DEVICE FOR HOLDING AND GUIDING THE FINGERS IN WRITING.

A metallic rod, A, made about two inches longer than the width of the hand, and having each end rounded, is passed under the hand as shown in Fig. 1. To the lower portion of the rod is attached a ring, B, encircling the fourth finger. The ring, C, upon the first finger, is provided with a loop through which the rod is passed; this allows the device to be adjusted to hands of different sizes.

The use of this device does away with the habit of doubling under the third and fourth fingers and of allowing the hand to rest on its right side upon the desk; the penholder cannot fall below the knuckle joint. The thumb, fore and second fingers are free for any movement, and as the writer has complete command of his fingers he is not inclined to hold them too straight or the penholder too tightly. While a correct position is at once assumed, the writer is bound to keep his wrist off the desk.

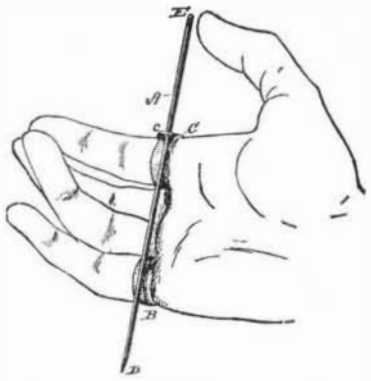


Fig. 1.

Fig. 2.

DEVICE FOR HOLDING AND GUIDING THE FINGERS IN WRITING.

This invention has been patented by Ignaz Bergman, of Fort Madison, Iowa.

An Antidote for Hydrophobia.

The celebrated French chemist, M. Louis Pasteur, claims to have discovered a complete antidote for hydrophobia. In an interview with a Paris *Figaro* correspondent he is reported as saying:

"Cauterization of the wound immediately after the bite, as is well known, has been more or less effective, but from to-day anybody bitten by a mad dog has only to present himself at the laboratory of the Ecole Normale, and by inoculation I will make him completely insusceptible to the effects of hydrophobia, even if bitten subsequently by any number of mad dogs.

"I have been devoting the last four years to this subject. I found out, in the first place, that the *virus rabique* loses its intensity by transmission to certain animals, and increases its intensity by transmission to other animals. With the rabbit, for instance, the *virus rabique* increases; with the monkey it decreases. My method was as follows: I took the virus direct from the brain of a dog that had died from acute hydrophobia. With this virus I inoculated a monkey. The monkey died.

"Then with the virus—already weakened in intensity—taken from this monkey I inoculated a second monkey. Then with the virus taken from the second monkey I inoculated a third monkey, and so on until I obtained a virus so weak as to be almost harmless. Then with this almost harmless virus I inoculated a rabbit, the virus being at once increased in intensity.

"Then with the virus from the first rabbit I inoculated a second rabbit, and there was another increase in the intensity of the virus. Then with the virus of the second rabbit I inoculated a third rabbit, then a fourth, until the virus had regained its maximum intensity. Thus I obtained virus of different degrees of power. I then took a dog and inoculated him, first with the weakest virus from the rabbit, then with the virus from the second rabbit, and finally with the rabbit virus of maximum intensity. After a few days more I inoculated the dog with virus taken directly from the brain of a dog that had just died of acute madness. The dog upon which I had experimented proved completely insusceptible to hydrophobia. The experiment was frequently repeated, always with the same successful result.

"But my discovery does not end here. I took two dogs, and inoculated them both with virus taken directly from a dog that had just died of acute hydrophobia. I let one of my two dogs thus inoculated alone, and he went mad and died of acute hydrophobia. I subjected the second dog to my treatment, giving him the three rabbit inoculations, beginning with the weakest and ending with the strongest. The second dog was completely cured, or rather became completely insusceptible to hydrophobia."

M. Pasteur then went to a kennel and caressed a dog that had undergone this latter operation. "*Voyez!*" said Mr. Pasteur, "*comme il est bien gentil.* Whoever gets bitten by a mad dog has only to submit to my three little inoculations, and he need not have the slightest fear of hydrophobia."

Manufacture of Pearl Buttons.

At Springfield, Mass., there is a manufactory of pearl buttons, and a reporter of the *Republican* stepped into the factory the other day, and he tells briefly what he saw:

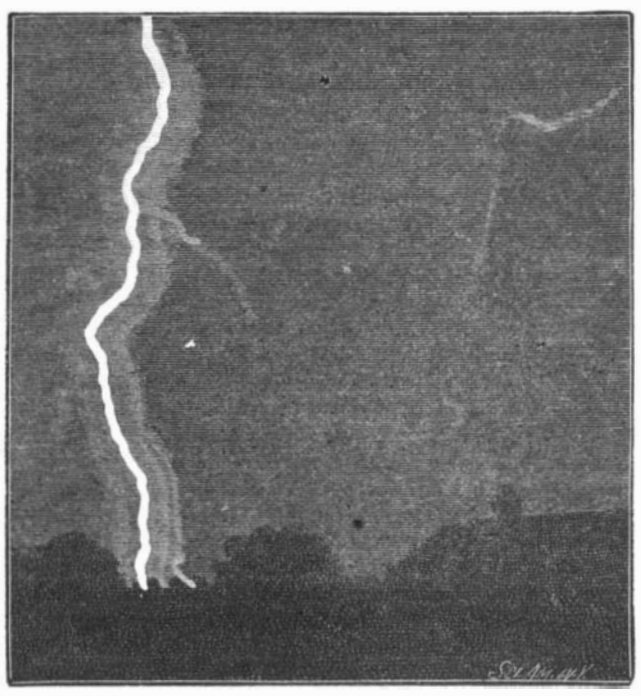
The Springfield Pearl Button Company has now had a year's life, and if increase of working force is any criterion, it is a vigorous infant. It is unique among New England button making industries in that it uses only simple machinery, depending mainly on the trained hands and eyes of its twenty-five or thirty workmen for the perfection of its products. The marine shells from which the mother of pearl is obtained—shells of the pintadina variety, coming from the East and West Indies, California, and, in fact, all quarters of the world—are taken as they come packed, are rinsed in water, and are then ready for turning. The shell is made up of the mother of pearl inside, this being of a creamy or varied coloring, and a thinner outer layer of a bony texture. The shell is pierced through a number of times by a hollow boring tool, fitted to a common lathe, some dozens of small disks being the result. Each disk then goes through three or four or sometimes a half dozen more operations at the hands of the men standing in a line at one work bench, each having a lathe and a three-cornered file, sharpened to suit his work. The bony part is cut from the disk and the button shape given it while revolved by the lathe against the sharp steel held in the workman's hand, no gauge being used. Some of the buttons are grooved with a few lines on the face, and a few holes are punched in each. Part of the buttons are subjected to a mysterious coloring operation in a revolving box, but the best grades are finished in the natural colors. The polishing is mainly done by hand.

The whole process is very quick, and the method has the great advantage of being immediately adapted to any style of button desired, no change in machinery being required, but merely a fresh adjustment of flesh and blood. All sizes of ordinary buttons are turned out, as well as some "collar buttons," though no fancy articles are made. The light-colored material is the most valuable. Fifty cents a pound is paid for the rough shells, but the buttons are worth from one to seven or eight cents each.

PHOTOGRAPHING A FLASH OF LIGHTNING.

The accompanying engraving was made directly from a photograph sent to us by Mr. W. C. Gurley, of Marietta Observatory, who writes as follows:

"The reproduction of a flash of lightning by photography would, a few years since, have been deemed quite an impossibility, but the introduction of the rapid bromo-gelatine process has rendered it not only possible but comparatively easy of accomplishment.



The accompanying photograph is from a negative taken by myself during a thunder storm which passed several miles south of the observatory on the evening of May 4.

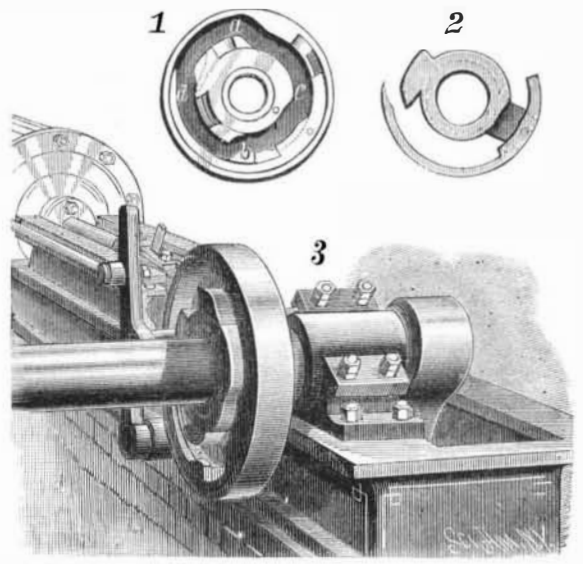
Wheatstone has demonstrated by direct experiment that the duration of a single flash of lightning cannot possibly exceed a millionth of a second. That a photograph showing the detail of the one mentioned could be taken in this inappreciably short time seems quite wonderful, not to say incredible. The plate employed was one of Cramer's extra rapid, and developed with strong pyrogallic developer.

It will be observed that the flash is not of the usually depicted zigzag form, and that it seems to be alternately contracted and expanded in its passage through the atmosphere.

Taking the interval between the flash and the report, I estimated its distance from the camera to have been about five miles."

CUT-OFF VALVE GEAR.

The valve is operated by a rod connected with a rocking lever provided with a pin which enters an irregular or eccentric adjustable groove in a disk mounted on the crank shaft. The disk is flanged and is provided with an eccentric track, half of which is formed by the inner surface of the flange, and the other half by a cam ring (shown in the lower part of Fig. 2) held to slide between the remaining half of the flange, and a ridge projecting from the surface of the disk, parallel with and close to the flange. One end of the ridge is united to the flange, but the other end is open to permit the cam ring to pass in and out. A segmental ridge of varying thickness projects from the inner surface of the disk, and also forms an eccentric track.



McCARTER'S CUT-OFF VALVE GEAR.

A neck projects from the disk around the central aperture, and between this neck and the first ridge is formed a segmental slot. Upon the outer side of the disk is a collar, around which fits an eccentric ring (shown in the upper part of Fig. 2) provided with a cam projection, diametrically opposite which is a hole for a screw. This ring is held in the space between the collar and the segmental ridge. Fitting loosely in the outer collar is a ring secured to a plate which extends to the periphery of the disk. A screw passes through a hole in the plate, through the slot in the disk, and into the eccentric ring. A roller, mounted on a pin in the rocking lever, passes into the irregular groove formed by these parts. The cam ring, the eccentric ring, and the plate projecting from the ring encircling the collar move together. Fig. 1 is a face view of the disk with the parts in position, the shaded portion showing the path of the roller.

When the piston is at that end of the cylinder farthest from the shaft, steam will be admitted to the rear of the cylinder, and the piston will be moved toward the shaft, the slide valve remaining motionless. The projection, *c*, then strikes the roller, the lever is shifted, and the steam is cut off. The slide valve does not move until the stroke has been completed, when the end, *a*, of the ridge strikes the roller, swings the lever and rod in a direction from the shaft, thereby shifting the valve so as to admit steam into the front end of the cylinder. The valve again remains stationary, until the end, *d*, of the cam ring strikes the roller, when the steam is cut off. During the stroke toward the shaft the valve is opened to admit steam by the projection, *b*. The points, *a* and *b*, which govern the admission of steam are fixed, but the points, *c* and *d*, which govern the cut-off are movable. The cut-off mechanism can be so adjusted that steam will be cut off at any desired part of the stroke. As will be readily seen, the device can be applied to stationary or marine engines or locomotives, and will work equally well with either a slide or other form of valve.

This invention has been patented by Mr. M. J. McCarter, of Norristown, Pa.

Toronto, Canada, 1834—1884.

Toronto is one of the few cities outside of the United States on our northern border which seem enough like ourselves in the go-aheadativeness, intelligence, and thrift of its inhabitants to really form an integral part of the Great Republic, instead of forming, as it does, a pleasant neighbor under a "foreign" flag. The city celebrates its semi-centennial from the 30th of June to the 5th of July next, and on one side of the card containing the elaborate programme are views of the "then" and "now"—one being a pleasantly located hamlet, with windmill and Indian canoe in the foreground, and the other a great and handsomely laid out city, with the evidences of a large lake commerce and prosperous industries. The jollification should be a hearty one.

Jerseys the Favorite.

The manner in which the Jerseys have been bred of late years serves as a lesson to breeders of all classes of stock. It is well known that the most experienced breeders flattered themselves that their knowledge of the points required in regard to form, texture of hair, color, escutcheon, and general appearance would enable them to annually improve the herds and increase their powers of production. But, despite all the care exercised in breeding for external marks, the *qualities* of the animals did not follow the arbitrary rules and regulations laid down for the breeders as a system to be pursued, and it became evident that the influences governing the adaptability of the animals to practical purposes surrounded certain families without regard to the desires of the breeders in other respects. There is nothing remarkable in some of the best cows, so far as outward appearances are concerned, but there is an inherent quality transmitted to succeeding generations that does not diminish by being passed from one to the other.

While the cows of admired form were receiving the highest consideration at the parish shows, they were beaten at the pail by some that could not compete with them except in production, and the attention of breeders was directed to the fact that *actual* improvement depended more upon the ability of the cow to produce largely than upon exterior indications, and after following the lines to which such pedigrees traced, the system of breeding was changed to that which was sure to increase production and make the descendants more valuable.

We find that the greatest value is now placed on cows possessing the blood of ancestors that were remarkable for production only, and even the bulls are discarded unless their pedigrees are royal and trace back to the fountain head graced by some favorite valuable cow. Coomassie is handed down through her sons, and her grandsons bring fabulous prices in all quarters. Eurotas, valuable and noted as she was, is still more highly prized through her sons, Duke of Darlington and Pedro. We find close inbreeding strictly adhered to as long as the blood of Rioter, Jupiter, and Prize can be secured, and no out-cross is allowed unless it is one that is known to be an improvement.

As we stated before, the lesson is a good one. The same course in breeding Jerseys may be followed with advantage in breeding sheep, swine, and horses. It is careful selection, with the aid of beaten paths to tread, and if persisted in will surely lead to the best results. The only objection is the tendency to breed closely, but so far there apparently seems to be no damage done, yet the rule should not be too imperative. The best cows have always been produced by inbreeding, and such animals are usually capable of transmitting their qualities to their descendants, but care should be exercised in order to avoid loss of vigor and strength. Happily, so far, the Jerseys are as vigorous and productive as ever, and the improvement seems to better with each generation.—*The Farm and Fireside.*

Protection of Vines from Frost.

Monsieur G. Jouanne, in a recent number of *Le Gaz*, says it is widely known what losses are occasioned to viniculturists in wine producing territories through the destructive agencies of the early spring frosts, as in the course of a few hours the prospect of a plenteous harvest is blighted. The symptoms of a hoar frost, usually manifesting themselves shortly before sunrise, unfortunately can only be discovered or detected by careful, vigilant watching throughout the entire night—even then it is difficult to foresee them, as this sort of supervision cannot be prolonged to any considerable extent without entailing upon the watcher great fatigue and decided personal inconvenience.

The preventive appliances hitherto used must be ready at any and every moment; and among such appliances may be mentioned stationary covers, small planks, straw mats, metal disks, as having been employed for protecting the vines from the killing hoar frost. All of these being in the nature of stationary covers, often possess but little value, as from any sudden change in the course of the wind their utility as a shield is good only in one direction.

The formation of artificial clouds, produced by the burning of tar, is, without doubt, one of the best protectors that can be used; and as gas engineers are directly interested in advocating and applying this system, we believe it will not be void of interest to them to learn the method adopted successfully in experimenting with tar smoke for the purpose of protecting vines against frost.

A row of flat bottomed, open mouthed porcelain vases, each containing 5 to 6 kilogrammes (12 to 14 pounds) of tar, is placed around the borders of the land to be protected. The vases are usually set from 20 to 25 meters (66 to 81 feet) apart. To facilitate and hasten the lighting a piece of oakum or a bunch of straw saturated with petroleum is stuck in the middle of the filled tar vase; with a similar piece of burning oakum, fastened to the end of an iron rod, the contents of the whole row of vases can soon be ignited. Almost immediately a thick, heavy smoke arises, continuing to ascend during the progress of combustion; and being blown by the wind, from whichever quarter it comes, soon spreads over the whole field. As it is generally during a calm that the frosts are most dreaded, the absence of the wind only tends to increase the thickness of the smoke that issues from the vases and hovers among the vines; it is most efficacious, therefore, at the time it is most needed. The vases should be provided with a lid, made of a simple piece of wood, when it is intended to place them in position in advance of the time of their being needed, in order that their contents may not be exposed for too long a period to the action of the elements. These tar pots, arranged in this manner, and on the side of the field most exposed to the prevailing winds, are ready to be at once put to the use of protecting the vines as soon as the first symptoms of frost are felt.

In order that the vine grower may be notified of the near approach of the frost, the following is suggested. A mercurial thermometer should be armed with a float and an electric contact so arranged that when the column of mercury would fall to a degree corresponding with a temperature approximating near to a hoar frost, the circuit of the pile attached to the thermometer would be closed, and thus put in action an electric alarm clock. This clock could be stationed in the proprietor's sleeping apartment, or in that of his superintendent; the thermometer might be placed in the field, or in any convenient location outside the house, in such a position as to be at once affected by any decided change in temperature. By this means the frost itself would sound the signal of alarm, and all would be in readiness to avert the threatened danger.

The Star of Bethlehem.

The theory concerning the "Star of Bethlehem" is based on a poetical foundation, having little to support it. In the year 1572 Tycho Brahe, a Dutch astronomer, discovered a new star near Caph in the constellation Cassiopea. It increased in brilliancy until it was as bright as Venus, and could easily be seen at noonday. It continued to shine brightly for a month, then gradually grew dim, and in 16 months disappeared from view. It was looked upon as a new creation or a sun on fire, and the general opinion was that it would never again shine in the star depths.

Forty years later the telescope was invented. When it was turned to the position in the heavens occupied by the blazing star, a minute star was found near the identical spot. This telescopic star is still there, and is doubtless the same one that blazed forth in 1572. The discovery that it existed led astronomers to search astronomical records, and it was found that similar bright stars had appeared in the same region of the sky in 945 and 1264. Counting back three periods from 945, we are brought to the near vicinity of the birth of Christ. Observers gifted with poetic fancies have naturally connected the two events, and have inferred that the star in the east, pointing to the place of the Nativity, was a sudden outburst of this wonderful star. For this reason it has received the name of the Star of Bethlehem.

About 24 of these temporary stars have appeared in the last 2,000 years, subject, like the star in Cassiopea, to sudden outbursts followed by a return to their normal insignificance. They are now classed as variable stars, subject to sudden outbursts due to eruptions of blazing hydrogen, and which are followed by long periods of quiescence. According to this theory, the star of 1572 is a variable star, with a period of a few more than 300 years. The last period was 308 years, if the bright star of 1264 was one and the same; we may therefore hope for a repetition of the incomprehensible phenomenon in the immediate future. The star was due in 1880; if it appears at all it will surely blaze forth by 1885. There is a possibility, therefore, that the long-lost Star of Bethlehem, the Pilgrim Star, the star of 1572, or Tycho Brahe's star—for it is known by all these names—will once more become a shining wonder in the sky. Such a celestial visitor will be warmly welcomed by astronomers, and far more acceptable than a great comet spanning the heavens with its gossamer tail.—*Providence Journal.*

African Ants.

The bashikonai ants must be a terrible plague. They travel night and day, in armies miles long. The elephant and gorilla fly before them; the black man runs for his life so soon as the ants are seen. It is related by a traveler that as he was going up one of the mouths of the Zambesi, he saw a whole village suddenly deserted by the inhabitants, who fled with all they could carry off, a proceeding which, as there was no foe in sight, rather puzzled him, till he found they were fleeing from the ants. When these ants enter a hut, they clear it of every living thing in a few minutes. Huge cockroaches, almost as large as mice, centipeds, mice, and rats are instantly devoured. A strong rat is killed in less than a minute, and in another minute its bones are picked. A leopard, dog, or deer is soon dispatched and devoured, for they kill by their numbers. They are quite half an inch long, and one variety is so strong that it will bite pieces clean out of the flesh. They possess, however, one meritorious quality—they mortally hate, and, whenever they can, put to death the mischievous white ants which make such destruction in houses. In addition to these and the sand ants, which bite like scorpions, leaving a distressing pain behind them, there are several varieties of flies which sting horribly, such as the igogonai—small gnats—whose bites go through the tough hide of the negroes, causing a terrible itch; the ibolai—flies or gnats—which sting as though with a needle, and whistle as they dash at you; the richouma, which fill themselves with your blood before you know they are there, and then leave an itching that lasts for hours, varied at intervals by certain sharp stabs of pain; the sloway, or nest-building flies, not quite so big as a bee, which cling to a man even in the water, and assail the natives with such ferocity that if a canoe, by chance, touch one of their nests, the men instantly dive overboard.

Bad Water, Bad Cloth.

The following facts related by the *Deutsche Wollen Gewerbe* convey an instructive lesson. A German mill, almost exclusively engaged in the weaving and dyeing of army cloth, received many complaints of the cloudiness of its scarlet cloths. These cloths are required to be dyed with cochineal, and so simple is the operation that the proprietors of the works were puzzled to know the cause of the defect. Every measure was tried to obtain a clear and uniform shade. From 100 to 150 pieces were dyed at once. The weaving was so reorganized that the dyeing went on continuously. The cloth was singed and washed in the piece in order to remove every particle of impurity, and then passed through a bath of bran.

Despite all this care the goods came out with as many cloudy spots as ever, and, driven to desperation, the proprietors took steps to have their cloths dyed at a neighboring works. Before sending them the thought suggested itself that perhaps the cause of the damage lay in the water used for the vats. This was taken from wells sunk through alluvial deposits into the rock below, and upon analysis it proved to be pure.

Attention was next turned to the steam, and there was found the cause of all the trouble. A portion of it condensed, treated with chloride of tin and gradually raised to 90° Centigrade, formed on its surface a thin layer of grease of a blackish gray color, that could be removed with a glass spatula. A solution of stannate of soda and lime now added to the water revealed the presence of indigo. Pushing the investigations, the cause of its presence was soon found out. Three boilers, connected together, draw their feed water from wells which derived their supply by a ditch leading from a neighboring stream. On the banks of this stream was a wool bleachery, and between it and the dye house a machine shop. Little by little, and seemingly unobserved, a portion of the drainage from the bleachery, in which 10,000 pounds of wool were cleansed, and, for the most part, bleached daily, found its way into the ditch which supplied the wells that fed the dye house boilers. As the steam from them heated the contents of the dye vats by being turned directly into them, the dyes became impure and the dyeing clouded. This indicates how drinking wells may sometimes be contaminated.

Removal of Nitrate of Silver Stains from Marble.

The Liebig statue at Munich, which was set in place less than a year ago, is of marble, and its beautiful color tempted some dirty rascal to try to spoil it. For this purpose a liquid containing in solution permanganate of potash and nitrate of silver, two of the substances which produce the most ineffaceable stains upon cloth, was squirted with a syringe over the statue, covering it with black spots, which penetrated deeply into the soft stone. As soon as the injury was observed, competent chemists were set at work to devise means for repairing it. An analysis of scrapings from the surface of the stained marble showed the presence of silver and manganese, and the form in which they were employed was readily guessed, since the nitrate of one and the sodium salt of the other are the only soluble compounds of them in common use.

The nature of the stains being discovered, it was necessary to invent a method for converting the substances which constituted them into others which could be removed from the stone, and the experts resolved to attempt their transformation into sulphides, with a view to their subsequent solution and removal by the aid of cyanide of potassium. In order to secure the continuous application of sulphur necessary for the complete conversion of the spots, fire clay saturated with sulphide of ammonium was plastered over them, and renewed at intervals until the action was complete. The paste was then removed, and the marble washed with pure water until all the alkaline sulphides were removed. Another fire clay paste, saturated with solution of cyanide of potassium, was then prepared, and applied to the spots in the same way as the first. The sulphides formed in the marble were dissolved by the new reagent, and the solution absorbed by the clay; and on the final removal of the paste the spots were found to be perfectly removed.

THE sixteenth and seventeenth annual report of the Trustees of the Peabody Museum of American Archæology and Ethnology (Vol. III., Nos. 3 and 4) has just been published, and in addition to the list which it contains of valuable additions to the museum at Cambridge, is a series of papers upon the researches carried on under the auspices of the museum in different parts of the country. These papers, many of them, are very interesting, and call attention to the careful study which is being made of the customs and habits of our Indian tribes. The character of the work that has been carried on is shown forth in the titles of some of the articles, viz.: On the Social and Political Position of Woman among the Huron-Iroquois Tribes, by Lucien Carr; Notes upon Human Remains from Caves in Coahuila, Mexico; White Buffalo Festival of the Uncpapas; Religious Ceremony of the Four Winds; Shadow or Ghost Dance; The Wa-wan or Pipe Dance of the Omahas, etc. The description of the ceremonies and festivals of these tribes is a valuable acquisition to what literature we already have upon these different subjects, and the reports upon the discoveries that have been made in the burial mounds of these tribes, and the examinations that have been made upon the human remains found within the mounds, constitute by no means the least valuable feature of the work.