLESPIE, of Virginia, in the same year, removed successfully the astragalus in compound dislocation of the ankle-joint.

Dr. DEPEYRE, of New York, in 1831, first in the United States, performed the operation of lithotripsy.

Dr. MOTT, in 1833, tied the right subclavian artery within the

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scaleni muscles. The same year, Dr. HALL, of Baltimore, ligated the arteria innominata, unsuccessfully.

Dr. THOMAS HARRIS, in 1834, resected the elbow-joint.

Dr. BARTON, in 1835, resected the femur for anchylosis of the knee-joint, and successfully straightened the extremity, so that the patient could use the limb.

Dr. J. MASON WARREN, of Boston, in 1837, first performed successfully, in the United States, the "Taliacotian" operation for restoration of the nose.

Dr. MUSSEY, of Cincinnati, in the same year, resected the entire scapula and clavicle.

Dr. GEORGE MCCLELLAN, in 1838, removed the entire upper extremity, including the scapula and clavicle.

Dr. GURDON BUCK, Jr., of New York, in 1841, resected the elbow-joint for disease of that articulation.

Dr. JOHN WATSON, of New York, in 1844, performed the operation of œsophagotomy, successfully.

Dr. BUCK, of New York, in 1845, excised a wedge-shape portion of the knee-joint in anchylosis; embracing the patella, condyles, and articulation of the tibia.

Dr. J. KEARNEY RODGERS, of New York, in 1845, tied the subclavian of the left side within the scaleni muscles.

In 1846, the inhalation of ether as an anæsthetic agent was discovered by Dr. MORTON, of Boston, and first brought into use by Dr. J. C. Warren, of that city.

Dr. SWEAT, of Maine, in 1847, made a successful amputation at the hip-joint.

Dr. WILLIAM E. HORNER, of Philadelphia, in 1850, resected the entire half of the upper jaw without employing any external incisions in the cheek.

Dr. PAUL F. EVE, of Georgia, in the same year, extirpated successfully the entire uterus.

Dr. GILBERT, of Philadelphia, in 1851, suggested a new and valuable mode of counter-extension in fractures of the femur, by the application of strips of adhesive plaster to the limb.

Dr. CARNOCHAN, of New York, in 1851, removed successfully the entire lower jaw, disarticulating it at the condyles.

Dr. PEASLEE, of New York, in the same year, removed both ovaries successfully, by the large peritoneal section.

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Dr. J. MARION SIMS, of Alabama, in 1852, invented a new process—the "clamp suture"—for the cure of vesico-vaginal fistula.

Dr. STEVEN, of Ontario, New York, in 1854, successfully disarticulated the head of the femur, and excised it at the line of the surgical neck.

Dr. OWEN, of Charleston, S. C., in 1856, performed the operation of Cæsarean section, having done it twice before in the same patient.

Dr. E. S. COOPER, of San Francisco, in 1859, tied the arteria innominata for aneurism of the right carotid and subclavian arteries.

Dr. E. S. FENNER, P.A.C.S., U. S. Vols., in 1862, amputated successfully at the hip-joint, the operation having been performed twenty-four hours after the injury.

Dr. R. B. BONTECOU, Surgeon U. S. Vols., in 1862, successfully excised the entire knee-joint two days after the injury was received. An H-shaped incision was employed.

Dr. E. C. FRANKLIN, of St. Louis, Surgeon U. S. Vols., in 1862, exsected the sternal two-thirds of the clavicle, for gunshot wound, the patient dying of hospital erysipelas sixteen days afterward.

Dr. EDWARD SHIPPEN, Surgeon U. S. Vols., in 1863, also amputated successfully at the hip-joint. The operation was performed seven hours after the injury was inflicted.

Dr. JOSHUA THORNE, Act. Asst. Surgeon U. S. A., in 1863, successfully excised the outer condyle of the femur, with part of the shaft. In this case the report says no anæsthetic was used, and the operation was performed nearly five months after injury.

Dr. JAMES H. ARMSBY, of Albany, in 1863, tied the subclavian artery successfully above the clavicle, the patient making a good recovery.

Dr. JOHN HEMANS, Jr., Asst. Surgeon U. S. A., in 1863, resected three inches of the upper third of the femur for necrosis of the bone, following a gunshot wound, with the most beneficial results.

Dr. WILLARD PARKER, of New York, in 1863, ligated the subclavian inside the scalenus muscle, together with common carotid and vertebral arteries, for aneurism. Death occurred from secondary hemorrhage on the forty-second day after operation.

Dr. ALEXANDER B. MOTT, Surgeon U. S. Vols., in 1864, per-

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formed a successful secondary disarticulation at the hip-joint, in consequence of necrosis of that bone. The same year Asst. Surgeon C. WAGNER, U. S. A., performed a successful secondary operation at the hip-joint.

Dr. A. W. SMITH, of New Orleans, in 1864, ligated successfully the arteria innominata; also, the right carotid for aneurism, which is one of the greatest surgical achievements of the age. Of this operation, Mott, the great American surgeon, said: "I have expressed myself to my class for many years past that I would like to live long enough to see the innominata successfully tied for aneurism. For this surgical achievement I am more than gratified—*I am delighted.* On the brow of Dr. A. W. SMITH, of New Orleans, will always rest the laurel of the first successful operation of ligature of this great artery. Time can never rob him of this surgical achievement."

Dr. J. H. PACKARD, Act. Asst. Surgeon U. S. A., in 1865, reamputated at the hip-joint successfully, seventeen months after the first operation. The disease for which the disarticulation was performed was necrosis of the femur.

The introduction of the endoscope for the examination of the urethra, and treatment of diseases of this canal and the surrounding organs, is also another late introduction into the surgical armamentarium.

Among the surgical performances of the past two years are the following:

Dr. H. A. POTTER, of Geneva, New York, in 1865, successfully removed a large molar tooth from the under surface of the tongue, the offending material having remained unknown for some time, giving rise to severe and protracted hemorrhage.

Dr. HORATIO ROBINSON STORER, in 1865, successfully removed the uterus and both ovaries by abdominal section, the tumor weighing altogether thirty-seven pounds.

Dr. GURDON BUCK, of New York, in 1865, made a very ingenious and successful operation for a hideous deformity occasioned by a complicated double hare-lip and cleft palate.

Dr. NATHAN BOZEMAN, in 1865, reports a very interesting and instructive case of ovariotomy, in which the intra-peritoneal treatment of the pedicle with the silver ligature, was adopted with most brilliant success.

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Dr. W. T. HELMUTH, of St. Louis, in 1865, successfully removed the entire half of the inferior maxillary bone. In the same year, he resected the tibia and fibula in the case of a boy whose foot was bent nearly at right angles with his body, resulting from fracture of these bones. In the following year, he removed successfully a calculus from the bladder of a boy seven years of age, who was afflicted with the complaint from infancy.

In the past two years, 1865 and 1866, the attention of the profession has been directed from various sources to anæsthesia, and the agents which produce the best vapors for these purposes. Local anæsthesia especially, by a variety of spray-producing instruments, has been such a signal success, and its application has so far exceeded the promise of what it was expected to accomplish, that it is impossible to predict what future results may be anticipated. These topics will, however, be alluded to in the chapter on Local Anæsthesia.

Dr. JOSEPH CREAMER, in 1866, also removed successfully both ovaries, the patient making good her recovery.

Dr. C. A. POPE, of St. Louis, in 1866, removed the uterus and both ovaries, the patient dying soon after from the shock of the operation.

Dr. D. O. FARRAND, in 1866, ligated the subclavian artery, the patient succumbing a few days after the operation.

I regret that many surgical operations of interest to the profession are necessarily excluded from their places in this historical sketch of surgical achievements; but, amid the great number of operative proceedings, those only which occupy a prominent position *on record* have been appropriated by the author as the distinctive landmarks of medical progress since the earliest periods of the world's history. To my Homœopathic confreres who have been solicited for operations of interest and practical details of value to the profession, and who have not responded to such call, the omission must be credited.

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PART I.

GENERAL SURGICAL PATHOLOGY AND THERAPEUTICS.

In order to arrive at a proper understanding of the work before us, and for the advantages of systematic study, I shall furnish, under the title of Surgical Pathology and Therapeutics, those general considerations that pertain to the investigation of the character and results of surgical disorders, and also the remedies that enter into their treatment. The results or pathological lesions that are intimately associated with such disorders, will be considered under the head of *Surgical Pathology*, while the characteristics of disease, as well as the adaptability of means for its cure, will be treated under the head of *Surgical Therapeutics*.

CHAPTER I.

MODIFICATIONS OF HEALTHY NUTRITION.

Surgical Pathology, a branch of **General Pathology**, teaches the investigation of those derangements or abnormal conditions that pertain more exclusively to the practice of the surgeon than the physician. All diseases considered as deviations from a healthy standard "may be studied either as exhibited in the disordered action noted in special tissues, or in that seen under very much the same general characteristics wherever developed; hence, they are divided for systematic reference into *special* and *general disorders*." The proper understanding of the great principles

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that enter into the consideration of general derangements will facilitate the student in the appreciation of those modifications and differential changes that are met with in diseased action in special localities.

There is no part of this treatise more valuable to him who would become a proficient in the art, than a thorough knowledge of the cardinal principles of Surgery, as comprised under the head of inflammation, wounds, new growths, morbid deposits, and poisons. After a thorough acquaintance with these great landmarks in the domain of surgical knowledge, it is easy for the student to master the issues of minor yet weighty importance that proceed from or are identified with them. If principles are well and rightly instilled in his mind, he will readily form a proper appreciation of what is merely operative.

Health being considered as a normal condition of each component part of the organism, which is "maintained and developed by a series of acts designated as **Nutrition,**" a brief reference to the views of physiologists on this process will tend to the elucidation of points in *disease*, or that condition resulting in, or from, a modified nutritive action."

SECTION I.

OUTLINES OF THE NORMAL NUTRITIVE PROCESS.

Nutrition is defined by physiologists "as that modification of the formative process peculiar to living bodies, by which the tissues and organs already formed maintain their integrity." All tissues and organs in the body are shown by microscopic investigation to consist of a series of minute elementary atoms called *cells*, the vital functions of which, or, as it is termed, *cell action*, afford nutrition to every part of the organism.

To accomplish, therefore, the process of nutrition, *three* phenomena are required: *first*, a normal cell action; *second*, a proper condition and supply of blood; *third*, a proper nervous or life force to regulate all. Any deviation from this state is productive of diminished or excessive reaction.

The demand for nutrition arises primarily from the tendency of the organism to simple *increase* or *growth*. The multiplication

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of the first embryonic cell is illustrative of this process, by what is termed "duplicative subdivision," by which a multitude of cells are formed, each one being in all essential particulars similar to the original. It is by this process that the embryo becomes the child, the child the adult, with comparatively little change save that of growth. These changes are divided by physiologists into *four* well-marked ages or periods:

1st. **Development.** 2d. **Growth.** 3d. **Adult Life.** 4th. **Old Age.**

Development begins primarily in *intra-uterine* existence, and is the increase or passage of the germ to a higher condition of form and structure. In this change which takes place, the part becomes fitted for some special function, and is advanced towards the state in which it exists in the highest or most complete form of its specific type.

Growth consists in the achievement of *size*, and is most marked between the period of birth and puberty. The difference between the processes of development and growth, is most marked in those cases in which there is a partial or complete arrest of one, without a corresponding impairment of the other. Thus, a dwarf, however small in stature, may present a perfect development of every part that is characteristic of the complete human organism, the deficiency being solely in the capacity for *growth*. On the other hand, the ordinary size at birth may be attained, every organ presenting its usual dimensions, and yet some important part may be found in a state of *arrested development*. This is apparent in those abnormal conditions of the heart and brain that are sometimes witnessed in extra-uterine life. An *excess* of growth, taking place conformably to the normal place of the tissue or organ, constitutes *hypertrophy*; a *diminution* of growth, without degeneration or alteration of structure, is known as *atrophy*.

Adult Life is essentially the period in which nutrition plays the most important part. During the time of active life, a demand for nutrition is created by every exertion of the vital powers, but more especially by the evolution of the nervous and muscular forces. The production and application of these two forces may truly be considered the great end and aim of the human organism, so far as the individual is concerned. At this period the forces of the organism are diligent in preserving the development already attained, and repairing the waste continually going on. This is

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effected through the process of assimilation, manifested from the beginning of existence up to the period of death of the organism.

Old Age is the period characterized by impairment of nutrition, with a progressive tendency to wasting and decay. Evolution takes the place of involution. In advanced age, from insufficient nervo-muscular energy, nutrition is performed less rapidly, and waste is the result. Thus, then, with the advance of old age, the organism becomes progressively more and more unfit for the active performance of its vital operations; a gradual weakening is observable in the mental as well as in the corporeal energy. Degenerations of the tissues and organs of the body proceed as age advances; and the entire system, unable to perform its accustomed functions, gradually sinks into death — the end of life.

The performance of the function of nutrition is dependent not merely upon a due supply of pure and well-elaborated blood, but also upon the normal condition of the part to be nourished, and especially upon its possession of a right measure of "formative capacity," in virtue of which the newly-produced tissues are generated in the likeness as well as in the place of those which have become effete. The exactness of this replacement is most remarkably shown in the retention of the characteristic form and structure of each separate organ or part of the body, and thus of the entire organism through a long series of years; no changes being apparent (so long as the state of health is preserved) but such as are conformable to the general type of that alteration which the organism undergoes with the advance of life. This is observed not only in the conservation of those peculiarities that make the species, but is also seen in the continuous renewal of those minor characteristics which serve to distinguish man from his fellows. Not only is this formative power exercised in maintaining the original type, but also in keeping up certain acquired peculiarities, as, for instance, the cicatrix left after the healing of a wound. In the preservation of life, whether of a tissue or the whole organism, nutrition consists in the performance of two distinct offices—in one, material is furnished for the formation of new cells, whose destiny is to replace those whose existence has terminated; in the other, the waste constantly going on is supplied in those textures in which the organic forms are permanent. This process is carried on by the function of *assimilation*

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and *digestion*, the new material being furnished to the blood, and by it supplied to every tissue and organ. Thus, nutrition consists in a process essentially formative on one hand and destructive on the other. When these processes are evenly balanced, health is maintained and the normal condition of the organism preserved. During the period of *growth* the formative process is in excess, and development is produced. In old age the reverse takes place, and progressive decay ensues. When the disproportion between the formative and destructive process results in abnormal growth, *hypertrophy* is said to occur. When a similar excess of the destructive over the formative processes takes place, *atrophy* ensues. These two processes will be further considered in a subsequent part of the work, under their respective heads, to which the reader is referred.

CHAPTER II.*

SURGICAL SEMEIOLOGY.

The correct investigation of the elements of a disorder being essential to a recognition of its presence, the first subject to which attention should be directed is Surgical Semeiology, or that portion of pathology which teaches the signs or symptoms of surgical disorders.

Of these signs some are equally applicable to many complaints, and may be studied together, being rather generic in their character; while others, which are more specific, can be best alluded to under the particular head to which they belong. Presupposing that the practitioner is fully acquainted with the anatomy and physiology of the human organism, I shall consider, *first*, those signs and manifestations of surgical disorders as are exhibited for the most part on the exterior portion of the body; *second*, those symptoms that more strictly belong to derangement of the internal organs.

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*Smith's Principles and Practice of Surgery.

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SECTION I.

SIGNS MANIFESTED ON THE EXTERIOR OF THE BODY.

Health being considered as the result of the perfect operation of all the normal organs of the body, any deviation from this condition constitutes disease. This abnormal state of the parts will be known by the changes that are developed in the individual, and which are cognizable to the senses of the surgeon. The province of the surgeon, therefore, is to make himself familiar with the general condition of the external condition of the body, as is manifested in the *carriage*, *posture*, *shape*, *color*, *temperature*, and *sensibility* of the individual, that he may be the better enabled to discriminate between a healthy and diseased condition.

§ 1.—Of the Carriage or Posture of a Patient.

The carriage of man in the full enjoyment of his physical and mental powers is erect, lithe, and graceful; but when these powers are invaded by disease or accidental injury, they become prostrate, and the individual seeks repose in the recumbent, supine, or sitting posture.

The character of the injury will often become manifest by the position occupied by the sufferer.

The *supine position*, in which all the limbs are relaxed, generally indicates, if the result of external violence, great muscular debility or serious depression of the nervous system—all parts of the body being dependent on this great center for life force. The doubling of the body *forward*, or that position in which the limbs are drawn up toward the chest, usually shows abdominal trouble; while its rigidity backward, or extreme extension, the head and heels approximating each other, shows a derangement in the contents of the spinal canal.

The *sitting posture* may be either the result of partial external injury, by which the individual is prevented from assuming the erect position, or it may follow an effort to leave the recumbent attitude, the strength not being sufficient to stand upright.

The *relaxed condition of the extremities*, or their *fixedness in unnatural positions*, is often diagnostic of injuries by which

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muscular action is more or less impaired. The power of moving a limb or any portion of the body, freely and at will, denotes health; but a trembling, unsteady, quivering motion, imperfect elevation, or unnatural flexion or extension, denotes an impairment of the muscular powers, or nerve force. In health the mechanical movements of the body and limbs are easy and graceful, while in the injured or diseased condition it is quite the reverse. In the examination of a patient, therefore, the surgeon should compel him to go through a regular set of motions, that he may be enabled to diagnose with accuracy the portion of the body disordered. In conducting an examination of this character, the body should be divested of all extraneous covering, and the manipulation be made with special reference to the part diseased or injured. In the examination of recruits for the army, the surgeon directs the individual to be entirely divested of clothing, and stand erect before him. Inspection is then made of his general carriage, the position of the head upon his shoulders, the fullness of his chest and abdomen, the position of his legs and feet, as well as the general characteristics of his whole external organism. After this, a more minute inspection will be made of separate organs and particular parts. The various movements of the arms upon the body, as well as flexion of the spine backward and sideward, the extension and flexion of the hands and feet, and finally of the fingers and toes, are necessary often to detect disease or injuries from accident.

§ 2.—Of Physiognomy.

The inspection of the countenance or physiognomy, so often relied upon in determining the moral attributes of an individual, is also depended upon, more or less, in forming an estimate of physical disorder. Thus, a lively countenance betokens not only physical but mental quietude and comfort; while a distorted or distressed expression evinces a condition the reverse of health. The sharp nose, hollow, sunken eyes, knitted brows, tenseness of skin, with the leaden or livid hue of the face, denotes great prostration of the nervous forces, and is indicative of extreme suffocation or the approach of death. A pinched character of the features is often the accompaniment of peritonitis. Spasms of the lips and cheeks, termed "risus sardonicus," frequently precede or accompany tetanus.

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Frowning is often indicative of pain in the head or eyes; *distension of the nostrils*, of pain in the chest or impeded respiration; contractions of the angles of the mouth, with compression of the lips, are often the result of vesical or rectal irritation; and involuntary spasms of the mouth or tongue, denote injury of the nerves supplying these parts.

§ 3.—The Shape and Size of a Part.

In cases of injury, especially of the extremities, the *shape* and *volume* of the part are points worthy the consideration of the surgeon. These signs demand a comparison of the different sides of the body—it being primarily understood that the right side is more perfectly developed than the left, in consequence of the greater amount of exercise it undergoes. The *enlargement* of any region may develop the formation of unnatural growths in the deep-seated tissues; or the formation of air, as in emphysema of gangrene, or of wounds about the chest; or the existence of matter, or of unnatural secretions, as seen in elephantiasis, in tumors, suppurations, synovial degenerations, etc. The *diminished size* of a region often indicates atrophy, loss of muscular power, or an unnatural relation of parts, as are sometimes witnessed in injuries of muscles, luxations of joints, depressed fracture of the ribs and skull.

Variation in length indicates changes in the natural relations of the continuity or articulating surfaces of bones, and is of importance in determining fractures or dislocations, especially of the extremities. In determining this change in the length of a limb, two fixed points should be taken, and the measurement made between these In the upper extremities, these points or landmarks are, the acromion process of the scapula and the condyle of the humerus; in the lower extremities, the anterior superior spinous process of the ilium above, and the internal malleolus of the tibia below. Care should be taken that in the measurement of the lower extremities the pelvis should be placed in a direct line with the spine, neither swayed to one side nor the other. An obliquity of the pelvis to either side will increase the length of that side to which it leans.

The *shape* of parts is frequently of importance in determining the existence of disease. The pyriform shape of hydrocele — the oval, globular or ovoidal appearance of hernial protrusions — the

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change produced in joints by effusion or suppuration—the knotted, lobulated shape of cancroid degenerations—the swelling of the abdomen in ascites—the puffiness and œdema of the lids in ophthalmia, etc., etc., are valuable aids to the surgeon in diagnosing the existence of these affections.

§ 4.—Of Color.

The *color* of the skin on the different parts of the body is indicative of disease. The results of accident, such as bruises, contusions, etc., are known by a lividity of the integument; superficial burns by redness, and the chocolate tint that accompanies circumscribed or diffused sphacelus. The color of the face is often diagnostic of disorder of the system. Thus, a purple or livid tint of the cheeks denotes derangement in the organs of respiration; a leaden or sallow hue is indicative of carcinomatous disease; pallor of countenance, of excessive loss of blood; and a yellow, jaundiced appearance sometimes accompanies gunshot wounds of large joints. Pallor, also, attends concussion of the brain and depressed fracture of the skull. In forming a diagnosis of sphacelus from color alone, judgment should be exercised to distinguish it from the effusion of blood beneath the skin from a bruise, or the discoloration of the integument from purpura hemorrhagica. The color of the skin is also of service in diagnosing tumors, as the nævus maternus, aneurisms by anastomoses, and aneurismal tumors. Wherever an obstruction exists in the circulation of a part through the capillary vessels, changes in the color of the skin lying over them are almost sure to take place.

§ 5.—Of Temperature.

The *temperature* of the whole body, or of a part, is often of value to the surgeon, not so much as a symptom of disease as indicating a change in the local or general circulation. Thus, the burning heat of inflammation is often experienced by patients and felt by surgeons as apparently many degrees above the natural warmth of the body; when in reality, according to the observations of physiologists, it is little, if any, exalted above that of the blood.

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Cold, or the absence of heat, is of more value to the surgeon as symptomatic of disordered circulation or prostration of the vital forces, indicating the presence of danger from diminished vitality. It is of great importance, after ligation of the larger vessels, to preserve by artificial means the temperature of a part; and also after severe operations or injuries, in order to prevent more serious consequences.

§ 6.—Of the Excretions and Secretions.

In arriving at a correct diagnosis in certain diseases, it is important that the surgeon should inspect the secretions and excretions of the body, as valuable aids in determining the character of the disorder.

Thus, the *urine*, whether clear, turbid, or high-colored, or mixed with blood or pus, with or without sediment, according to its characteristics, points to disease of the kidney or bladder. The *feces*, too, will oftentimes guide us to a more perfect understanding of a disorder by attention to its peculiarities. Blood mixed with fecal matter may be the result of hemorrhoids, and the same intermingled with pus may denote ulceration; and a contracted, narrow-shaped piece of feces, as if compressed on its sides by an obstacle in passing, may prove the existence of an enlarged prostate, the development of schirrus, or the presence of rectal stricture. The *sputa* and *matter vomited*, according to their color frequently become important guides in determining disorders of the stomach, throat, or lungs. If a wound of the chest is followed by a free expectoration of frothy and bloody mucus, the lung will probably be found to have been injured; while the spitting of blood or of pus, and the vomiting of the contents of the stomach, indicate the state of those organs in many surgical disorders.

A continuance of the normal secretions of the body is indicative of the integrity of organs, in the event of injuries occurring in their immediate vicinity. Thus, a pure mucous expectoration, or the regurgitation of food or drink after injury of the chest or abdomen, or the natural discharge of bile, or of urine after injury of the liver or bladder, is of itself sufficient to establish the fact that these organs have not participated in the injury.

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The character of the discharge from wounds, ulcers, fistulæ, etc., is of importance as denoting the pathological condition of the tissues involved. Healthy pus, and the clean, moist edges of an ulcer, show a healthy condition of the part; while dark, sanious, grumous, or offensive matter, with angry-looking edges, denotes the existence of less favorable circumstances.

The characteristics of *pus*, and the differential diagnosis of its various attributes, will be discussed under the chapter on the Consequences of Inflammation, to which the reader is referred.

SECTION II.

EXAMINATION OF THE INTERNAL ORGANS.

After investigating the general features of *external* signs of surgical affections, as important in determining the nature of those disorders that fall under the care of the surgeon, it is equally necessary to investigate the state of the *internal* organs, in order to attain the formation of a correct diagnosis.

The four principal portions of the human economy to which I shall call your attention are, *Circulation*, *Respiration*, *Digestion*, and *Nervous Power*.

§ 1.—The Circulation

The information furnished by a careful inquiry into the state of the circulation in its reference to disease is too well known to require discussion. In hemorrhages, the signs from the state of the general and local circulation are all important. The sudden sinking of the pulse, feeble action of the heart, loss of color in the capillaries, are indicative of loss of the vital fluid. Hemorrhage from the ears, if in a young person, is indicative either of rupture of the membrana tympani, or fracture of the base of the skull, involving the petrous portion of the temporal bone. Hemorrhage from the rectum, in case of severe injury affecting the abdomen, is diagnostic of rupture of some of the vessels within that cavity.

In tumors associated with aneurismal enlargement, the activity of the local circulation is strongly indicative of the disease. A fibrous, fatty or other tumor, when bound down by fascia upon the

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course of a large vessel, may prove a source of error, unless close attention is paid to the collateral circumstances. When it is desirable to ascertain whether a pulsating tumor is aneurismal or not, it should be raised from the subjacent parts, and then observed whether the pulsation continues. This practice is especially referable to enlarged glands or tumors in the axilla, groin, or neck. The absence of the peculiar aneurismal thrill, the solidity of the tumor, its gradual development, the enlargement of neighboring glands, the constitution of the patient, the exciting cause, etc., will become important aids in establishing a correct diagnosis. The state of the circulation, as exhibited in the capillary vessels, is of value in determining the character of tumors, such as the fungi and the erectile. Thus, rupture of the skin, followed by repeated hemorrhages, will enable us to distinguish between fungous hæmatodes and cancer; frequent bleedings from mucous cavities, accompanied with swellings or tumors, would lead to the suspicion of polypi or of ulceration. A suddenly-formed tumor in the region of a joint, producing faintness, with discoloration of the skin, and developed after severe muscular exertion, may be diagnostic of either rupture of an artery or subluxation of a joint.

The feeble pulsation of the arteries in the extremities is often associated with either the existence of obstruction in the vessel, or of its ossification. If to this condition be added a change of temperature and color in the part, in an aged subject, it points to the existence of senile gangrene. In examining for the pulsation of an artery at its usual seat, we should always bear in mind the natural malformations that sometimes occur in its course, and not be misled by its non-appearance at its accustomed point, in forming a diagnosis in cases involving disease of those vessels.

§ 2.—Of the Respiration.

The rapid or embarrassed state of the respiration is often an important aid to the surgeon in forming a correct diagnosis. Thus, slow, snoring, or stertorous breathing may denote mischief done to the brain. A change in the tone of the voice, or the characteristic cough, may lead us to suspect the existence of disease in the larynx or trachea, as well as foreign bodies impacted in the trachea or œsophagus. A hacking cough, with efforts to clear the throat,

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accompanied with titillation in the part, is evidence of disease in that part. In examining the respiratory organs, auscultation and percussion should be practiced by the surgeon, in order to determine with accuracy the character of the disease invading those organs.

§ 3.—Of Digestion.

The changes produced by surgical diseases as affecting the organs of digestion, arising from whatever source, demand careful investigation in forming a correct opinion of the existence of such disorders. I shall consider this subject under the heads of *Mastication*, *Deglutition*, *Hunger and Thirst*, *Vomiting*, *Hiccough*, *and Defecation*.

Mastication.—This function, when improperly performed, will lead us to suspect either a diseased condition of the teeth or of the muscles moving the jaws. Disease of the teeth may be known by pain while in the act of mastication or in approximating the lower to the upper jaw. A crackling noise in the neighborhood of the ear during the act of chewing indicates disorder in the maxillary articulation; the escape of saliva, enlargement of sublingual or other glands of the mouth; swelling of the tongue may be attributed to cancerous affection, ranula, or other diseases affecting that organ.

Deglutition.—Deglutition is an act that, independent of disease, is performed without difficulty or embarrassment; but let the tonsils be inflamed and swollen, the uvula elongated and enlarged, or the pharyngeal or œsophageal orifice be at all inflamed or constricted, and it now becomes difficult, painful, and sometimes impossible. In hare-lip, or fissure of the hard or soft palate, food introduced into the mouth is oftentimes swallowed with difficulty, having a tendency to pass in greater or less quantities through the cavity of the nostril. In œsophageal stricture, or the formation of tumors or abscesses at or near that orifice, swallowing is often difficult, and spasms occasionally take place, most serious in their import, from the accidental course of a particle of food into the larynx.

Hunger and Thirst.—Hunger and thirst, in the healthy state, are removed by the introduction of food and drink into the stomach; but if injury or disease oppose the introduction of these articles

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in the system, then insatiate hunger and thirst are the result. A recurrence of either of these, within a short time after a proper amount has been taken, may lead to a suspicion that the food has escaped at some point before entering fully into the system; hence, wounds of the throat, stomach, artificial anus, are almost always followed by constant hunger.

Vomiting.—As a symptom of surgical diseases, vomiting is often of value in determining the character and extent of injuries. Blows on the head, falls, etc.—especially in children—are apt to be followed by vomiting, showing disorder of the cerebral functions. If to the vomiting there be added a tendency to sleep, stertorous breathing, etc., concussion of the brain is likely to have occurred, which demands of the surgeon his most careful attention. After partaking of a hearty meal blows upon the head are prone to produce vomiting, with removal only of the contents of the stomach, no serious consequences ensuing.

The character of the matters vomited is also diagnostic of the disorder or injury inflicted. Vomiting of blood may follow an attack of epistaxis—the blood having been swallowed, coagulates in the stomach and is ejected therefrom; but when it arises from an injury or wound inflicted upon the stomach or throat, producing laceration or division of the vessels supplying these organs, it becomes a matter of more serious import. The vomiting that takes place during an attack of strangulated hernia is of a stercoraceous character, and is prognostic of the most fearful consequences. In intussusception, stricture of the bowels, etc., vomiting is an important symptom. The matters ejected are also stercoraceous—more or less mixed with the contents of the stomach.

Hiccough.—Hiccough may be the result either of a wound of the diaphragm, irritation of the phrenic nerve by its compression from a tumor or other abnormal growth; or it may be the consequence of extreme nervous or vascular prostration, or of long-continued vomiting. The noise arising from the act of hiccoughing is produced by the sudden and involuntary contraction of the diaphragm and the simultaneous closure of the glottis, which arrests the passage of air in the trachea. It is sometimes a *symptom* of gangrene, and occurs as such in many morbid conditions; but it is frequently met with in persons otherwise in good health.

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Defecation.—The character of the defecations in many instances is indicative of the actual condition of the intestines. Hardened lumps, or "scybalæ," indicate constipation; while the mixture of pus or blood may lead to the suspicion of an abscess opening into the bowels; to the existence of fistulæ, hemorrhoids, or to the development of cancer. In the natural condition of the rectum, and in a healthy state of the excretion, the feces are usually round, of moderate size, and of the consistence of potters' clay while being worked. In stricture of the rectum, in an enlarged prostate gland, or in old and thickened hemorrhoidal tumors, the stool will be found flattened and smaller than in the natural state. In choleric discharges, microscopical and chemical investigations have shown that the evacuations are indicative of certain changes having taken place in the intestines; the rice-like dejections consisting of patches of epithelium removed from the mucous surface of the intestines.

§ 4.—Of Nervous Function.

The evidences furnished to the surgeon by the nervous system in cases of injury are of great value in determining the character of disorders. The existence or absence of pain, the loss or exaltation of muscular power, are more or less indicative of injury to the nervous system.

In some patients there exists an abnormal sensibility to the action of disease or injury, accompanied with nausea, faintness, and great excitability of the nervous powers generally; while in others this sensibility is so diminished or blunted that the most violent diseases or injuries manifest little or no excitement or derangement of this function. It is on this account that the surgeon should be extremely guarded in forming a prognosis as to the result in such cases—remembering always that in some persons a trifling accident develops great prostration; while in others, the most severe lesions are accompanied with a trifling derangement of the nervous power.

As a general rule, however, loss of sensibility, muscular power, or the extreme development of either, should be regarded as indicative of cerebral or spinal disorder.

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SECTION III.

USE OF THE SENSES IN FORMING A DIAGNOSIS.

The impressions produced on the mind of the surgeon, in employing the use of the senses in forming a diagnosis of disease, are apparent to all. To observe critically and understandingly, it is necessary that a methodical use be made of the senses, calling into requisition, *first*, those of the most importance in discriminating diseases, and so on, according to their actual value. In this category I shall place first *Sight*, then *Touch*, *Hearing*, *Taste*, and *Smell*.

§ 1.—Of the Sight.

If properly cultivated and applied, sight is the most important and accurate of all the senses as a means of diagnosing disease, especially when applied to the external structures of the body. To be of value, then, the surgeon must become familiar with the appearance of healthy structure, before he can rely upon the impressions made by disease. By the sense of sight, a comparison should be made between the unnatural appearance of a part and that which is presented in a state of health, before any value can be assigned to its importance as a means of diagnosis. Thus, in fracture of a limb; in deformities from dislocation; in swellings caused by tumors and suppurations; and in the contraction of limbs and of the natural orifices, by sight alone we can judge not only of the existence of the deformity, but also of its extent and magnitude. In addition to the change of form, the appearance of parts will give us increased evidence of the character of disease. Thus, *redness* may denote the existence of inflammation; a *copper-colored* spot, the probability of syphilitic taint; a *bluish red* color, the formation of venous rather than arterial vascularity; a *livid* tint, the evidence of ecchymosis; and the *yellow* conjunctiva, the existence of hepatic disorder. By sight we can determine also *change of structure*. The *character* of wounds may be known by their edges; and their *depth* by the color of the blood escaping from them, the presence of muscular tendinous fiber, or by the appearance of nerves in their track. In *ulcers*, we judge of their

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acute or chronic character by the appearance of the granulations and the nature of the discharges. In determining the nature of tumors, sight is of importance in demonstrating whether they are malignant or benign, smooth or lobulated, pendulous or pulsate; the variations in condition being subsequently ascertained by the assistance of the other senses. The *microscope*, by the means of sight, has given us much valuable information in determining the character of tumors and other morbid growths, and has become a valuable adjunct to other means in arriving at correct conclusions concerning the nature and treatment of surgical disorders. For a detailed account of the manner of using this instrument, and the uses to which it may be applied, the reader is referred to two excellent monographs * upon this subject. The use of the *laryngoscope* in detecting diseases of the air passages, and of the *auroscope* and *ophthalmoscope* in diagnosing diseases of the ear and eye, are made, by the use of this sense, important adjuvants in the investigation of disease.

§ 2.—Of the Touch.

The sense of touch, either alone or in connection with sight, is of almost limitless importance in its general applicability in the diagnosis of surgical diseases. The pulsation of aneurisms; the mobility of tumors; the crepitation of emphysema, of tendons, and of fractured bones; the movement of liquids, as in fluctuation; the position of the testicle in hydrocele; the sounding for stone in the bladder, are cognizable to the surgeon chiefly through this sense.

The *touch* may be practiced in surgery either through the direct contact of the fingers or of the palms of the hand. The forefinger, on account of its being the most convenient, is more often used, and is the best educated for the purposes of diagnosis. The tactile surface may be augmented by the apposition of the first and second fingers, by which their usefulness is increased in detecting swellings beneath the tissues, whether they are fluid or not. In larger collections of fluid, as in abdominal dropsies, the apposition of the entire palm of one hand on one side of the belly, while the opposite

* "How to Work the Microscope," by Lionel Beale; London. "The Microscope in its Application to Practical Medicine." Same Author.

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side is lightly tapped with the pulps of all the fingers of the other, will often indicate the presence of liquid by the sensation, or succussion of the fluid against the palm. In practicing "the touch" great expertness is required, to attain which, frequent and repeated manipulation must be resorted to by the surgeon. In order to possess dexterity and skill in this manipulation, he should proceed as follows: "Retain the fingers of one hand with sufficient firmness on one side of the part to be examined, while with the other he presses quickly and with moderate force on the opposite side of the swelling; or, if the part to be examined is of considerable extent—as the abdomen—let him direct an assistant, as advised by Recamier, to press gently with one hand in the median line of the body, while he manipulates with his own hands as just stated. The motion of the intestines, as well as of the liquid wave, being thus partially checked, the sense of fluctuation, if yet apparent, will be almost certain evidence of the presence of liquid."

By touch, we can determine the existence of congestion in the superficial vessels, or of the activity of the capillary circulation, by alternately pressing upon and quickly removing the finger from the part. If, upon rapid pressure of the finger, and its equally prompt removal, the part quickly regains its livid or florid color, it indicates activity of the circulation; if it is slow and tardy in regaining its orginal appearance, the circulation is correspondingly weak and torpid.

The peculiar sensation of grating or "crepitation," felt by the friction of two broken fragments of bone upon each other, or the rubbing of two articulating surfaces of a joint together, or by that of a tendon in a thickened bursa, is manifest to the surgeon by the sensation of touch and hearing. Frequent errors in diagnosis, committed by some of the ablest surgeons, will attest the great importance of educating the fingers as diagnosticians in many surgical disorders, whose nature can hardly be correctly understood without the light afforded by the sense of touch.

§ 3.—Of the Hearing.

By this sense the surgeon is frequently enabled to judge of changes in the organism by the intonation and variations of the patient's voice. Thus, in polypus of the nose the natural tone of

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voice is altered; and so with diseases of the larynx and trachea, fissues of the hard and soft palate, etc.

By the grating sound, denominated "crepitus," he is enabled to ascertain the nature of disorders as they affect certain structures; as, in the result of mortification, when gas collects in the cellular tissue, a certain crackling sound is heard as well as felt; and so, in the *gurgling* sound that is often heard in circumscribed cavities, as in hernia; and, also, the peculiar whistling sound that, during operations near large vessels, is heard when air enters a vein. In wounds of the thorax, the escape of air from, or the entrance of air into the cavity of the chest, are diagnostic of the character of the injury affecting those organs.

The peculiar *thrill* in varicose aneurisms, caused by the flow of blood through the vessels, is indicative of the connection of a vein with an artery. The elastic "ripe-watermelon-like sound," produced by pressing upon encephaloid growths when they are connected with bone, and the *crackling* of the osseous shells of certain bony tumors, are all made apparent to the surgeon through the sense of hearing.

Percussion and auscultation, in ascertaining the true condition of the lungs in a state of disease; in determining the viability of the fœtus prior to operative interference; in ascertaining the extent of effusions into the chest, in reference to the operation of paracentesis thoracis; are a few of the many instances where hearing is made an important adjuvant to a correct diagnosis. The recent application of the *sounding-board* to the vesical sound, to ascertain the presence of a stone in the bladder, is an another triumph of art in employing the sense of hearing to the detection of disease within the cavities of the body.

§ 4.—Taste and Smell.

Used by the older surgeons in determining change of structure and in assisting the diagnosis of diseases, are now rarely employed. By the aid of chemistry and the microscope, and the brilliant discoveries made through these channels, the two latter senses are rarely brought into requisition, and are, therefore, of little benefit to the profession in the investigation of surgical disorders.

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PART II.

BANDAGING, AND OTHER POINTS OF MINOR SURGERY.

Operative Surgery, as understood in common language, is divided into two great parts — *Minor* or *Auxiliary Surgery*, and *Great Surgery*. This distinction has for a long time existed in practice, though in reality there are no logical considerations that warrant such a division. There are no natural limits that can be established between minor and great surgery. Guy de Chauliac's Work on Great Surgery, the first to take such a title, says nothing of minor surgery; and the Bertheonee, or small surgery of Paracelsus, has no resemblance to the minor surgery of to-day. Minor surgery, at the present, has reference to the mechanical part of those simple processes that are not only connected with operative surgery, but pertain to almost every day's experience in the practice of the profession.

A thorough knowledge of the operations of minor surgery is absolutely indispensable to the complete success of the surgeon. The ability to bandage neatly, and to perform skillfully the various minor operations to which he is ordinarily called, can never be secured by reflection or by a close application to books; but requires, instead, the experience of repeated practice. And through neglect to qualify himself properly in this most important branch, many a practitioner has placed his reputation and prospect of future success beyond the possibility of recovery, or has at least suffered severely from the criticism of those with whom he has been brought in contact.

For convenience and a systematic study of this subject, I propose to devote this part of the volume to the consideration—

1. *Of Apparatus of Dressing.* 2. *Elementary Operations.* 3. *Disinfecting Agents.* 4. *Catheterism.* 5. *Injections.* 6. *Vaccination.* 7. *Removal of Foreign Bodies.*

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CHAPTER I.

APPARATUS OF DRESSING.

The art of **Dressing** comprises every methodical application of mechanical and topical means whose object is the cure of surgical diseases. They are the smaller but important operations that the student or practitioner is obliged to call into daily requisition; and may be rightfully considered as perhaps the most useful in surgery.

Dressings are the different articles employed for the relief of injured parts, and to preserve them in proper coaptation, thus facilitating their union. They are also used to prevent a too hasty union; to protect the wound from the action of the atmosphere and external injury; to absorb discharges; to prevent desiccation of surface; and to insure cleanliness.

SECTION I.

INSTRUMENTS REQUIRED FOR DRESSING.

The **Apparatus of Dressing** includes the Instruments for Dressing, and the Pieces of Dressing to be applied.

The *instruments* which the daily avocations of the surgeon call for are of various kinds. For convenience they are arranged in what is known as a Pocket Case, which should contain Forceps; Scissors, straight and curved; Probes; Directors; Spatulæ; Bistouries; Scalpels; Lancets; Catheters; a Porte-caustic; a Tenaculum; Needles, straight and curved; Ligatures; and a Razor.

The **Forceps** supplied are usually of two kinds: the **Polypus** or **Dressing Forceps**, Fig. 1, and the **Artery Forceps**, Fig. 2; the former are employed for removing dressings, in order to protect the fingers from irritating discharges, and also to enable the surgeon to seize them with less risk of injury to the affected part. In using them, the thumb and second finger should be passed through the rings of the handle, and the forefinger extended upon the joint of the blades, which renders them firm.

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The **Artery Forceps** are like the *Simple* or *Dissecting Forceps*, with the exception of having a *slide* to keep them shut when necessary; each blade has also longitudinal grooves at the inner side of its extremity, that a firm hold may be obtained.

Fig. 1.

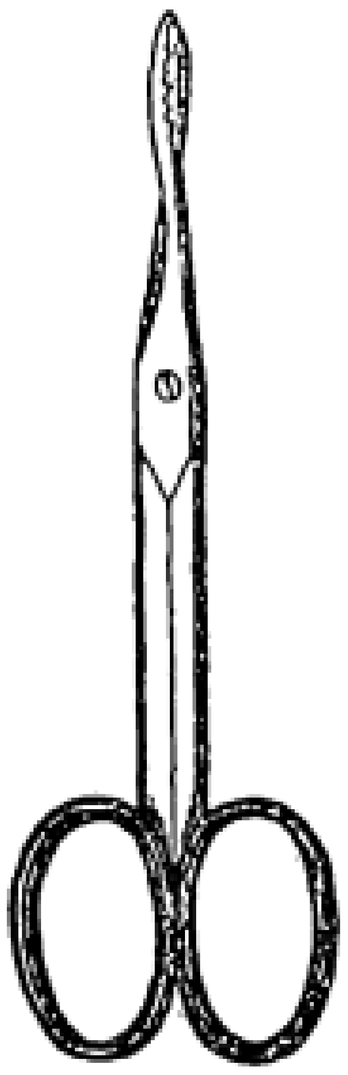


Fig. 2.

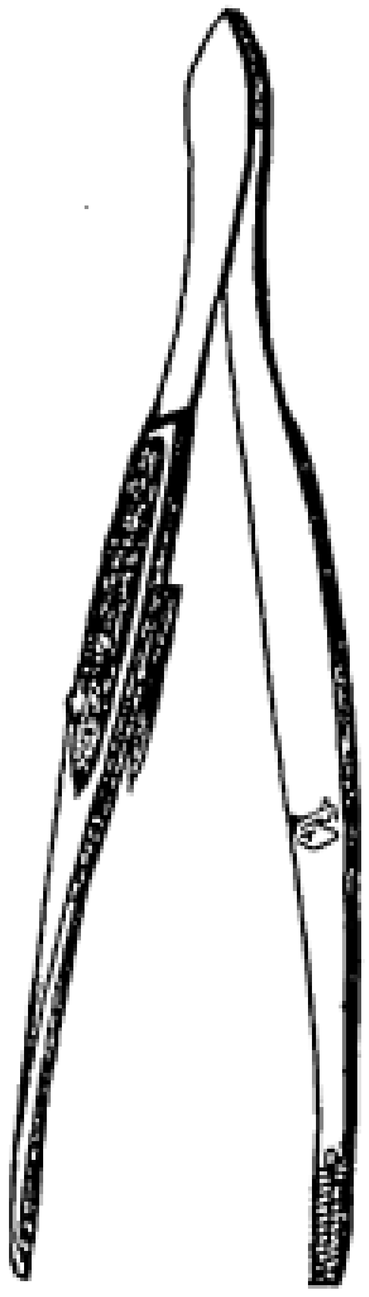
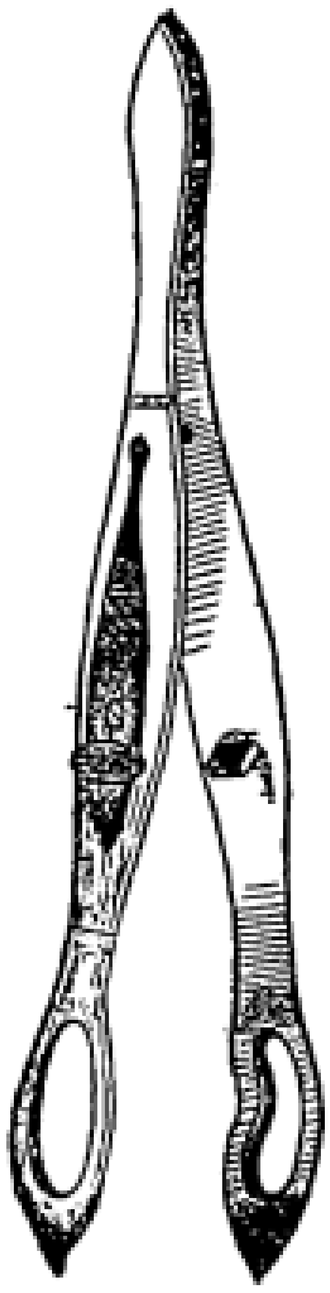


Fig. 3.



Scissors are of two kinds—**Straight** and **Curved.** The use of the former is so apparent that no description is required. The best form of the **Curved** is obtained by their being bent at the joint. They are mainly required to effect the removal of such dressings as adhere closely to the body—such as adhesive strips, bandages, etc.

Probes are intended as substitutes for the fingers; but in all cases where it is possible to introduce the finger, it should be preferred, especially in gunshot wounds, on account of the greater accuracy of the touch. They should be flexible, and made of silver, to prevent their liability to be injured by contact with the various fluids which they may meet. They should, also, be of different sizes; and one should be made with an eye in its flattened extremity, for the purpose of being armed, if necessary, with a ligature of silk or a piece of tape.

The **Director** is simply a broad probe with a groove in it, which is used to direct the scalpel or bistoury in the severing of deep-

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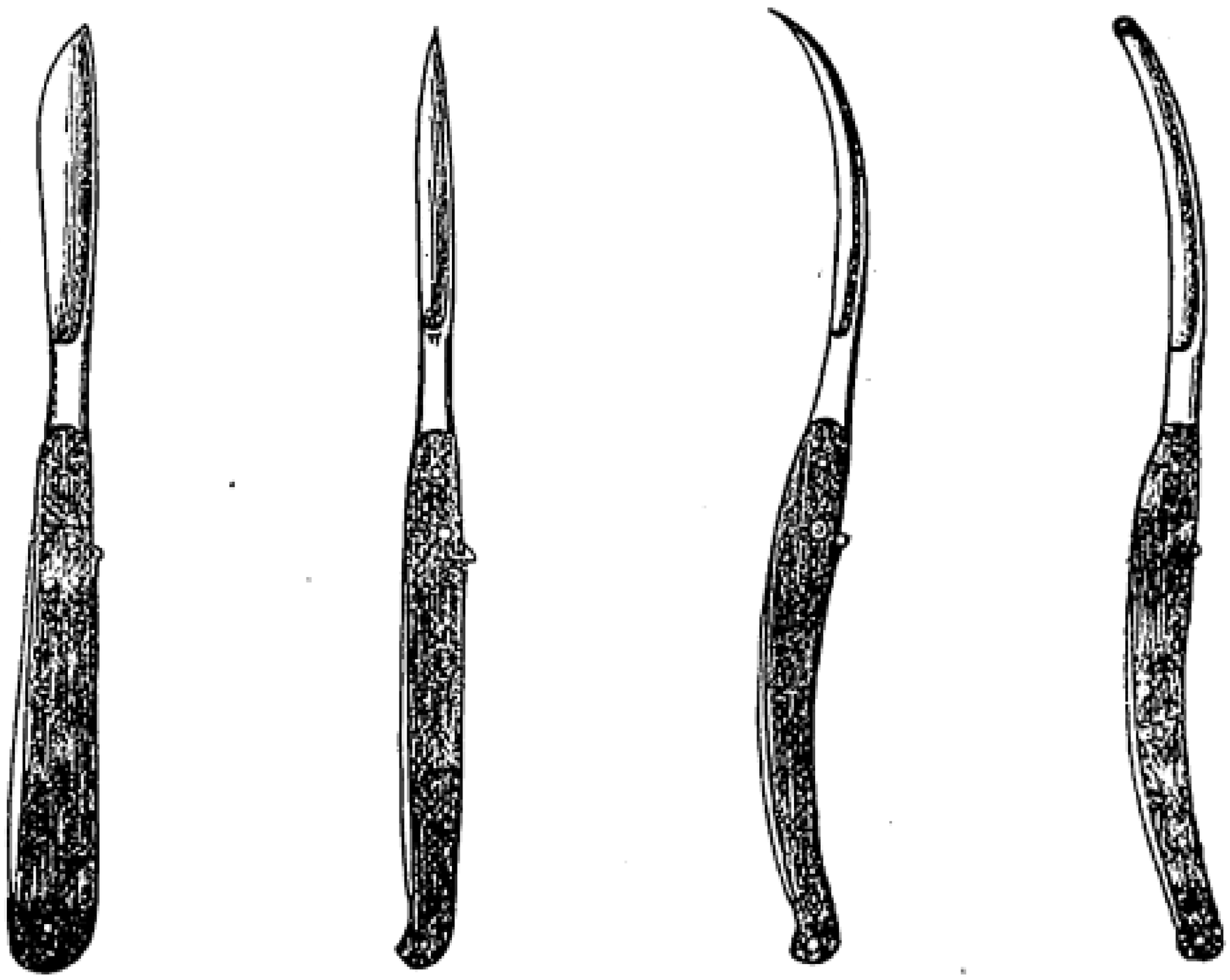
seated parts. When employed, it should be held with the thumb on the top of the handle, and the fingers beneath its shaft, to prevent its slipping. The knife, being held in the other hand, is then made to pass along the groove as far as desired.

The **Spatula** is used in spreading cerates, in the preparation of dressings, or for removing substances which remain adherent to the skin, and for depressing the tongue.

Bistouries and **Scalpels** are of various shapes and sizes. The **Scalpel** is simply a knife with a convex cutting edge, whereas a **Bistoury** is either straight or curved. The latter are usually four in number, two **Curved** and two **Straight**, Figs. 4, 5, 6, 7—one of each pair being sharp-pointed, and the other ending in a probe, or button-point. The size of either instrument used will depend much upon the fancy of the surgeon and the character of the operation to be performed.

Fig. 4. Fig. 5. Fig. 6. Fig. 7.



Thumb and **Abscess Lancets** are so simple, and their use so manifest, no description is accounted necessary.

Catheters are made of either gum-elastic or silver, the latter being preferable. They consist of tubes of various sizes, and are

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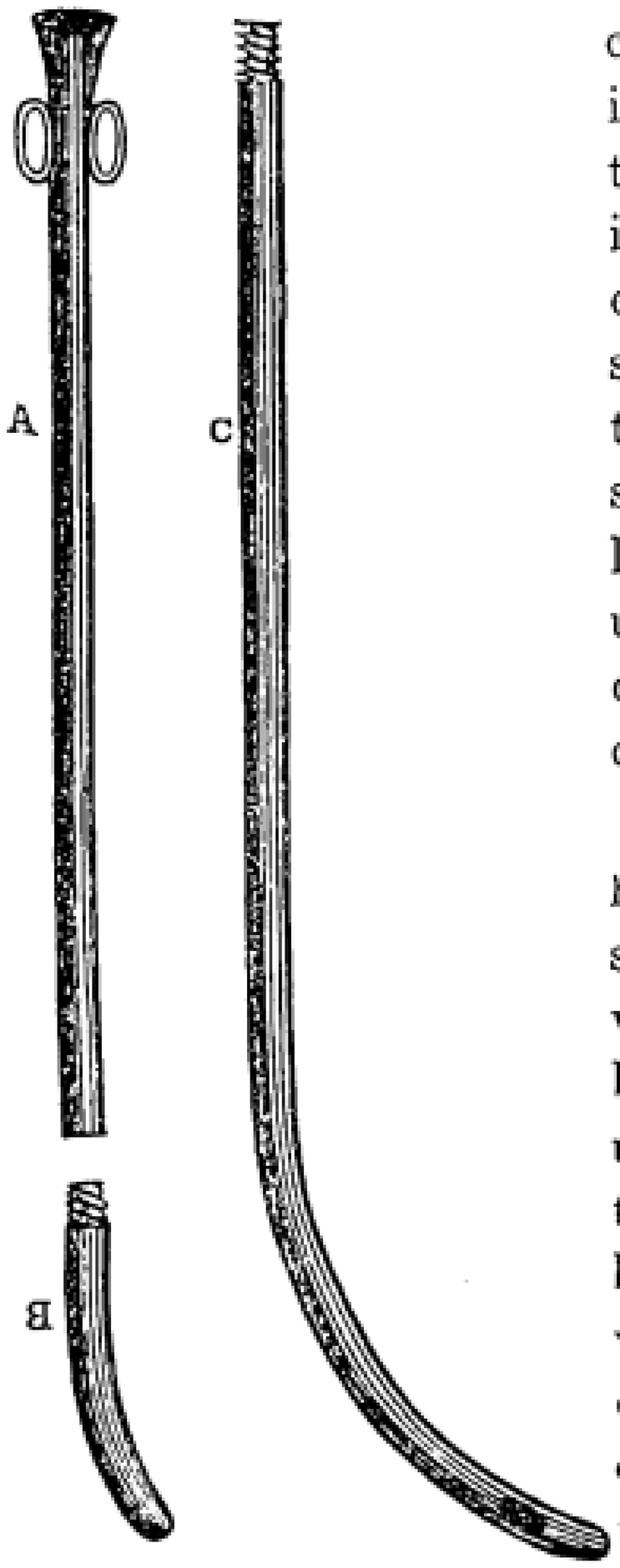
curved more or less, near their rounded extremities. They are of two kinds, one being adapted to the urethra of the male, the other kind to that of the female. The two are, however, sometimes united into what is called a *double catheter*, Fig. 8. It is of silver, and consists of three pieces, as represented in the accompanying cut. A, a straight tube about five inches long, having at its upper extremity two rings opposite each other; at the other end is cut a screw-thread, fitting either of the two tips, B or C; the former short and slightly bent, for the female, the other long and curved, so as to suit the male urethra. Near the lower extremity of each tip is cut two fenestra, communicating with the cavity of the tube.

Fig. 8.



The **Porte-caustic** or **Caustic Holder** has its use indicated by its name. It should be made of platinum, or of silver with platina ends, as this metal best resists the action of the caustics usually employed. When it is required to give the caustic a fine point, it is best accomplished by rubbing it with a wet rag, as the brittleness, especially of nitrate of silver and sulphate of copper, renders it difficult to bring them to a point by scraping them with a knife.

The **Tenaculum** is a hook with a long curve and sharp at the point. It is employed for the purpose of drawing bleeding arteries from the surrounding tissues, by inserting it into their open extremities, that they may be conveniently ligatured. The artery forceps is designed to perform the same office, and in most cases is preferable to the tenaculum.

The **Needles** used by the surgeon are either **Straight** or **Curved.** The latter should be double-edged from the point to the widest part, and very sharp. They should be of sufficient size to make

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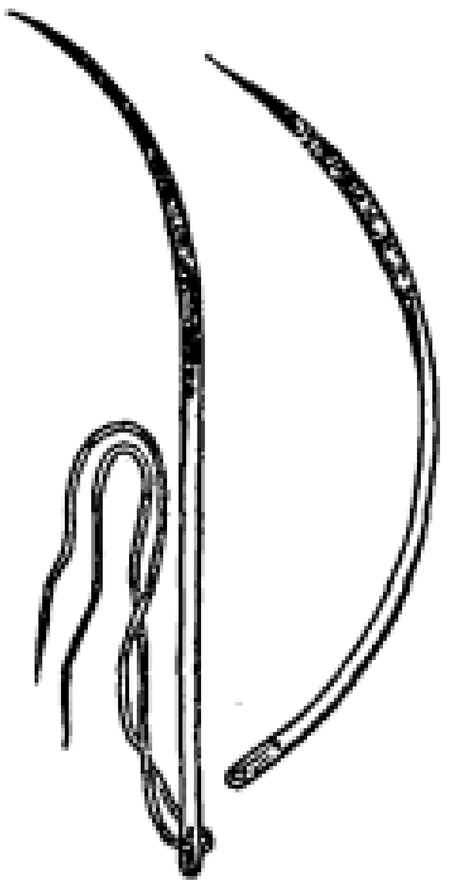
an opening large enough to prevent any dragging of the skin as the suture is drawn through. The accompanying drawing represents two forms of the surgeon's needle, of which the straightest will usually be found the most convenient.

Fig. 9.



A needle has recently been invented by Prof. Post, of New York, designed to facilitate the introduction of insect pins in wounds of the face and other parts requiring perfect adaptation. It consists of a needle about two and a half inches in length, straight except at the point, where it is slightly curved to the extent of half an inch, and expanded into a small flat handle at its proximal end. The curved extremity is flat, with cutting edges, while the greater portion of the length of the needle has a groove on the side corresponding with the convexity of the curve. The needle is used by passing it through the lips of the wound in the position to be occupied by the pin, after which the latter is inserted along the groove and the needle removed. The pins are there held in position by a thread arranged in the form of a figure 8.

The needle constructed by Dr. G. S. Bryant, of this city, differs from the above in being bent at a double angle near its proximal end, by means of which the handle occupies a higher plane than the grooved part of the needle. Another ingenious needle, invented by Dr. Bryant, is the vesico-vaginal needle, which will be explained hereafter.

The **Aneurism-Needle**, represented in Fig. 10, is employed to effect the ligation of an artery that has retreated within the tissues beyond reach. In this case it becomes necessary to cut down upon the bleeding artery at the most convenient point above the wound, and tie it at that point. After the sheath of the vessel has been opened, the needle is used by passing its extremity, armed with a double ligature, under the artery and out on the opposite side; one division of the ligature is then secured between the fingers, or by a forceps, and drawn out upon one side, while the other portion follows the needle as it is withdrawn from the other side of the wound. The artery is then tied.

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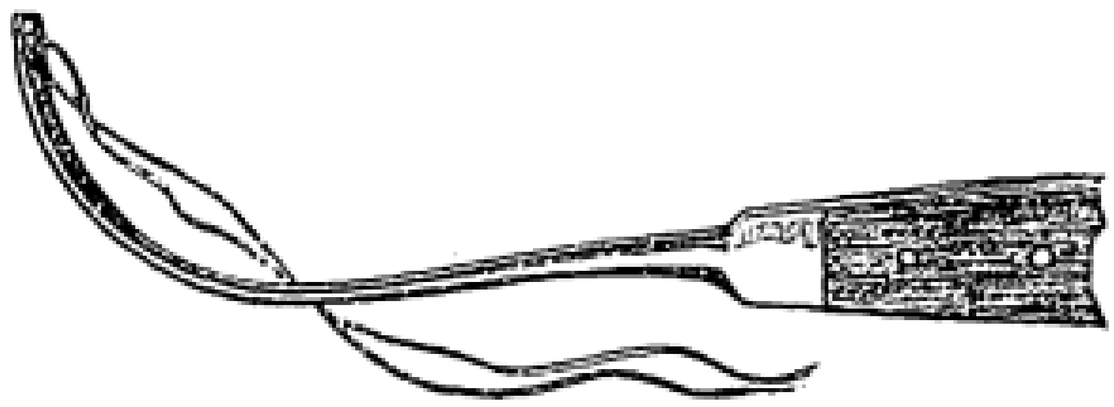
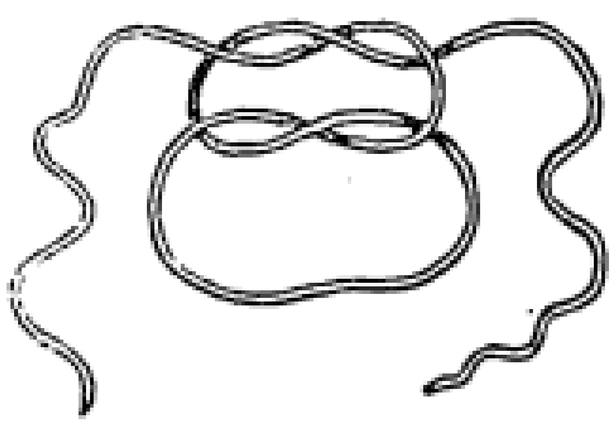
Fig. 10.



A **Ligature** is a strong cord, usually of silk, and used to arrest the hemorrhage of a wounded vessel; it is also occasionally employed in the removal of tumors.

The kind of knot to be preferred is a matter of some moment: I regard what is called the "Surgeon's Knot," which is made by passing one end of the ligature *twice* around the other, as highly objectionable, as it is exceedingly bungling, and possesses no superiority over the *double* or "sailor's knot;" unless, indeed, the operator neglects to have his ligatures properly waxed—*a precaution which should never be overlooked*—in which case it is not quite so liable to slip as the "sailor's knot" while the subsequent part of the knot is being made. The "sailor's knot" is much more rapidly executed, and presses more uniformly upon the entire circumference of the vessel. It is made in the following manner: 1. Pass the end of the ligature held in the right hand, *from* you, once around the corresponding end of the ligature held in the left hand. 2. Pass the end of the ligature in the left hand, *toward* you, once around the other end, and the knot is complete, Fig. 11.

Fig. 11.



It is imperative in all cases that the ligature be drawn with the requisite degree of firmness to cut entirely through the internal and middle coats of the artery, in order that sufficient inflammatory action may be produced in the vessel to agglutinate its sides, and thus render the channel impervious. One end of the ligature should then be cut off within about a quarter of an inch of the knot, to diminish the amount of irritating matter left in the wound. The length of time during which the ligature should remain around the artery will vary according to the size of the latter; generally from five to twenty days, may be considered as

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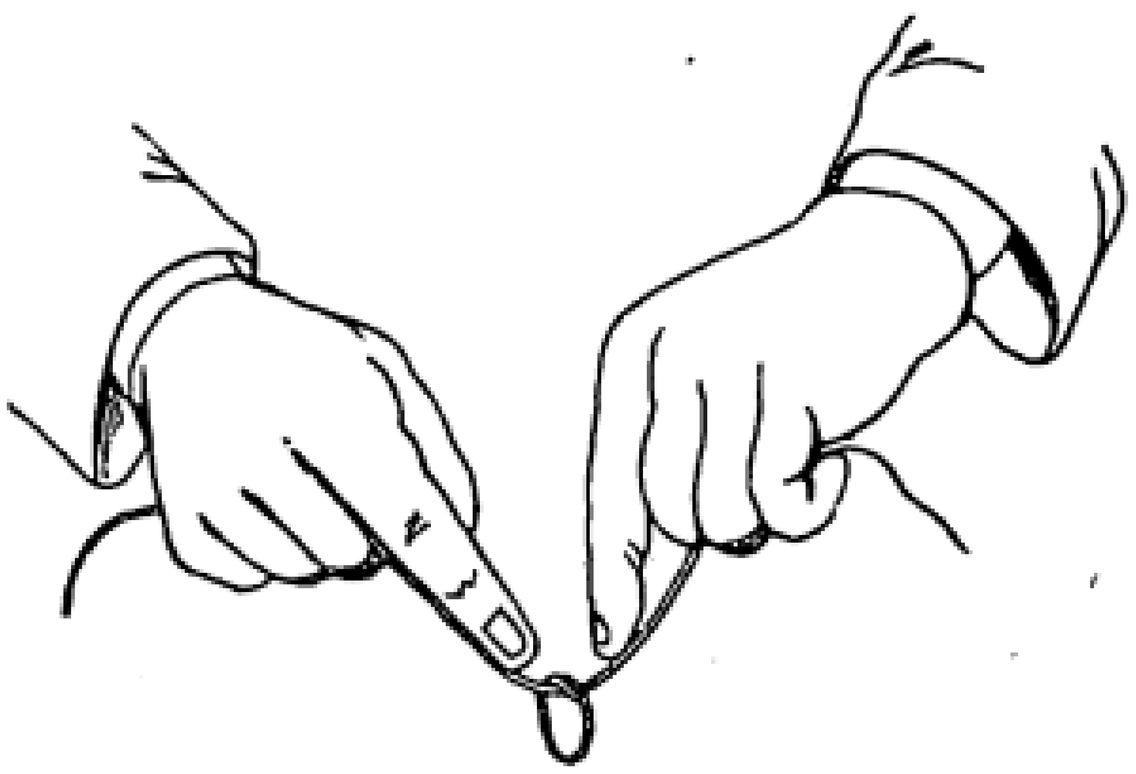
elapsing before the external coat becomes severed at its point of constriction. The ligature may be gently twisted and drawn upon, in order to favor its release, as sometimes it is retained by the granulations in which it is imbedded. No *force*, however, should ever be used, particularly when large arteries have been ligated, lest an unexpected secondary hemorrhage occur.

The manner of holding the ends of the ligature, that the knot may be drawn firmly, is represented in Fig. 12:

Fig. 12.



Under the head of Apparatus of Dressing, also, the operator should, in the more important cases, include Basins, Towels, Buckets, Sponges, etc. The latter, as obtained in the shops, are not fit for use without being subject to a cleaning process. This consists, first, in its maceration in boiling water, and subsequent beating, to remove the calcareous particles; they should then be macerated in water acidulated with about one thirtieth of its bulk of chloro hydric acid; dried and beaten again, and then bleached by exposure, when moist, to the vapor of chlorine, or some other discolorizing agent. They are then properly prepared for use.

The **Pieces of Dressing** include Lint, Charpie, Cotton, Tow, Ointments, Liniments, Compresses, Maltese Cross, Shields for Amputations, Adhesive Strips, Collodion, Plasters, Poultices, and the Application of Water.

Lint is a soft, fleecy substance, obtained by unraveling old linen. The linen selected should be soft and clean, from use and washing—as, for example, an old *table-cloth*. The "**Patent Lint**," as prepared by druggists, is in no wise preferable to the **Domestic Lint**; the latter can be made at a moment's notice, by scraping the

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surface of the linen previously put on the stretch, with a sharp knife. They are both employed as primary dressings, either dry, spread with ointments, or saturated with some kind of lotion.

Charpie is made by collecting the threads torn entirely apart from pieces of linen four or five inches square. The linen from which it is obtained should always be new, as it has been established that new linen absorbs better than old. It is commonly divided into two kinds, according to the length and fineness of the thread composing it: that which is long and coarse being of service to prevent the closing of sinuses or fistulæ; while the more fleecy, finer kind is placed in direct apposition with the part, particularly if the surface require stimulation.

Many arbitrary names have been applied to the various forms which charpie may be made to assume as an element of surgical dressings. Thus, we have the Pledget, Roll, Tent, Mesh, Bullet, Tampon, Pellet, etc., each of which has its peculiar use and advantages.

The **Pledget** is a mass of charpie, with the threads arranged parallel with each other and the ends folded underneath. It is then pressed by the hands into the required shape. After being neatly adapted to the part it is designed to cover, it is usually spread with cerate, care being taken not to make it so thick and bungling as to heat the surface of the wound, nor yet so light as to admit of its becoming immediately saturated with the discharges.

The **Roll** is a smaller mass of charpie, rendered cylindrical by rolling it between the hands, and then being firmly tied with a cord in the middle. It is chiefly used to arrest hemorrhage, by pressure, from deep-seated vessels, or to absorb the secretions from wounds or cavities. A director, probe, or dressing-forceps, may be found necessary in order to carry it sufficiently far into deep wounds. And for convenience of withdrawing the mass, the string attached to it may be left projecting from the orifice.

The **Tent** is made by twisting a mass of charpie into the form of a cone. It is used to dilate fistulous openings where only a moderate degree of dilatation is required. It is, however, much inferior to the **Sponge Tent**, which is prepared by soaking common sponge in melted beeswax; permitting it to cool and harden while under moderate pressure, and then slicing it into pieces of the required size. The dry, compressed sponge, prepared by allowing it to

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remain in a vice for a few hours, is highly recommended, and is very useful.

The **Mesh** is formed of threads of charpie, placed parallel with each other, then bent upon themselves and left loosely floating. It is used more especially in the treatment of fistulæ in ano. When thus employed it should be covered with some lotion or cerate and introduced into the cavity on the point of a probe. It acts by preventing the orifice from healing, thus enabling the cavity to granulate from the bottom.

Bullets are made by rolling charpie between the hands until it acquires the form of a ball. They are exceedingly porous, and hence very absorbent; and are of use in filling cavities and preventing matter from burrowing.

When a number of bullets are placed together for the purpose of distending a cavity or of arresting hemorrhage, they assume the name of **Tampon.** A large ball alone is also sometimes called a tampon. They are used in gonorrhœal inflammations of the vagina; in leucorrhœa; and in uterine hemorrhage. In arresting the latter, especially if it occur from violence, they may be made of the Boletus Igniarius, or Puff-ball, and used with the most marked success.

The **Pellet** consists of a ball of charpie inclosed in a piece of soft linen and firmly tied. It is frequently employed in the treatment of umbilical hernia of children, where it supplies the place of a truss. It is also sometimes used as a tampon.

Cotton is much inferior to charpie as an article of surgical dressing, in view of the fact that it is less absorbent and much more irritating; though during the late war it has been very neatly prepared and quite extensively used in the army as a substitute for lint and charpie. Its chief recommendation, however, is its use as a covering to extensive superficial burns, to protect their sensitive surface from the action of the air and at the same time absorb the discharges. It is highly useful, also, to form a soft bed upon which to rest an injured part; to prevent unpleasant pressure and excoriation from bandages and other apparatus; and to envelop parts when the natural temperature has become depressed.

Tow is of very questionable utility as an article of dressing, as it is exceedingly harsh and irritating; and if the pledget used be too

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thick, it becomes heating to the wound, and union is thus retarded. It may be employed, however, as an outer dressing to stumps which are discharging copiously, in order to protect the bed.

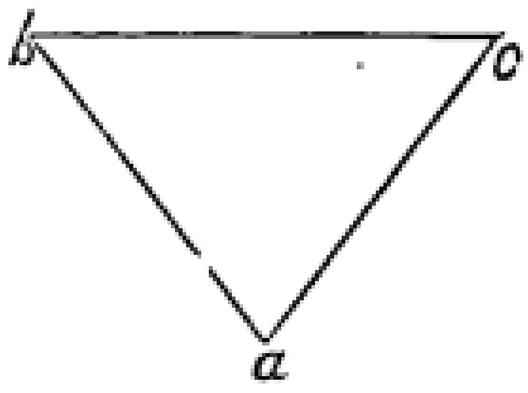
Ointments are any soft, unctuous substance or compound of a consistence that renders them conveniently applied. They are much less frequently used than formerly.

Liniments are designed to be applied to the skin by friction with the hand, or with soft flannel. Oil should constitute the basis, and with it a variety of ingredients may be combined that it may be thus rendered soothing or irritating, as required.

Compresses are made of various materials, as linen, muslin, flannel, calico, etc., and usually applied over other dressings. They have received a variety of names, according to their form and the indications which they are designed to fulfill. Thus, we have the Square, Oblong, Triangular, and Cribriform; the Maltese Cross, the Half-Maltese Cross, the Single and Double Split Compress, the Perforated, the Graduated, and the Pyramidal.

The **Square Compress** is that in which the substance used is doubled so that the length and width are equal. When folded so that it is twice as long as it is wide, it constitutes the **Oblong Compress**, and is used in surrounding the trunk or limbs. If the square piece be folded by uniting two of its angles, it forms the **Triangular Compress.** This is of excellent service in confining dressings to stumps, where it is necessary to change the dressing frequently without disturbing the limb. It should be of sufficient size to surround the limb, and should be applied as follows: Place the stump in the center of the side, *b c*, Fig. 13; then, turning the apex *a* over the end of the stump, the other points, *b* and *c*, should be turned up and the ends fastened by the use ofpins. When it is desirable to renew the poultice, or whatever other dressings are used, withdraw the pins, and, turning back the ends of the compress, the surface is readily exposed.

Fig. 13.



The **Cribriform Compress** is made by folding a square piece of linen several times upon itself in the form of a square, and then nicking the sides with the scissors, removing small triangular pieces.

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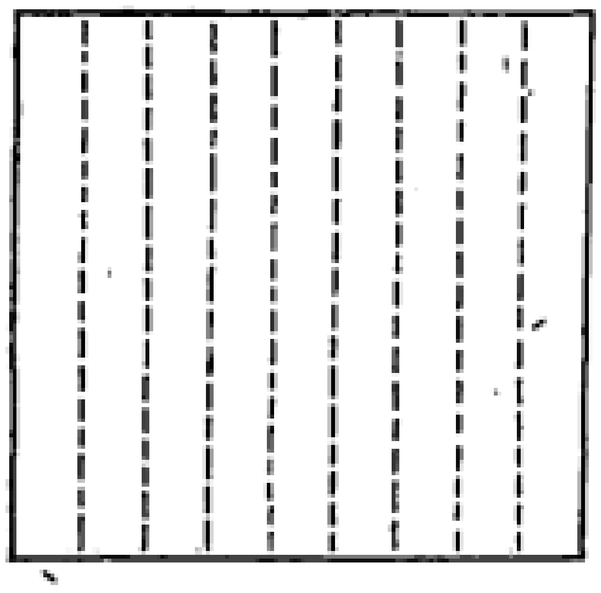
Fig. 14.



On opening it, we shall have the form represented in Fig. 14. This spread with cerate constitutes a very elegant dressing as applied to suppurating surfaces.

The **Maltese Cross**, so named from its form, is prepared by folding a square piece of linen through the middle or one of its sides, then doubling this so as to form a square; after which, join either of the two angles to form a triangle, as in Fig. 15. From the hypothenuse of this triangle remove nearly half an inch from the apex, which

Fig. 15.

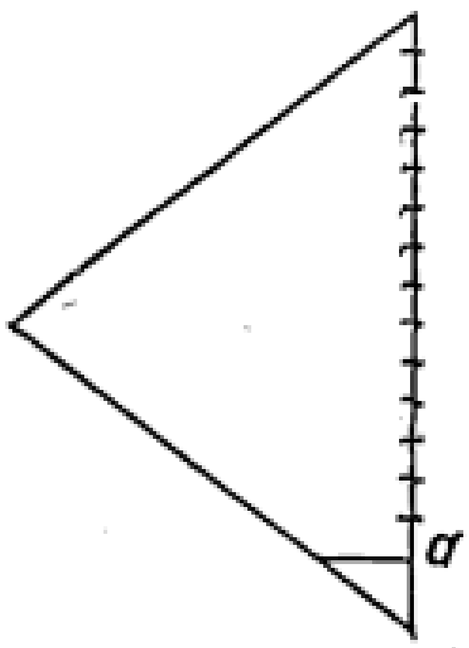
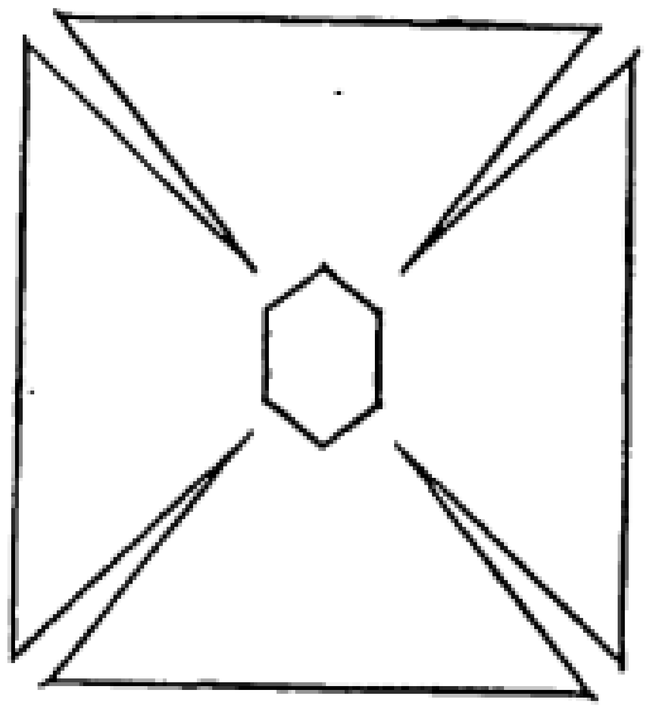


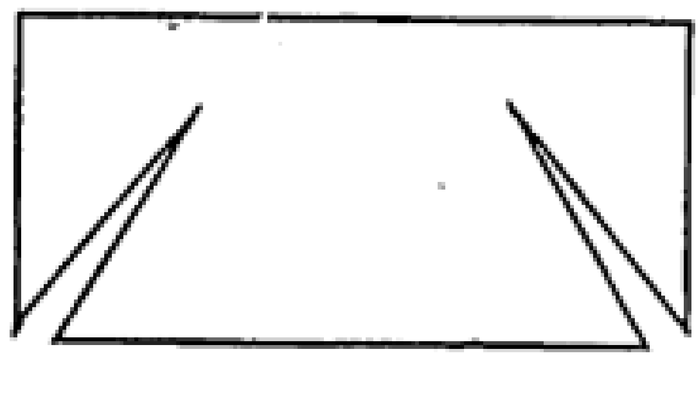
Fig. 16.



consists of folds without free edges; this leaves a space in the center. Then make an incision along the hypothenuse to within half an inch of the line *a*. On opening the linen we have the cross complete, Fig. 16. It is used as a direct application to stumps, being previously spread with cerate.

The **Half-Maltese Cross** makes a convenient dressing for stumps at the shoulder or hip-joint. It is made by folding a piece of linen in the form of an oblong square, and then carrying an incision from the two angles having free edges to within a couple of inches of the folded sides, Fig. 17. By opening the linen, doubled and cut in this manner, it will also form the cross, Fig. 16. The student should practice making them of paper, that he may be expert when called upon to make them for actual use. Indeed, the same may be urged

Fig. 17.



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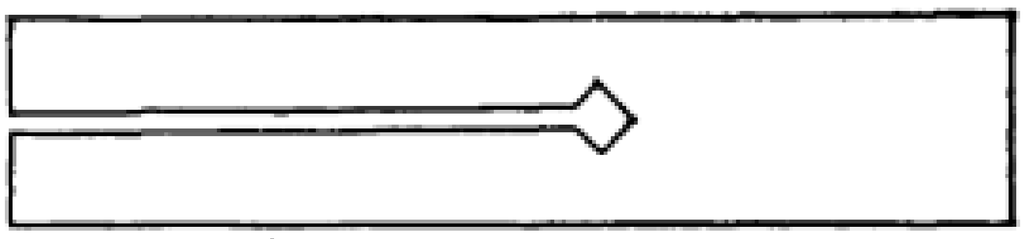
of many of the dressings, as repeated practice is one of the essential elements of success.

The **Retractor** is made from an oblong piece of muslin, and may have *two or three tails*, according as there is one or two bones to be divided by the saw.

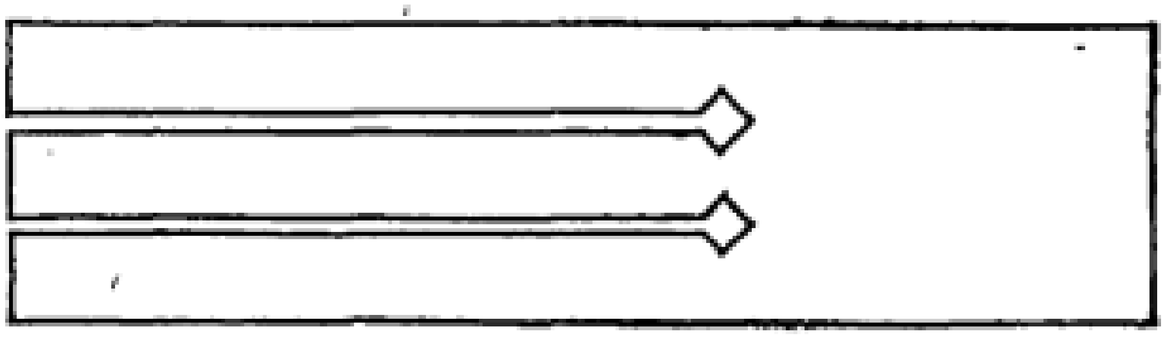
Fig. 18.



The *retractor of two tails*, Fig. 18, is employed to protect the soft parts where there is but one bone to be divided. In making an application of it, draw the tails downward on each side of the stump, at the same time drawing the body of the retractor upward over the stump. The muscles are thus forced backward and protected from the action of the saw.

The *retractor of three tails*, Fig. 19, is applied in a similar manner where there are two bones to be divided — the middle tail passing through the interosseous space. The diamond-shaped opening, at the end of each incision, is designed to adapt the retractor more perfectly to the bone.

Fig. 19.



The **Perforated Compress** consists of muslin folded several times upon itself, in the center of which a circular opening is cut. By means of this opening, points which have a tendency to slough, are relieved of pressure; as, for example, the internal condyle in injuries of the elbow; the trochanter of the femur; and the heel in fractures of the lower extremity.

The **Graduated Compresses** are of several varieties; the difference consisting in the manner in which each is folded. In the first form, each fold is so arranged as not entirely to cover the one previously made. It may be graduated at one or both extremities. Fig. 20.

The **Pyramidal Compress** may be either square or oblong. It is very neatly made by placing square pieces of muslin, each smaller than the preceding, one upon the other, and then fastening them

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together, which form a pyramid, Fig. 21. They are used for making pressure upon particular parts, as in cases of hemorrhage from deep-seated vessels.

Fig. 20.

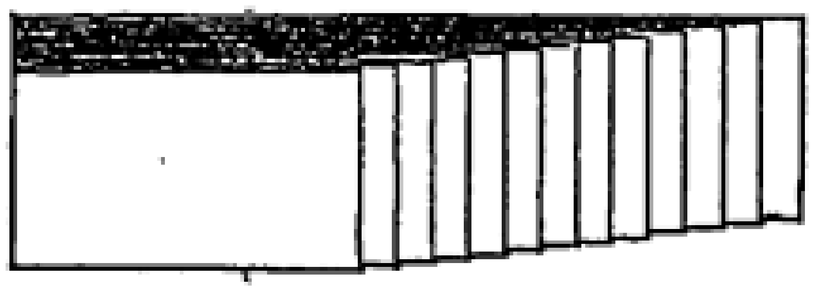
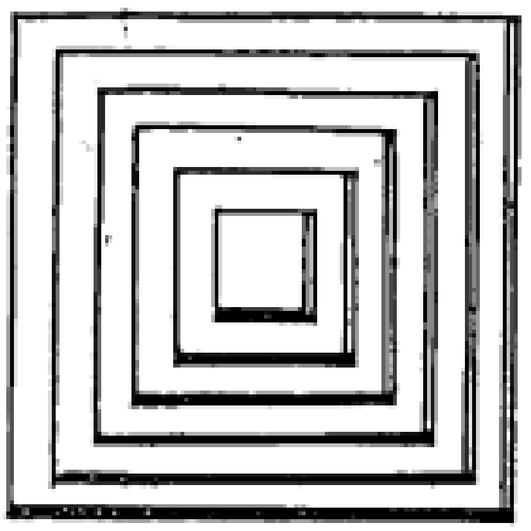


Fig. 21.



Adhesive Strips are designed to facilitate the union of wounds by approximating their edges and protecting the surface from the action of the atmosphere. They constitute one of the most indispensable articles of dressing employed by the surgeon.

For application, the strips should usually be cut off one-half or three-quarters of an inch in width, and warmed by being held near a fire, or by wrapping its unspread surface around a bottle of boiling water, which is preferable. The strip should then be applied first to the most depending portion of the wound, in order to draw it up to the other, and should never be applied from above downward. Care must also be exercised that a proper space be left between the strips to admit of the free escape of the discharges. Owing to the fact that the common adhesive plaster is irritating to the skin, sometimes producing an erythematous inflammation, and occasionally a papular or a vesicular eruption, objections have been raised against it, and the "isinglass plaster" proposed as a substitute. The latter is prepared principally by Mr. Husband, of Philadelphia, by spreading upon oiled silk, or silk glazed on one side only, a solution of isinglass in spirit. The advantages of this plaster consist in its unirritating property and its transparency, whereby the condition of the parts can be seen without removing the strips. Tallman's Glycerine Plaster, manufactured by Tallman & Collins, Janesville, Wisconsin, and which I used somewhat extensively in the army, is quite equal, if not superior, to the plaster prepared by Mr. Husband. Its important qualities are: its soothing properties of glycerine, its transparency, and adaptation to suppurating surfaces, as well as dressing to original wounds; it does not injure

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by age or change of climate. It is prepared for application by previously moistening it with a sponge wet with warm water.

Collodion, a very useful and convenient adhesive material, is made by dissolving gun-cotton in sulphuric ether. After approximating the edges of a superficial wound, it is generally sufficient to paint the surface a few times with a camel's-hair pencil; but in more severe injuries, it is well to lay strips of muslin, linen, or kid, saturated with the solution, on the wound, and then press upon the part until dry. The collodion can readily be removed by dissolving it away with ether.

Plasters are made of various substances; as, for example, the *soap plaster*, which is very mild and unirritating, and preserves the integument soft and moist, being, also, an excellent preventive of excoriation. The *mercurial plaster* is sometimes employed as a resolvent of tumors and other indurations. The *belladonna plaster* is occasionally used as a soothing as well as a curative agent. The preparation of them belongs properly to the apothecary, though the surgeon should regard it his duty to see that they are of the requisite shape to fit accurately the part to which they are to be applied. In adapting a plaster to the female mammæ, for example, a circular piece is required, with a round opening in the center large enough to admit the nipple, while the circumference of the piece should have several incisions reaching one inch toward the center. In general, however, plasters are little used in Homœopathic practice, their use being superseded by the administration of internal remedies and external *medicated* lotions.

The **Poultice** or **Cataplasm** was formerly one of the most common articles of dressing, both in domestic and professional practice. It is made of a variety of substances, and is intended to cover injured surfaces, the kind of poultice used being varied according to the object to be attained by its application.

The **Emollient Poultice** may consist of bread and milk, bread and water, bran or corn-meal with water, or of flaxseed meal. The latter forms a very excellent poultice. It is prepared by pouring sufficient hot water upon the meal to give the mass a soft consistence. It should then be spread upon a piece of muslin, and leveled smoothly and of a uniform thickness of one quarter or half an inch. The edges of the muslin should then be reflected upon it on every

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side for the space of about half an inch, so as to form a kind of frame. This gives the poultice a very neat and elegant appearance, and prevents the adhesion of the edges, or their hardening, while it facilitates its removal from the injured part. Every poultice should invariably be renewed before it becomes dry and hard. Its moisture can be retained much longer by covering it on the outside with a piece of oiled silk, which it is always advisable to do.

The **Stimulating Poultice** is made of different substances, as boiled carrots, grated to a pulp; raw potatoes, grated and applied cold; grated horse-radish; slices of garlic; black pepper; yeast alone, or yeast or porter with corn-meal; solutions of chloride of lime or of soda, of creosote, or of common soap.

The **Mustard Poultice** or **Sinapism** is made by pouring water upon the flour of mustard, thus reducing it to the consistency commonly employed for the table, and then spreading it thinly upon muslin.

Narcotic or **Soothing Poultices** are made of poppy-heads or powdered opium, or the bruised leaves of belladonna; of hops or chamomile flowers, inclosed in a flannel bag wrung out of hot water.

It may, however, be remarked that "water dressings" have in a great measure been substituted for the various kinds of poultices, ointments, and cerates formerly employed so frequently. This is so much the case that many physicians have dispensed with them almost entirely, relying instead upon the use of water and the internal administration of appropriate remedies.

Water Dressings may be cold or warm, simple or medicated. *Cold water* is intended to keep the parts constantly moist, and by its physiological effect diminish inflammatory action. It is of invaluable service in compound fractures, gunshot wounds, sprains, dislocations, and after amputations, especially if there be excessive action. In compound fractures, gunshot wounds, amputations, and suppurating surfaces, the water should be medicated with *calendula*; whereas, *arnica* is more applicable to sprains, dislocations, bruises, etc.

Irrigation is successfully effected by suspending a vessel, containing water of the required temperature, at a convenient hight over the injured part, and then forming a communication between the latter and the water in the vessel, by means of strips of lint

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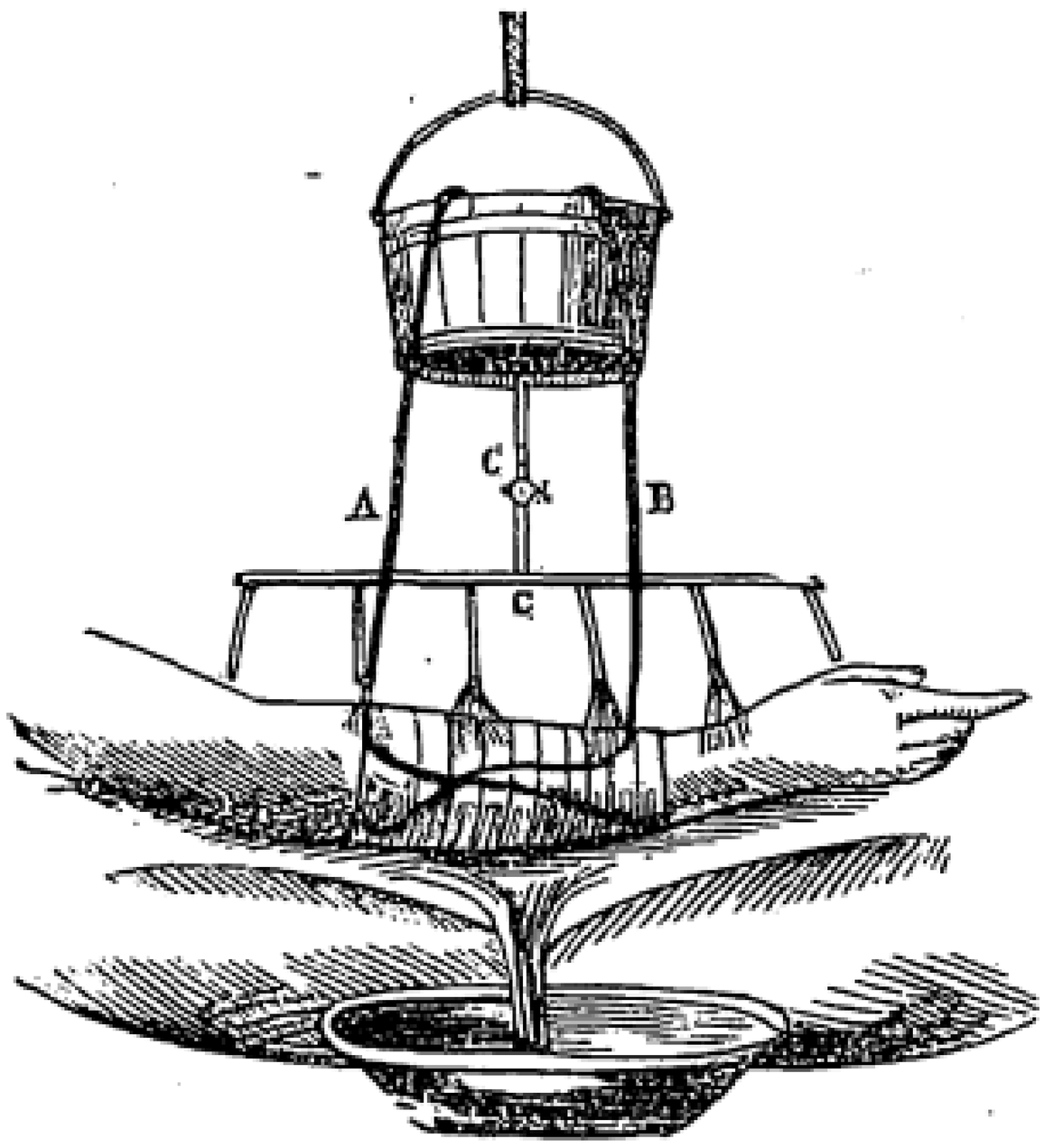
twisted together, or, what is better, pieces of cotton wick; the wick, being wet previous to its application, forms a siphon. In order to prevent the clothes of the patient or the bedding from becoming wet, the limb, previously covered with folds of moistened lint or soft linen, should be laid upon a pillow protected by a piece of oil-cloth, so arranged as to form a sort of gutter, along which the water may pass into a vessel below. A still more preferable method of accomplishing the same purpose is secured by the use of an apparatus with a stop-cock, by which the size of the stream can be regulated at pleasure, Fig. 22. The sensations of the patient should invariably be consulted respecting the propriety of continuing or relinquishing this mode of treatment. In general, it may be continued so long as it is agreeable to the patient; but it should be at least *suspended*, if not entirely *dispensed with*, provided it induce chilliness or an increase of pain.

Fig. 22.



The **Douche** or **Shower-Bath** is sometimes applicable to cases where it is desired to invigorate the vital functions generally, or to increase the activity of any particular part of the body. Its good effects are most clearly manifested in local paralysis, as of the lower portion of the spine, of the sphincter muscle of the anus, or of the neck of the bladder; also, in a similar condition, of some

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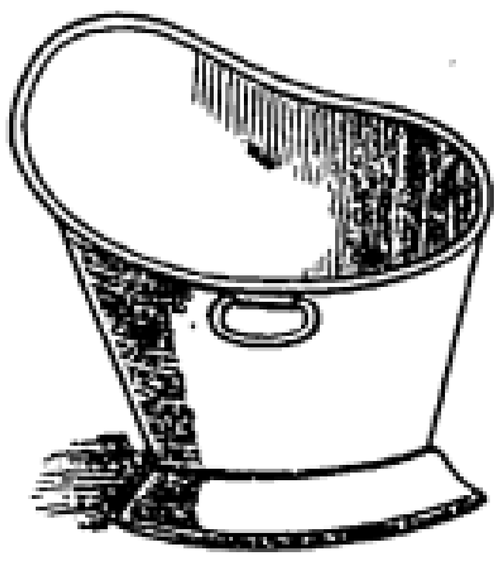
of the voluntary muscles, as the deltoid, for example, resulting from an injury. It can be conveniently applied by pouring the water from the nose of a tea-pot or pitcher, having the vessel used elevated to a suitable hight above the patient.

Bathing constitutes a very important adjunct in the treatment of many surgical diseases, but should always be conducted with care, as otherwise it may prove a source of formidable mischief. The temperature of the bath may vary from 33° F. to 112°, according to the peculiarities of the case. The feelings of the patient, guided by the judgment of the surgeon, form the only safe and rational guide to the temperature of the bath to be employed; since a degree of temperature which would prove agreeable and of service to one person, might produce a severe and injurious effect upon another.

The **Warm** or **Hot Bath** is occasionally used as a depressing agent in overcoming violent pain in excessive nervous excitement; spasmodic muscular contraction in the reduction of dislocations; spasms of the neck of the bladder; to assist in the return of hernial protrusions, and the like.

Partial Baths, as, for example, the pediluvium or foot-bath, the hip-bath, the hand-bath, etc., are often used with benefit. The *hip-bath* is a very effective agent in acting upon the lower part of the spine, and particularly upon the pelvic organs. It may be taken in any vessel of convenient size, though one of the form represented in Fig. 23 has the advantage of being so made as to afford support to the back while sitting. In using the *hand-bath*, the water should be applied hastily, not keeping the parts long exposed; after which the surface must be carefully rubbed with dry towels, when a glow may be produced by friction with the *dry hand*, which is preferable to the use of a towel or flesh-brush for this purpose.

Fig. 23.



APPLICATION OF DRESSINGS.

By the observance of *method* in the application of dressings, the surgeon can very materially lessen his labor, while at the same time he will be in no danger of injuring his reputation through negligence or want of knowledge as to what is required in any particular

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case. Though it is impossible to give directions which would prove applicable in every instance, still, general rules can be prescribed that will be advantageous to the young surgeon in enabling him to anticipate the awkward position he might be suddenly placed in by not making a proper selection of assistants, or by failing to have in readiness the necessary articles which are to constitute the dressing.

1st. A suitable number of reliable and efficient assistants must be procured, to each of whom special duties shall be assigned, with the instruction that *they are to observe these duties, and nothing else*. This prevents confusion. 2d. Before exposing the affected part, the patient should be placed in such a position that the assistants can perform what is required of them without interfering with each other, thus preventing hasty, inconsiderate movements. 3d. The surgeon, as a general rule, should place himself on the outside of the limb, with his face to the patient. 4th. The dressings to be employed should be prepared beforehand, not omitting to have sponges, vessels of water, warm or cold, castile soap, towels, etc., in readiness. 5th. During the dressing, the bed and clothes of the patient should be protected by water-proof cloth, or by so holding the part that the discharges and the water used in cleansing may flow into a vessel. 6th. Let the surgeon exercise great care lest he leave the patient in such a position as to occasion unnecessary fatigue.

SECTION II.

PREPARATION AND APPLICATION OF THE BANDAGE

By **Bandaging** is meant the confining of dressings or other surgical apparatus in their proper place, by means of pieces of muslin or other material.

Bandages are of several kinds, deriving their names either from the direction which they take, from their peculiar form, or from the particular purpose they subserve. Bandages are simple when formed by the application of the roller; compound, when made from one or more pieces adapted to the size and conformation of particular parts. The former kind is subdivided into the

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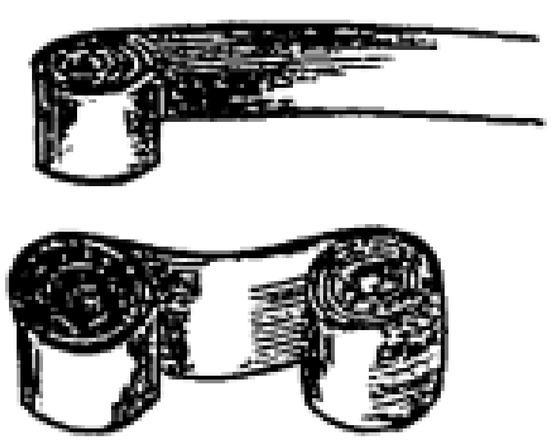
Circular, Oblique, Spiral, Figure of 8, Spica, and Recurrent; the latter, or Compound, into the Uniting, Dividing, Compressing, Expulsive, Retaining, etc.

§ 1.—Simple Bandage or Roller.

The **Roller** is usually prepared from muslin, calico, linen, flannel, cloth, or gum-elastic, by tearing it from the piece into bands from one to four or more inches in width, and from a few inches to ten or twelve yards in length. It should be free from hems, soft, pliable, and unglazed, to prevent it from slipping. Rollers are of two kinds, according as one or both ends are wound into cylinders.

Fig. 24.

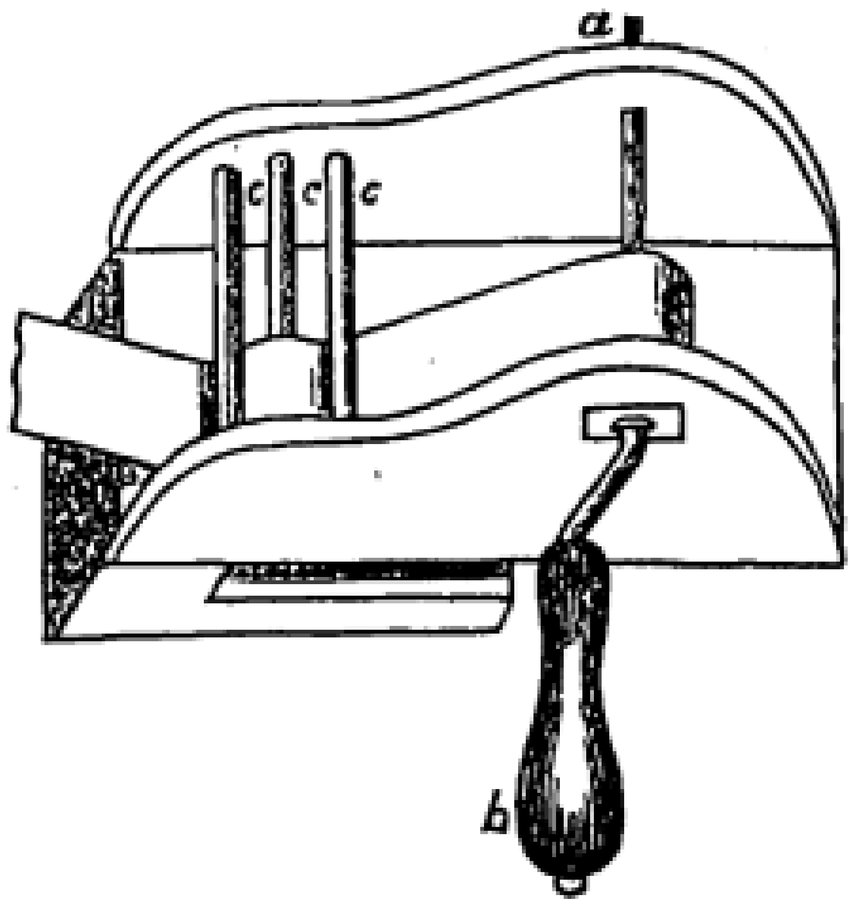


The **Single-headed Roller**, Fig. 24, consists of two extremities; one of which, the terminal, is in the center of the cylinder, the free extremity being the part remaining unwound. Between the two ends is the body, and the two surfaces, an external and an internal.

The **Double-headed Roller**, Fig. 24, consists of the same parts as the single one, with the exception of the free or initial extremity, which is also wound into a cylinder.

The rolling of the bandage may be accomplished with a machine, or by hand. A very simple and easily-constructed machine for this purpose is represented by Fig. 25; one end of the roller being

Fig. 25.



placed on the spindle, *a*, the other is to be held in the left hand to direct its course, and thus insure its being wound evenly, while

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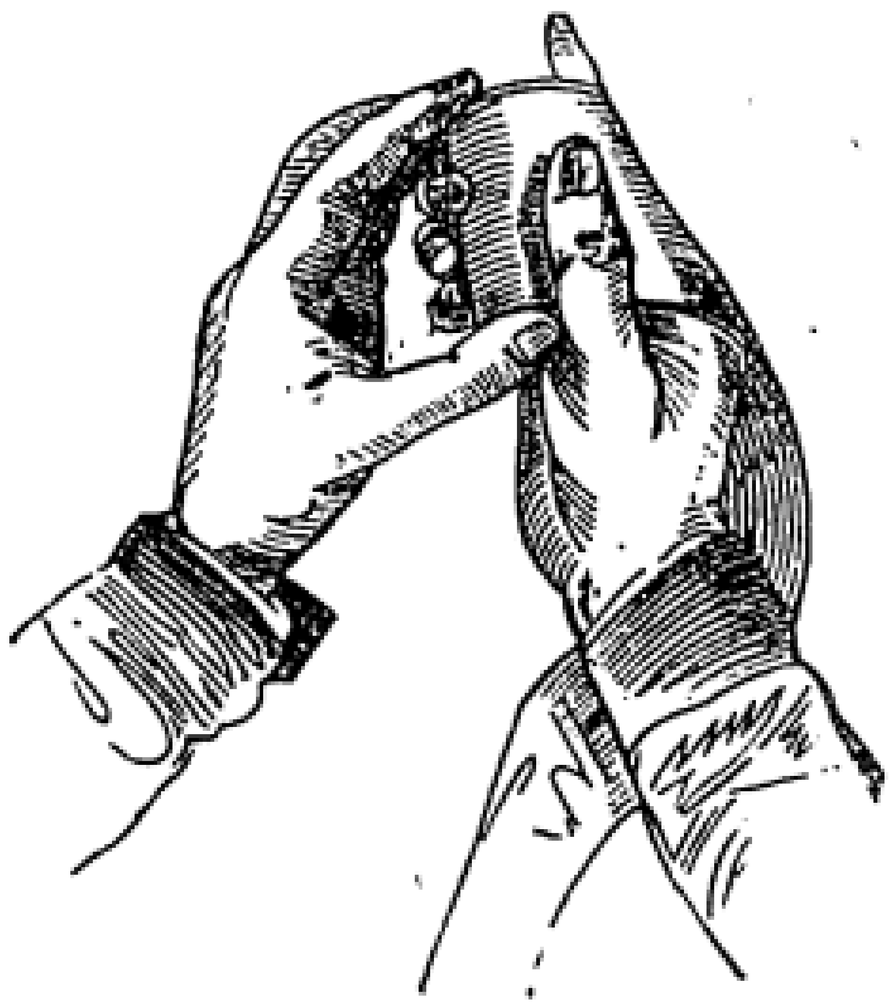
the crank, *b*, is turned with the other hand. Two or three round cross-bars are so arranged as to assist in winding it firmly. When the winding of the band is completed, grasp the roller tightly and withdraw the spindle. In hospital practice, where many bandages are required, the use of a machine will be found very convenient and economical. The surgeon, however, is not always able to avail himself of such aid when bandages are required; hence, a knowledge of the proper mode of manufacturing a roller by hand becomes a matter of importance. The following directions will show the process to be very simple, and a little practice will enable him to roll them rapidly: Place the terminal end of the band upon the thigh, and double it five or six times upon itself, to form an axis around which the remaining part of the band can be rolled. Then roll it between the hand and thigh a few times until it becomes sufficiently firm to be held between the thumb and finger without yielding. Then allow the body to run over the right forefinger, seizing it firmly between this finger and the thumb, so as to make traction. Now cause the cylinder to revolve by means of the last three fingers of the hand in which it is held; at the same time the thumb and finger holding the body of the roller should be made to revolve partially around the cylinder. By this compound movement the roller can be very quickly and neatly made. Figure 26 will explain the directions.

Fig. 26.



A roller designed for the body should be twelve yards long and usually four inches wide; when intended for the head, five yards in length by two inches in width; when for the extremities, eight yards in length by two to three inches in width, according to the size of the limb. A finger or penis bandage should be about one inch wide. In applying the roller, the surgeon commonly carries it from left to right, or from without inward for the right arm or leg, and from within outward for the left. The roller being unwound to the extent of three or four inches, the cylindrical part is grasped firmly between

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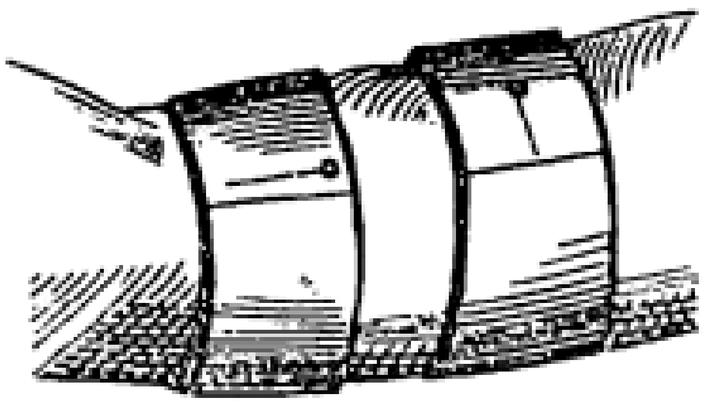
the thumb and fingers, so that it lies very nearly in the hollow of the hand; while the initial extremity is held in the other hand by pressing the fingers firmly against the palm, the thumb pointing toward the side from which the turns are to be carried. Now, placing the *external surface of the initial end* upon the limb, retain it by the pressure of the fingers until one or two turns are made around the part, so as to secure this end, after which the roller may be continued up the limb in the manner to be described hereafter.

§ 2.—The Circular Bandage

Is formed by horizontal turns of a roller, each of which overlaps, or very nearly so, the preceding one, Fig. 27. These bandages are very simple, and are applied to the Forehead, Eyes, Arms, and Lower Extremities. The terminal end of a bandage, whether circular or of any other kind, may be fastened by the use of pins, or by employing small, narrow bands. The pins may be applied in a line with the length of the roller or transversely, Figs. 27 and 28. If, however, the pin be placed as represented in Fig. 28, the head looking from the end of the roller, it will be likely to be withdrawn by the action of the roller itself. Some surgeons prefer securing the terminal end of the roller by means of tape, or by slitting the end of the bandage into two strips, tying them in a boy-knot; but this mode of fastening is only preferable in bandaging the penis, fingers, or toes.

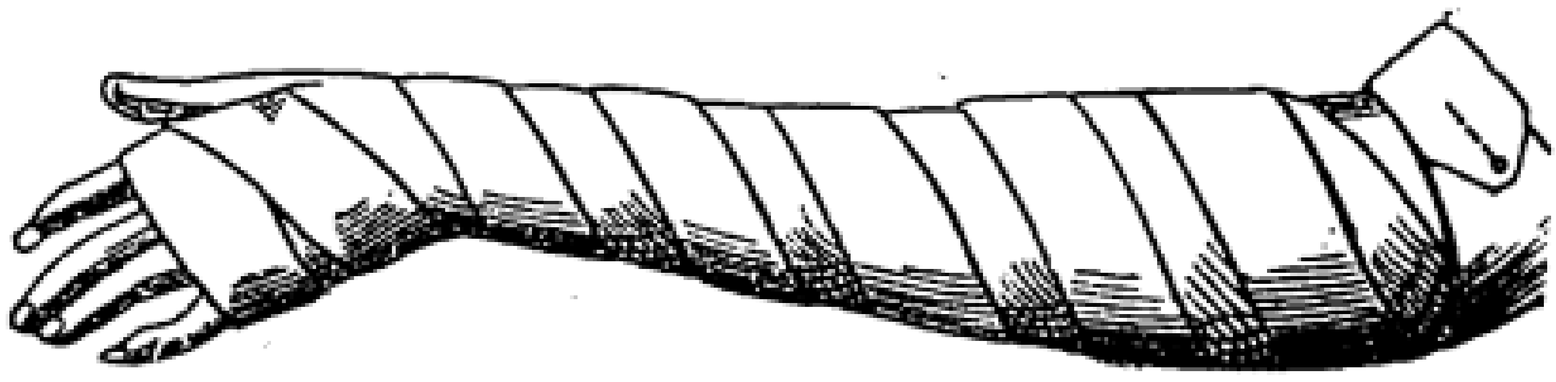
Fig. 27. Fig. 28.



§ 3.—The Oblique Bandage

Differs from the circular in that it ascends the limb rapidly and very obliquely, leaving an interval between the turns, Fig. 29.

Fig. 29.



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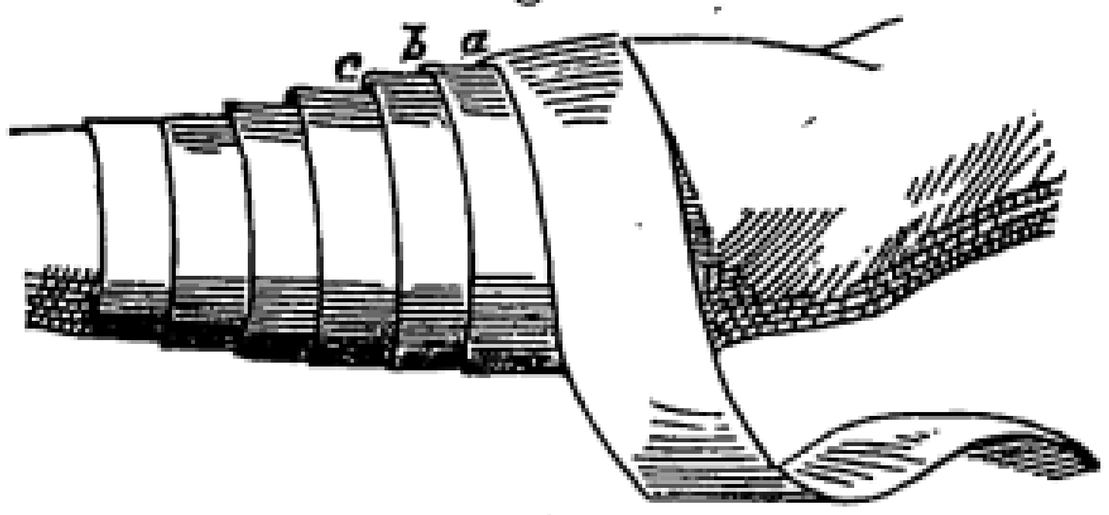
Use.—It is employed principally to retain dressings, though it is sometimes used with other bandages in particular cases, to which reference will be made hereafter.

§ 4.—The Spiral Bandage

Ascends the limb gradually, the turns being in such relation to each other that each succeeding one covers in a portion of the turn which preceded it, thus completely enveloping the surface to which it is applied. Owing to the circumstance that the parts requiring this bandage are more or less conical, especially the extremities, it is plain that, in ascending the arm—for example, passing from the apex of a cone to its base—one edge of the roller will press upon the surface, whereas the other will be entirely free, thus making the openings called *gaps*—*a*, *b*, *c*, Fig. 30. The injury to result from having a bandage thus applied is apparent; hence, in order to equalize the pressure, the roller is, at each turn, half-folded upon itself, making what is called a **Reverse**, which can not be neatly and properly made without frequent practice; and, as it is a matter of importance, the following rules are given:

Fig. 30.



Rules for making the Reverse.—1st. Holding the roller as previously directed, make the simple spiral, *without the reverse*, so long as both edges of the roller press equally upon the part; when the swell of the muscles is reached, place the left forefinger on the middle of the bandage where the fold is to come, in order, simply, to prevent the turns already made from becoming relaxed, Fig. 31.

2d. Slacking the roller between this point and the cylinder, rotate the latter on its long axis by pronating the hand, taking care not to allow the cylinder to sink below the level of the limb till the reverse is complete.

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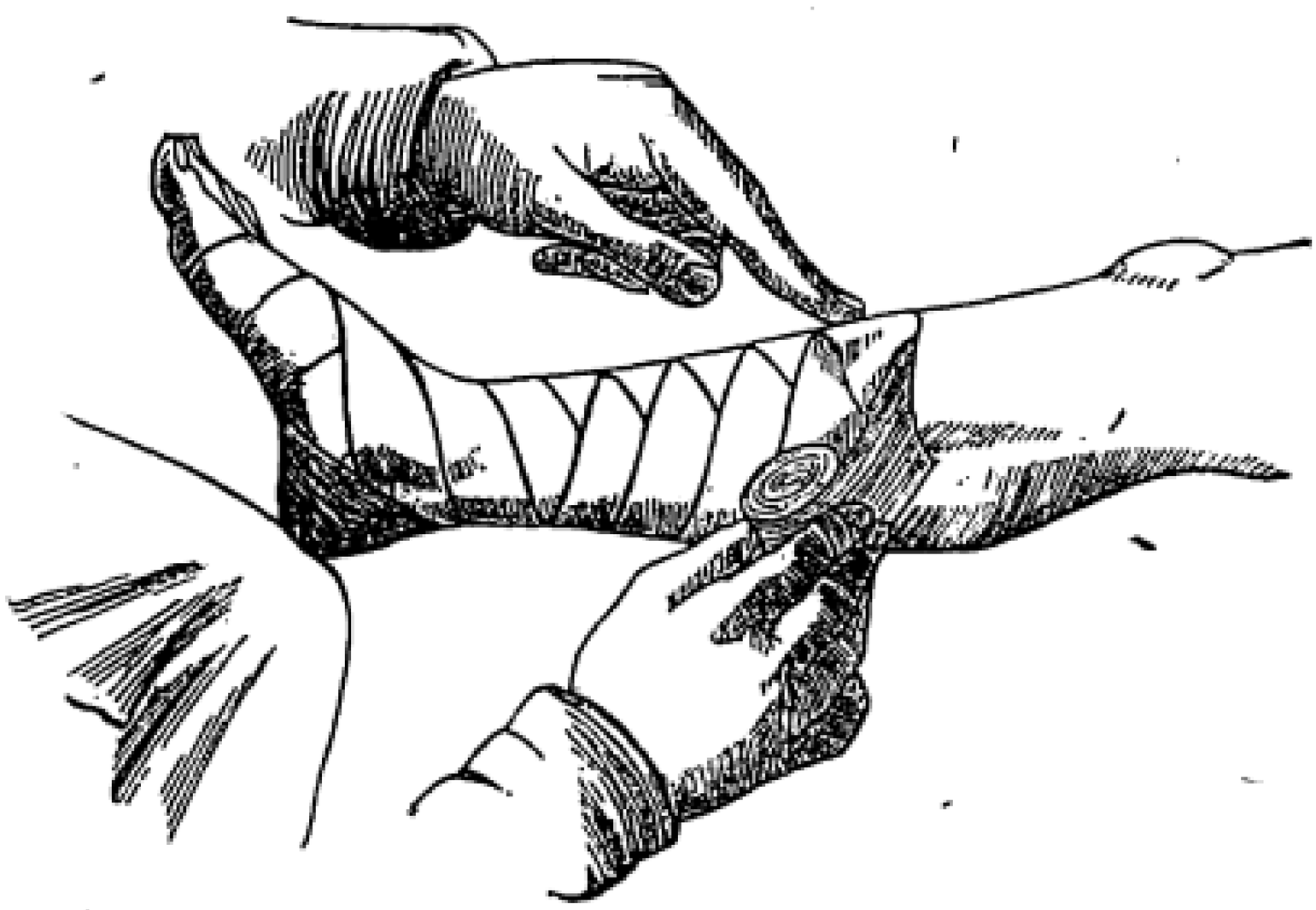
3d. Keep the edges parallel, permitting each succeeding turn to cover in about one-third of the preceding one.

4th. While making the reverse, keep the body of the roller perfectly slack, drawing it sufficiently tight *after the fold is made.*

These reverses are wholly indispensable where the limb is not uniform in size; and as their formation is the most difficult point in the application of the roller, it is proper to urge the necessity of the surgeon becoming thoroughly acquainted with the above rules. A little actual practice is all that is required to become expert, recollecting especially that, *while making the reverse*, no traction should be made, nor the cylinder sunk below the limb, nor held more than six inches from the middle of the turn.

Fig. 31.



The degree of tightness to be observed in the application of the roller is a question worthy of attention; for, unless a bandage be properly adjusted, it had better be dispensed with entirely. If it be too loose, it can not fulfill the indications presented, and if too tight, may produce gangrene. But above all things should the surgeon avoid the culpable practice of wetting the bandage in order to make it adapt itself more perfectly to the part. This practice is liable not only to produce the most intense pain, but is likely also to occasion gangrene, thus exposing the life of the patient. It is not possible to calculate how much the roller will shrink in drying, and hence no one can estimate the degree of pressure which will be produced. But the degree of traction requisite can only be deter-

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mined by the peculiarities of each individual case; though it may be stated, in general, that a bandage is applied in accordance with the indications to be pursued, when it lies evenly and presents a finished appearance, relieving the sufferings of the patient, and which does not of itself become a source of irritation and pain in the course of two or three hours.

There are repeated examples to show that the tendency of all inexperienced dressers is to draw the bandage too tightly, instead of falling into the opposite extreme. Practice only can make perfect; and hence it will afford a valuable lesson to the young surgeon to give some other person the benefit of a roller, to determine the amount of traction that can be sustained without inconvenience; or, what will be still more instructive, let him permit the second person to apply the roller to one of his limbs, when the pain which will be occasioned through want of skill will be likely to suggest healthful reflections respecting his own want of experience.

VARIETIES OF THE SPIRAL.

The **Spiral** has been divided into several kinds, according to the parts of the body which it is designed to cover. Thus, we have the Spiral of the Chest, of the Abdomen, of the Upper Extremity, of the Finger, of all the fingers or Gauntlet, of the Penis, and of the Palm or Demi-Gauntlet; together with the Spiral of the Lower Extremity, including the Spiral of the Thigh, of the Leg, of the Foot, and of the Toes. We have also the French Spiral, which is but a slightly different form of bandage from that last named.

The ability skilfully and neatly to apply and adjust the roller is of very great importance to the surgeon; and the time which the young dresser devotes to its acquisition is well spent. It can only be gained by frequent practice. Verbal descriptions, and the best executed illustrations, should be considered merely as guides and aids; they can not impart practical skill, any more than the perusal of volumes on anatomy, to the exclusion of dissections, can render the student acquainted with the mysterious construction of his material frame. Let each one, therefore, spend a few leisure moments every day, with some companion, in the practical application of the roller. At first, reference to some book on bandaging will be necessary, but after a certain degree

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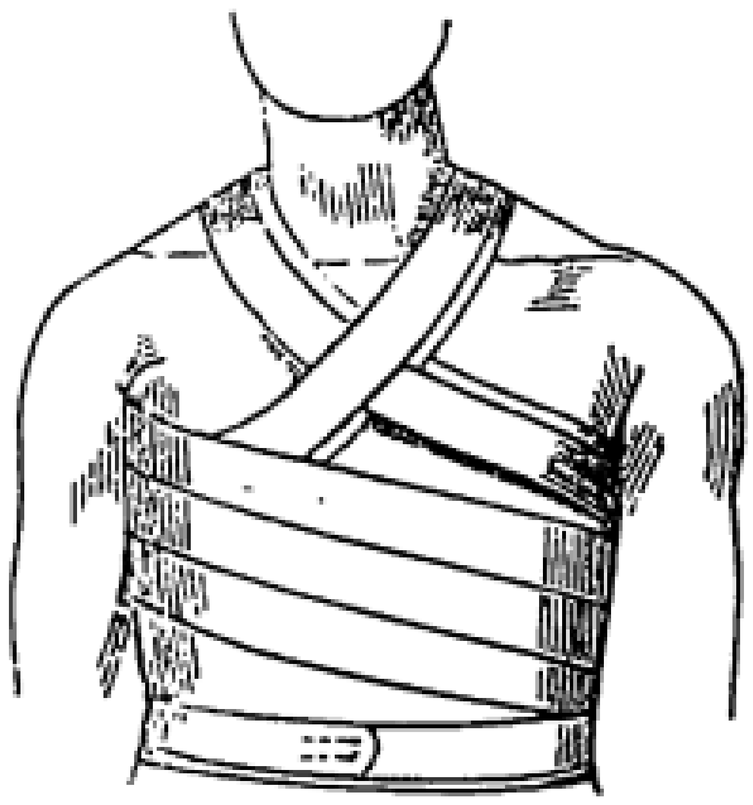
of skill has been acquired, the volume may be laid aside; the student's good sense, and the familiarity which he has already gained with the mode of bandaging, combined with his knowledge of the particular object to be attained in each case, will be his best guides and his best adviser.

1. *Spiral of the Chest.*

This bandage requires a roller twelve yards in length by three inches in width.

Application.—Place the patient in such a position as will make it convenient to pass the roller around the back. Confine the initial end of the bandage on the waist by making one or two circular turns from left to right; then direct the succeeding turns spirally up the chest, covering in one-third of each previous turn, until the axillæ are reached; from the left axilla conduct the roller obliquely in front of the chest to the base of the neck, around which pass to the right axilla; make one other similar turn, after which descend the chest by oblique turns to the point of starting. In the cut, Fig. 32, the terminal end of the roller is represented as passing from right to left instead of from left to right.

Fig. 32.



Use.—To confine dressings on the thorax in case of wounds; to assist in the coaptation of the fragments of fractured ribs; and in fracture of the sternum. In the two last cases, compresses must be placed on the projecting points.

2. *Spiral of the Abdomen.*

Application.—Commence at the lower part of the chest, and carry the roller obliquely around the abdomen, making one or more turns around the thighs to prevent it from slipping upward.

Use.—To produce pressure, as in certain cases of tympanitis, or after the operation of tapping in ascites. If very firm pressure be desired, the double-T bandage may be used.

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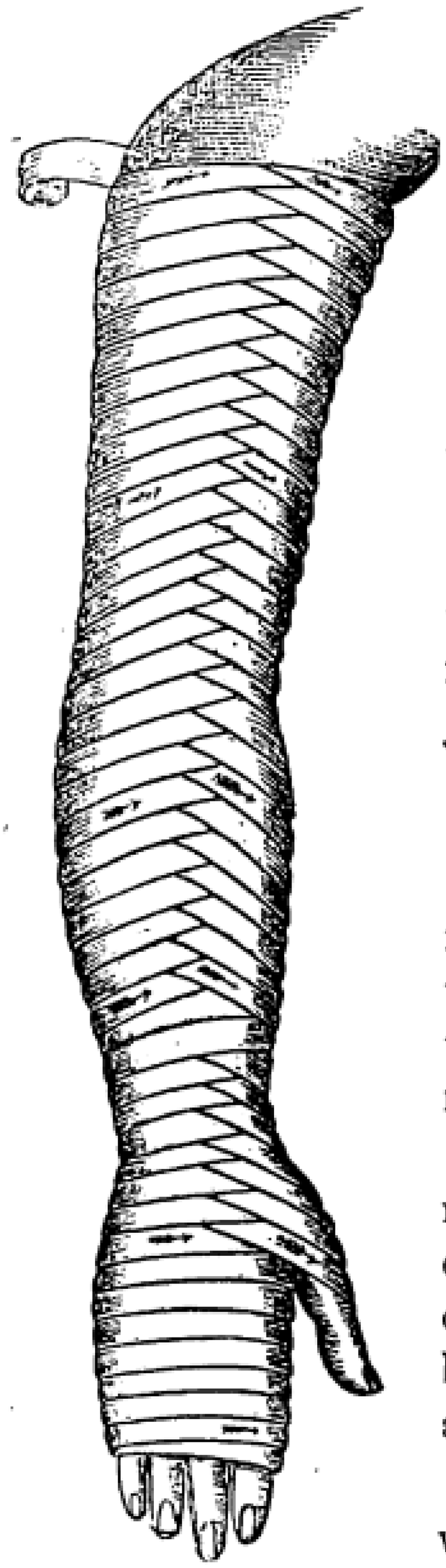
3. *Spiral of the Upper Extremity.*

Fig. 33.



A roller for this extremity should be eight yards long by two or two and a half inches wide.

Application.—Having covered the fingers by the gauntlet (Fig. 34), if it be necessary, give one or two circular turns around the wrist to secure the end of the bandage; then pass the roller obliquely over the back and palm of the hand to the extremity of the fingers, and then ascend to the phalangeo-metacarpal joint of the thumb by three spiral turns without the reverse, Fig. 33; cover this and the wrist-joint by a figure of 8 (to be described), and ascend the limb by reversed turns till the elbow is reached. Cover the elbow-joint with the figure of 8, if it is to be flexed, otherwise use the simple spiral turns with the reverse, continuing the bandage to the shoulder. Compresses to be used when required.

Care must be exercised not to apply too much traction, lest gangrene or ulceration ensue as a consequence. The only difficulty experienced in the application of this bandage is in making the figure of 8 neatly at the elbow.

Use.—It is employed in the treatment of varicose veins, aneurisms, fractures, etc.

4. *Spiral of the Finger.*

This is usually known as the *finger bandage*, and should ordinarily be about one yard in length by one inch in width.

Application.—Fasten the initial end of the roller at the wrist by circular turns; then cross the back of the hand, descending to the end

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of the affected finger by very oblique turns. Commencing at this extremity, ascend the finger by making the spiral with reverses, terminating the bandage by a circular sweep at the point of starting.

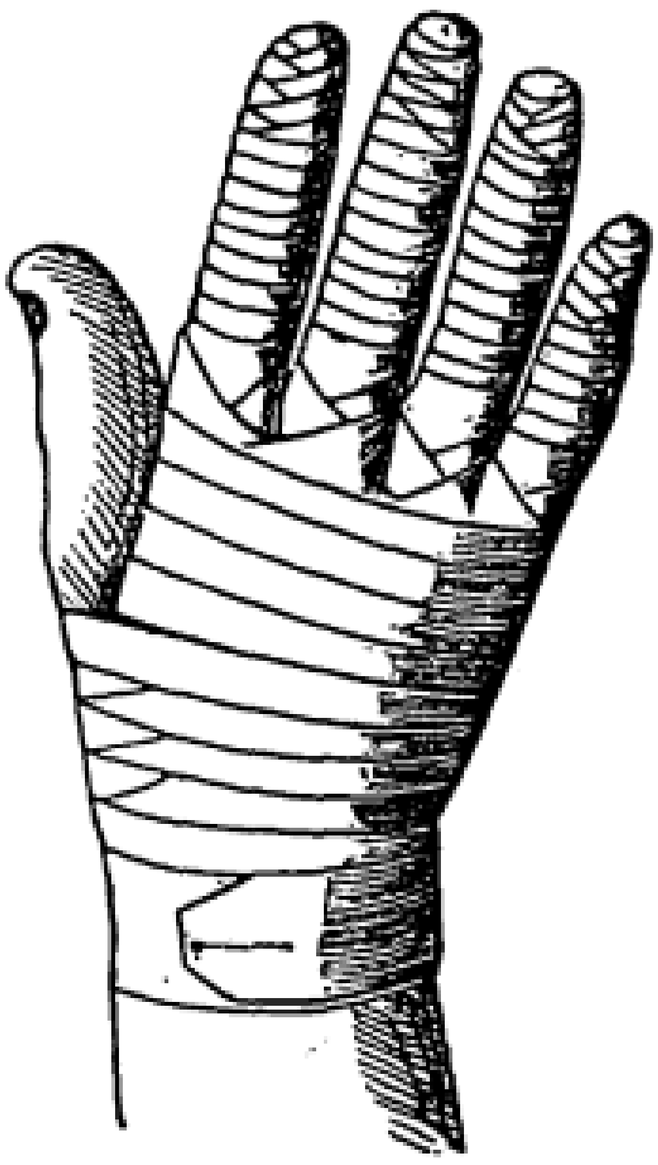
Use.—To retain dressings.

5. *Spiral of all the Fingers, or Gauntlet.*

The gauntlet requires a roller eight yards long by one inch wide.

Application.—Commence at the wrist by making one or more circular turns, then cross the back of the hand, descending to the end of the index finger by oblique turns; now ascend to the base of the finger by spirals with the reverse; then pass to the middle finger and descend it by oblique turns; when at the extremity, return by making the spiral turns as before, and so on till all the fingers are covered, terminating the roller at the wrist, where it may be fastened with a pin, Fig. 34.

Fig. 34.

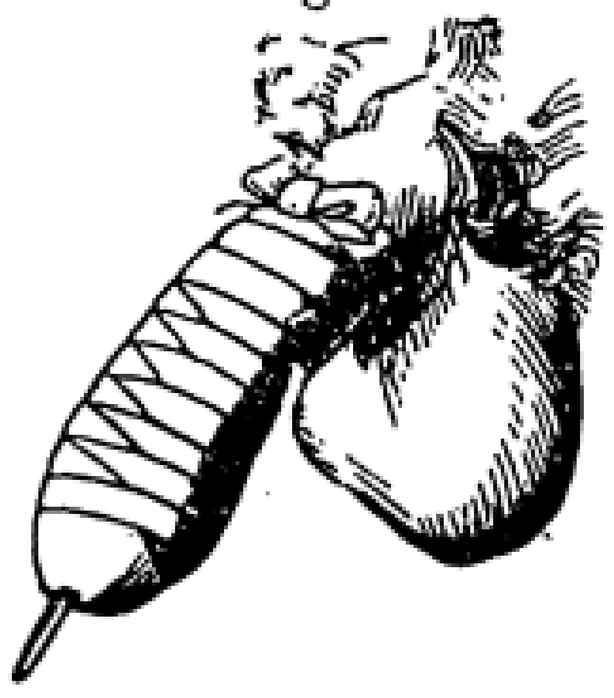


Use.—This bandage is applicable when two or more fingers are injured, or when there is danger of their becoming united if allowed to remain in contact, as in cases of burns; also, in fractures and dislocations.

6. *Spiral of the Penis.*

Application.—Commencing at the glans penis, form the spiral with reverses, terminating at the root of the organ, where the terminal end of the roller may be fastened by slitting it into two parts, which tie in a bow-knot, Fig. 35.

Fig. 35.



Use.—It is employed in retaining dressings, as in cases of chancres and other sores external to the prepuce; also, to compress the urethra when necessary, a catheter being left in it.

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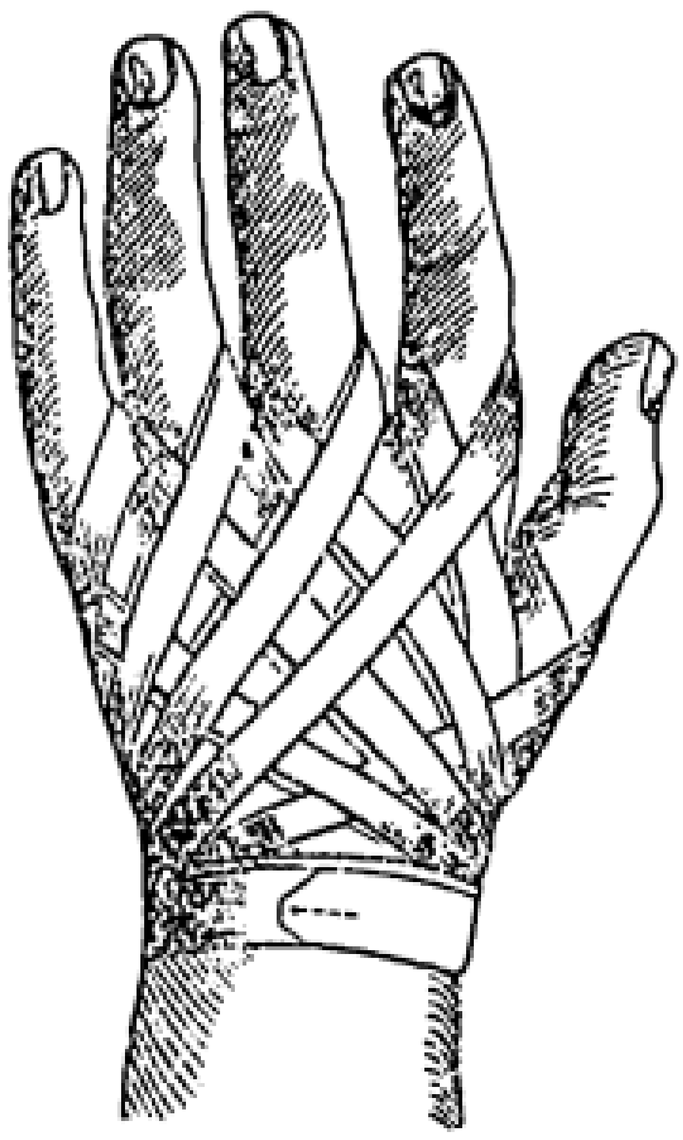
7. *Spiral of the Palm, or Demi-Gauntlet.*

Application. — Confine the initial end of the roller by circular turns, round the wrist, passing from its ulnar to its radial side; then carry the roller obliquely across the back of the hand (or the palm, according to which side the dressing is to be retained); thence to the radial margin of the forefinger; encircle its base, and continue the roller around the wrist; pass in like manner, by oblique turns around the base of each finger, including the thumb, terminating the bandage at the point of starting, Fig. 36.

The above is similar to the directions given in surgical works for the application of this bandage; but the figure used by way of illustration, Fig. 36, does not correspond, as a critical inspection will plainly show. In order that the figure may constitute a correct guide, it should be studied in connection with the following directions, which are equally as simple as those already given, and may be adopted if preferred: Having the hand prone, fix the initial end of the roller by circular turns, commencing at the top of the wrist, its radial side; upon reaching the ulnar side the second time, carry the roller under the wrist to the carpo-metacarpal joint of the thumb; encircle its base, pass obliquely across the back of the hand; thence around the ulnar margin of the wrist, passing to the carpal extremity of the radius; from which continue onward to the cubital side of the base of the little finger, encircle it, and pass again to the ulnar margin of the wrist, thence to its radial side; from which point continue obliquely across the back of the hand, to pass around the root of the third finger; and so on with the two remaining fingers, terminating the bandage by a circular sweep at the wrist.

Fig. 36.



8. *Spiral of the Lower Extremity.*

This bandage is composed of two rollers, each seven and a half yards long by two and a half inches wide.

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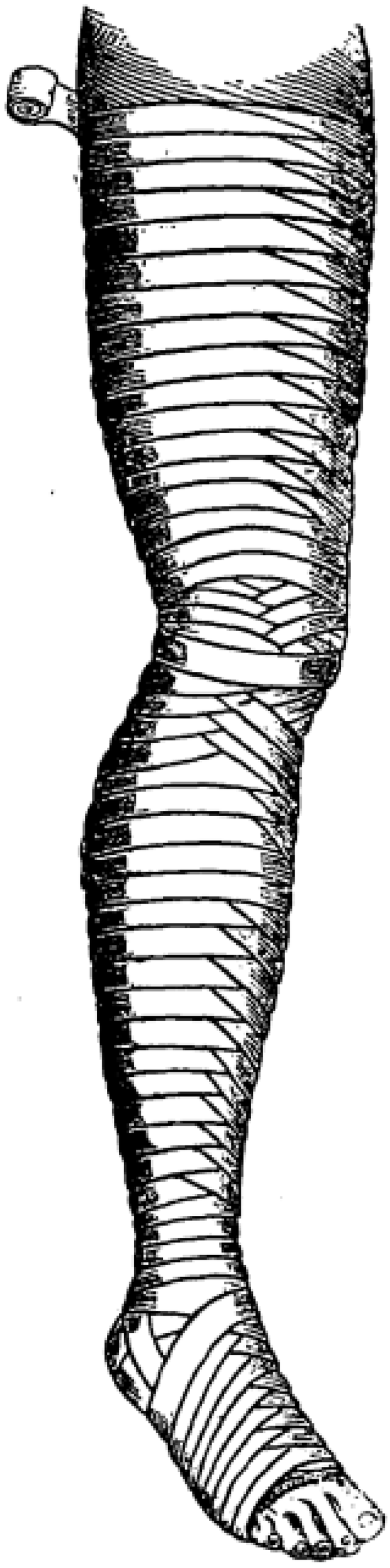
Application.—The patient may be seated with his heel resting on the point of the surgeon's knee, or he may assume a horizontal position, having his limb supported by assistants. The surgeon, placing himself on the outside of the limb, if he be standing, should commence by one or more circular turns from without inward, immediately above the malleoli. Then descend from the external malleolus obliquely across the instep, and under the sole of the foot to the extremity of the little toe; from this point cover in the foot to the instep, by spiral reversed turns, which are to be continued up the leg to the knee, when the figure of 8 should be employed. With a second roller the remaining portion of the limb may be covered, Fig. 37.

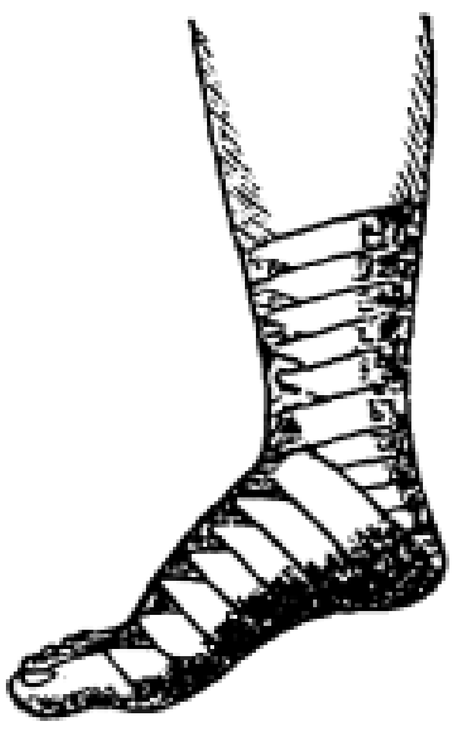
Fig. 37.



Use.—It is employed in the treatment of fractures, ulcers, varicose veins, and œdema.

The only objection which can be raised to this mode of applying the bandage is, that it leaves the heel uncovered; and where there is firm pressure—as in the treating of varices, ulcers, etc.—this part is disposed to swell and become painful if left unprotected; hence, in particular cases it is advisable to cover it, which may be accomplished as follows: Confine the initial end of the roller, covering the foot to the instep, as before directed; from the top of the instep pass directly over the point of the heel to the side of the ankle; thence around the front of the instep and the sole of the heel, covering in the anterior half of the previous turn; continue on to the outer malleolus; and thence in front of the joint again to the sole and point of the heel, thus forming around the leg, instep and sole a figure of 8, Fig. 38.

Fig. 38.



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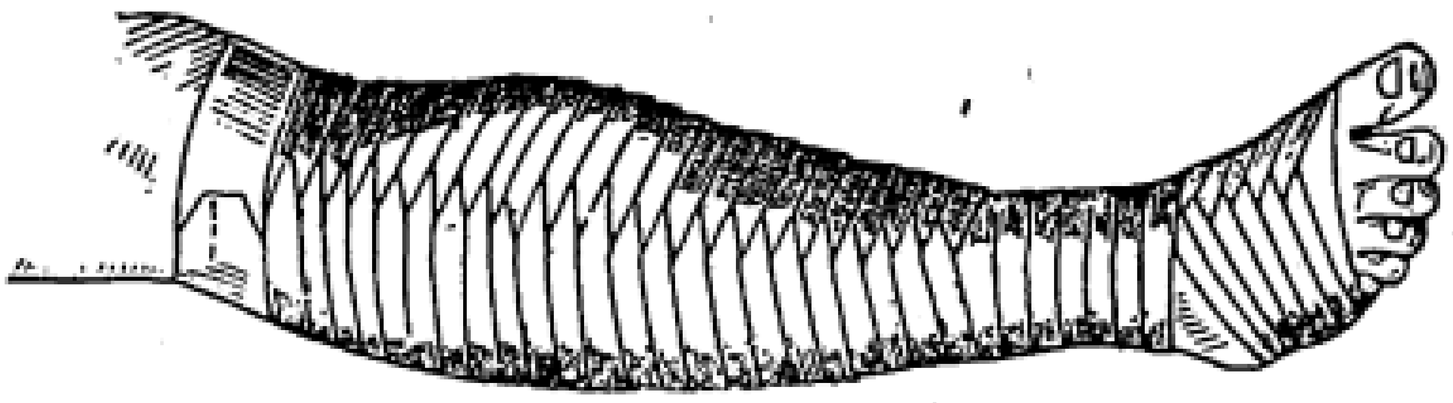
9. *French Spiral.*

Application.—Place the initial end of the roller upon the outer side of the instep, and pass obliquely across the upper surface of the foot to the ball of the great toe; thence beneath the sole to the opposite side; then proceed with as many spiral reversed turns as will be necessary to carry the bandage well up in front of the instep, when a few circular sweeps are to be passed around the

Fig. 39.



malleoli and immediately above; after which, ascend the limb by the spiral reverses, Fig. 39.

Use.—This form of bandage has the same general use as the one just described and represented in Fig. 38. As it leaves the heel and toes well exposed, it is, on this account, principally employed in the application of the *Dextrine* or *Starch Bandage.*

5. *The Crossed, or Figure of* 8 *Bandage,*

Is one of the neatest and most useful bandages employed by the surgeon, deriving its name from its shape. It is particularly applicable in covering joints or other parts requiring a firm and perfectly uniform pressure. Either the single or double-headed roller may be used. It is divided into several kinds, including the Spica, each of which will be treated of under the following head:

VARIETIES OF THE CROSSED, OR FIGURE OF 8.

1. *The Crossed of One Eye*

Requires a roller five yards long by two inches in width.

Application.—If the hair be long or very abundant, place a closely-fitting cap of muslin, or of a similar material, on the head previous to the application of the bandage, to prevent the roller from slipping. If for the right eye, pass from right to left around

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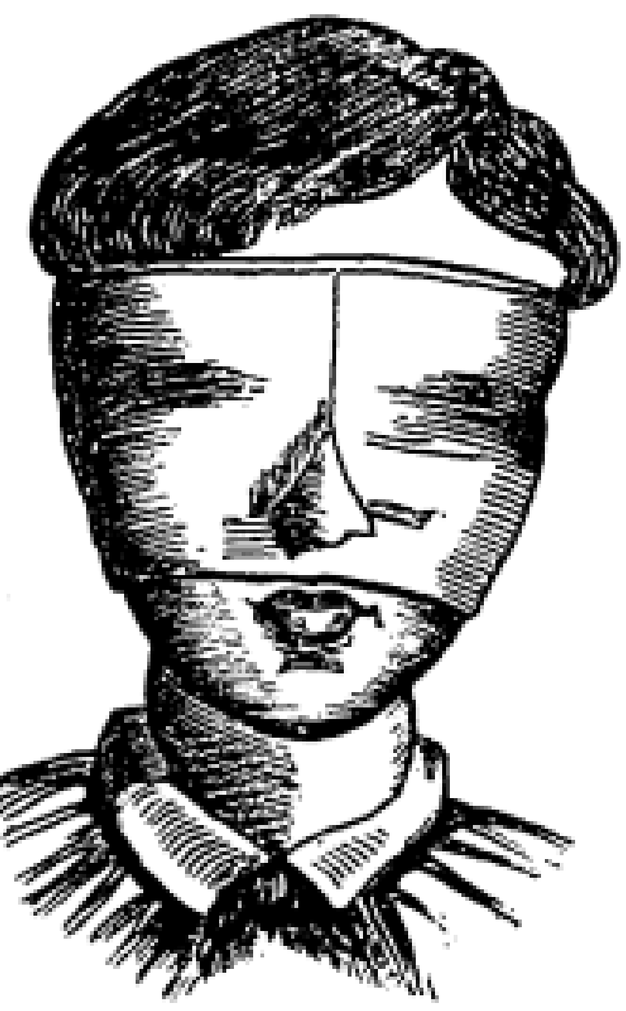
the forehead and nape of the neck by circular turns; provided it be for the left eye, pass in the opposite direction. On reaching the nape of the neck the third time, carry the roller under the ear of the affected side, and obliquely over the jaw and eye, covering the root of the nose, without carrying the band low enough to interfere with the vision of the sound eye; thence across the temple to the occiput, making the necessary number of similar turns to fullfil the object of the bandage, terminating it by circular sweeps around the forehead, Fig. 40.

Fig. 40.

Fig. 41.



Use. — Simply to retain dressings; or, if desirable, to make pressure.

2. *The Crossed of Both Eyes.*

This bandage may be made with a double or single-headed roller, seven yards long by two inches wide.

Application —Make two or three circular turns around the forehead and occiput by passing from right to left, or *vice versa*, on reaching the back of the head, pass under the ear up over the eye, root of the nose, and the parietal protuberance to the neck again; at the third turn pass from the parietal protuberance to the temple, instead of round the occiput; then cross the root of the nose, the eye and the cheek, making a X with the turns first made; continue with a sufficient number of similar turns, terminating by circular ones.

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Use.—It is employed as a retaining bandage. Pressure can be secured by a much more simple bandage, which consists of compresses and a broad piece of linen passed around the eyes, reaching to the middle of the forehead above, and terminating below just above the margin of the upper lip, and having an opening large enough to admit the nose, Fig. 41.

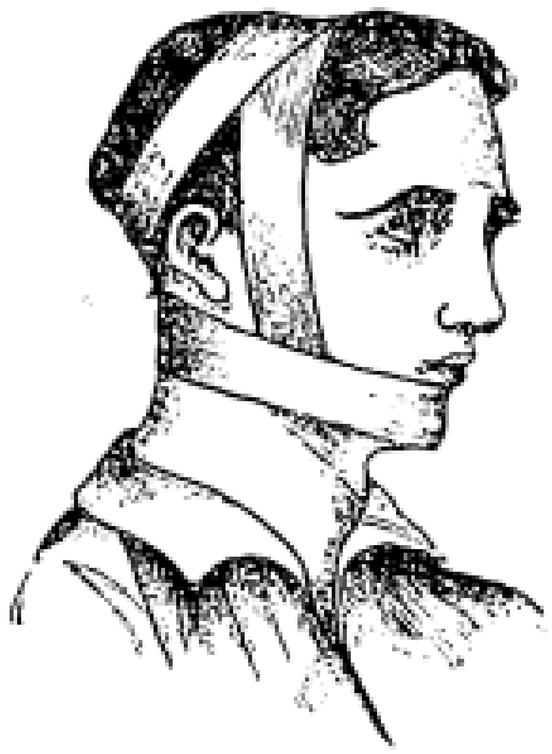
3. *The Crossed of the Angle of the Jaw*

Requires a roller 5 yards long by 2 inches wide, and a compress.

Application.—Secure the end of the bandage by circular turns around the cranium, passing from right to left, if the left side be affected; the reverse, if the injury or disease be upon the right. From the occiput pass the roller under and behind the ear of the sound side; under the jaw to the angle of the jaw on the affected side, placing a compress on and immediately behind this angle. Now carry the roller over the compress and the side of the face in front of the ear, obliquely over the vertex, behind the ear opposite the affected side. Make several turns in like manner, reversing the last in order to terminate the bandage by passing horizontally around the head.

Fig. 42.

Fig. 43.



Use.—It is sometimes employed to retain dressings in the parotid region; but its principal use is in the treatment of fracture of the neck and angle of the jaw, being the most efficient bandage used in cases of this character, as it forces the angle forward and inward to the anterior fragment by counteracting the action of the pterygoid

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muscles. In the application of this bandage in the treatment of fracture, omit the circular turns, sometimes recommended around the neck and chin, as they are of no benefit, but rather tend to displace the fragments.

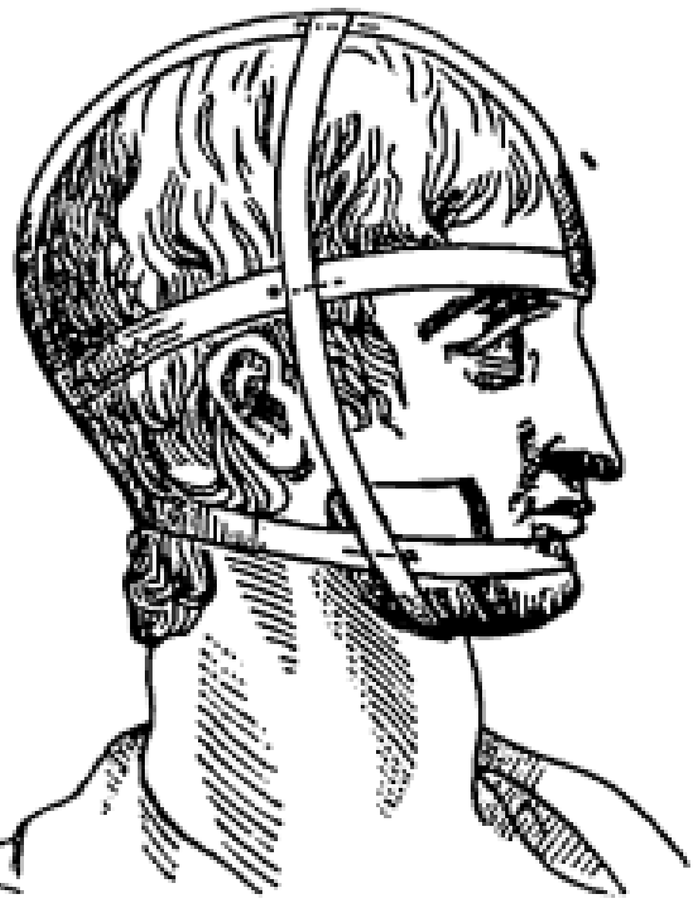
4. *Barton's Bandage for the Jaw.*

A roller five yards long by two inches wide is required.

Application.—Place the initial extremity of the roller on the occiput immediately below its protuberance, and carry the cylinder obliquely over the center of the parietal bone to the top of the head; thence descend across the right temple and zygomatic arch, passing beneath the chin to the zygoma of the left side; from this point proceed to the occiput again by traversing obliquely the zygoma, the temple, the summit of the cranium, and the right parietal bone. Now conduct the roller to the left, winding around the base of the jaw, to return to the occiput; repeat this same course until the roller is spent, placing a pin at the vertex and at other points where the bandage crosses itself, as represented in Figs. 43 and 44.

Fig. 44.

Fig. 45.



Use.—It is employed in the treatment of fractures of the lower jaw, anterior to the angle. This is eminently the most simple, easily applied and useful bandage that has been invented for this purpose.

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5. *Professor Gibson's Bandage,*

Though not exactly a figure of 8, is similar to the above, and may be described here. It consists of a roller five yards long by an inch and a half or two inches wide, with suitable compresses.

Application.—A piece of pasteboard having previously been softened by immersion in hot water, and molded to the form of the chin and jaw, as seen in Fig. 45, is first applied upon the seat of fracture. The middle portion of the bandage being placed upon the chin over the splint, then, placing a linen compress of suitable thickness under the chin, confine it by passing the roller several times perpendicularly over the side of the face, the zygoma, and summit of the head, and thence beneath the jaw; changing the course of the bandage at the temple, encircle the occiput and forehead by horizontal turns; a few horizontal turns are also to extend around the nape of the neck, along the ramus of the jaw, over the point of the chin. To render the whole more secure, a short strip may be fastened to the horizontal turns, encircling the forehead, extending to the lower horizontal turns, Fig. 45.

Use.—Fractures of the inferior maxilla.

6. *The Posterior Figure of* 8 *of the Chest*

Requires a roller seven yards long by three inches wide.

Application.—Having the anterior edge of the axillæ well protected by compresses or cotton, in order to prevent them from becoming chafed, direct an assistant to draw the patient's shoulders well back, and commence the initial end of the roller at the superior part of the left arm, by making three or four spiral reversed turns from before backward, and from within outward. From the front of this shoulder, pass obliquely over the back to the right axilla; thence in front of the shoulder over the back to the axilla of the left side again; continue to make similar turns so long as the roller will permit, fastening its terminal end by one or two circular sweeps around the body or arm, Fig. 46.

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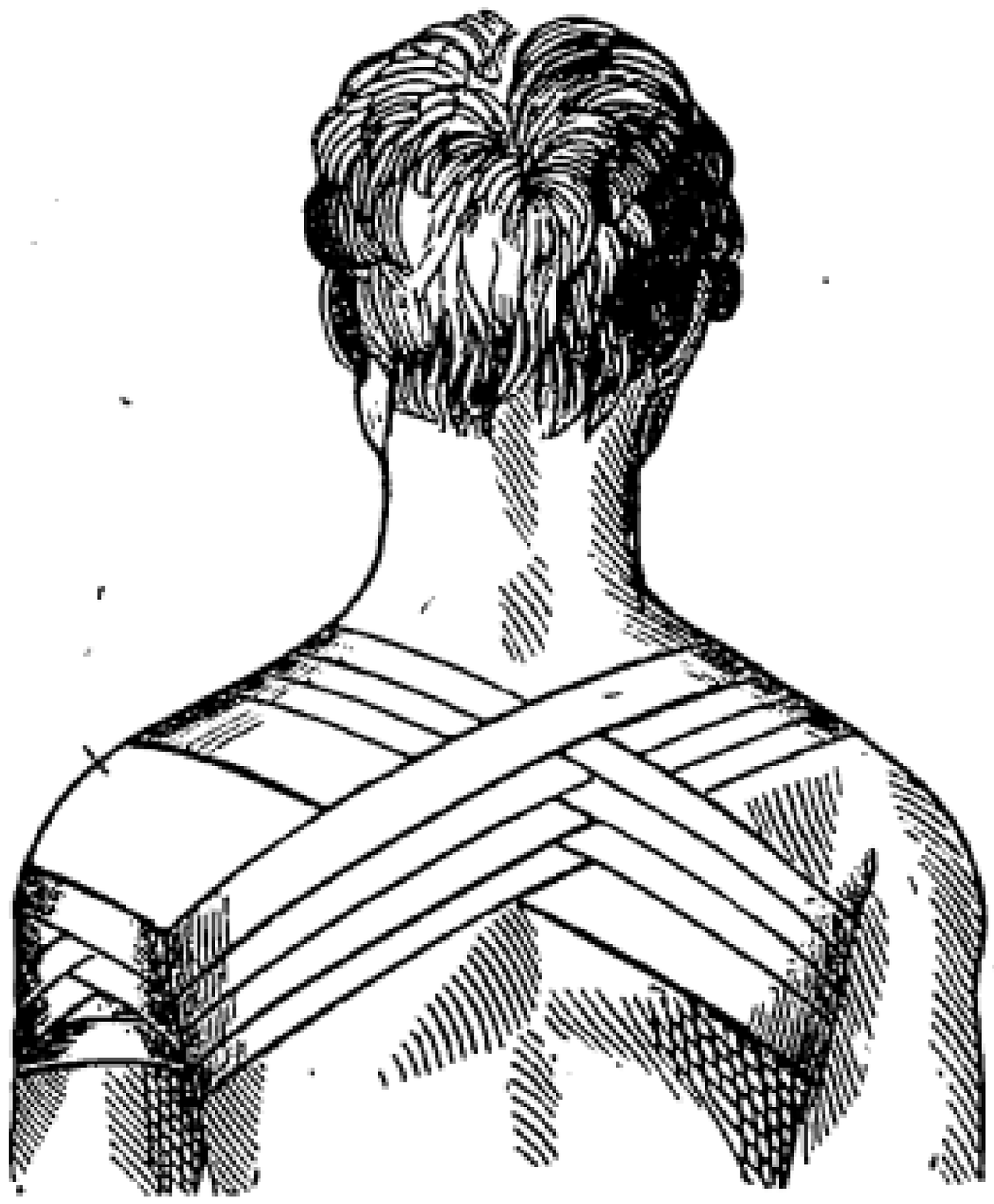
Fig. 46.



Use.—Formerly it was the principal bandage used in the treatment of fractured clavicle; but more modern ingenuity has devised means better adapted to the treating of this injury, and hence it is little employed for this purpose at present. It may be of service in uniting wounds of the back, or in preventing contractions from burns, or other causes, on the front of the chest.

7. *The Anterior Figure of* 8 *of the Chest*

Requires a roller of the same dimensions as the above.

Application.—This bandage is applied the same as the one just described, with the exception of the turns crossing each other on the breast instead of the back.

Use.—To unite longitudinal wounds of the breast, in dislocation, anteriorily, of the sternal end of the clavicle, when compresses should be placed on the upper part of the sternum; and in severe burns on the back, when deformity is threatened by the contraction of the cicatrices.

8. *Spica of the Shoulder*

Should be eight yards long by two and a half inches wide.

Application.—Leaving about two feet of the initial end of the

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roller free, commence by making one or more spiral reversed turns around the superior part of the arm of the injured side, passing from without inward, and from before backward. Then pass behind the arm over the shoulder, obliquely downward across the front of the chest to the axilla of the sound side; thence around the the back, obliquely upward over the shoulder and down in front, passing under the axilla of the affected side. Continue to make similar turns, covering one-third of each preceding one. The axilla must be well supplied with suitable compresses or cotton. After securing the terminal end of the bandage, bring the initial portion, which was left free, over the anterior folds of the axilla and the shoulder around the back of the neck, to terminate in front of the chest on the sound side, Fig. 47. When this bandage is made to ascend from the point of the shoulder toward the neck, it is called the *Spica Ascendens*, if from the neck to the shoulder, *Spica Descendens*.

Fig. 47.

Use. — To make compression around the extremity of the shoulder, and in the treatment of dislocation of the humeral end of the clavicle.

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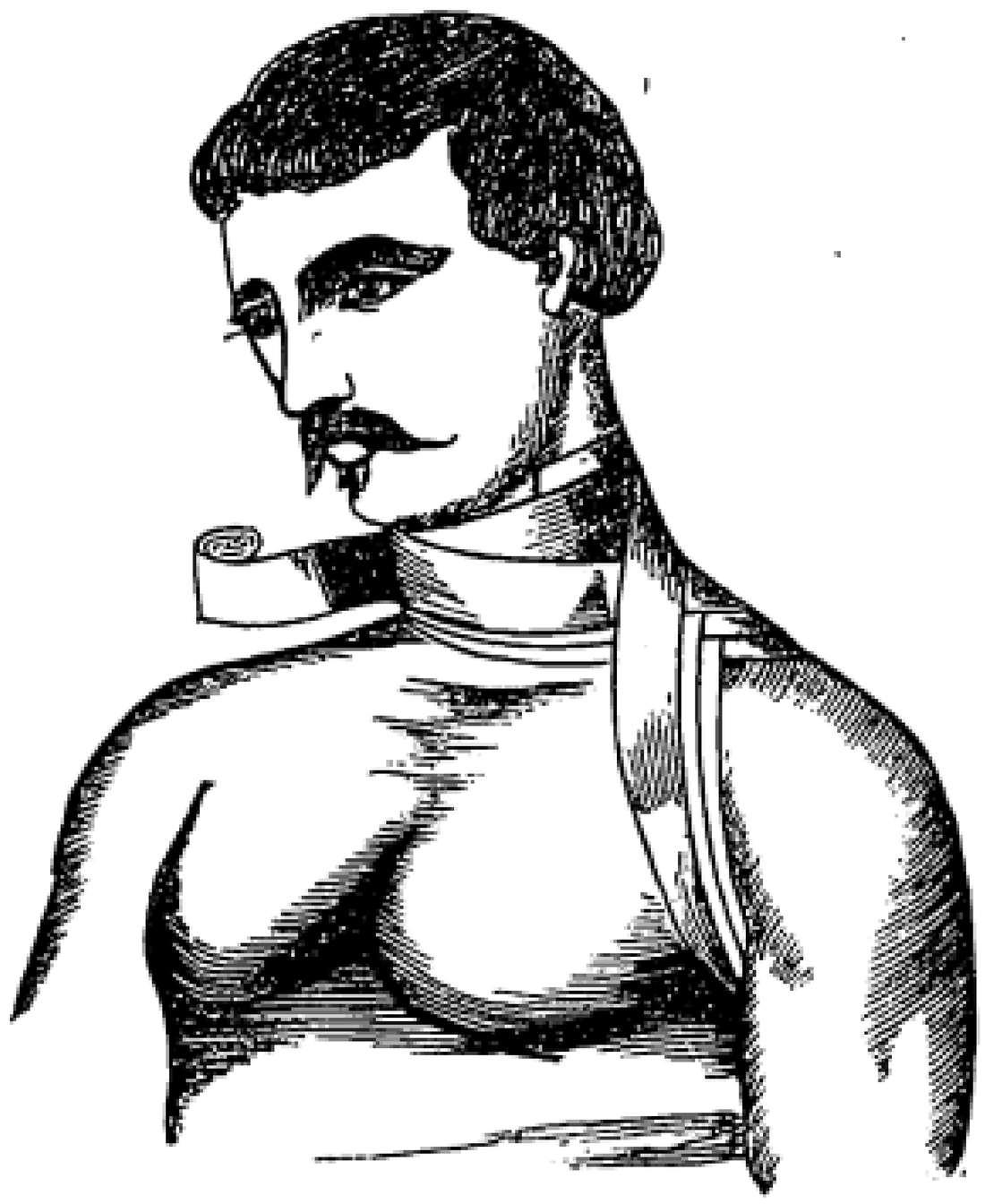
9. *Figure of* 8 *of the Neck and Axilla.*

The roller should be five yards in length by two inches wide.

Application.—Directing the roller from before backward, and from left to right, secure the end by one or two circular turns around the neck; reaching the base of the left side, pass over and behind the shoulder, under the axilla; thence in front to the root of the neck on the same side; round the neck to the left side again, to make the subsequent turns in like manner, Fig. 48.

Fig. 48.



Use.—This is a very serviceable bandage in retaining dressings about the shoulder, or in the axilla. It must, however, be applied with care, that it may not press too firmly, thus interrupting circulation or causing cramps in the hand.

10. *Figure of* 8 *of One Breast*

Requires a roller eight yards long by two and a half inches wide.

Application.—It may be applied by confining the initial extremity of the roller at the waist; reaching the left side of the body,

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