NEW APPLICATIONS OF ELECTRICITY.

Mr. Gustave Trouve has recently added two new inventions to the great number of creations of his fertile brain already perfected. We refer to two new applications of electricity which he presented to the Academy of Sciences, Monday, July 6, and which relate to the aiming and shooting of firearms at night. Their originality induces us to reproduce the note of the inventor to the Academy.

The first of these inventions consists of a luminous electric button; and the second, of a powerful projector. These devices are removable, and can be applied to any fire arms. Their operation is absolutely automatic. The Trouve electric button is of the same size as ordinary metallic buttons, and consists of a fine thread of platinum introduced into a small glass tube, which is protected by a metallic tube. A small opening is left in the metallic tube, so that the luminous button is visible only to the person using the weapon, to assist him in taking aim, but is completely hidden from the enemy or any one who is a few feet from the barrel of the gun. The device is operated by a hermetically closed pile of Mr. Trouve's. This pile, which is about as large as the little finger, can be secured on the barrel of the gun, parallel with the same, by two rubber bands. As the pile operates only when in a horizontal position, the button is illuminated as soon as gun is adjusted for firing; but when the gun is held upright, the pile ceases to operate, and the button becomes dark. It is easy to realize the great advantages offered by this device in taking aim in the dark.

NEW APPLICATIONS OF ELECTRICITY.

The luminous electric projector consists of a little incandescent lamp and parabolic reflector, or an incandescent lamp and a condensing lens inclosed in a metallic tube. The apparatus is easily secured on the barrel of a gun, parallel with the same, by two rubber bands. It is made to operate by pressing the butt of the gun against the shoulder. By means of this device the desired object can be illuminated, and all its movements followed. The generator used is the same as that used with M. Trouve's electric safety lamp, recently presented to the Academy by Mr. Jamin. It is carried in the belt, and its operation is automatic.

The services which these two apparatus are capable of rendering to the army and navy are very numerous. It is mentioned, for example, the advantages they will offer for watchmen on men-of-war in helping to fire upon torpedo boats at night, as well as in the daytime. They will also be very useful to hunters who wish to secure game at night.

Electricity and Dust.

With regard to the experiments made by Professor O. J. Lodge, it has been pointed out by a German paper that a similar experiment was described by C. F. Guitard, of London, in the *Mechanic's Magazine* for November 2, 1850. The following is an extract: "Some time since, in experimentalizing on the electric state of the atmosphere, I employed for that purpose a large glass cylinder, about 18 inches high and 9 inches diameter, open at bottom and having a neck at top. In placing the lower end of this cylinder in water, the more perfectly to exclude the air, and allowing small quantities of tobacco smoke to enter the neck at top, the smoke, after assuming various actions, according to, probably, the hygrometric state of the atmosphere, would gradually spread itself into a cloud filling the cylinder, and at length, as successive portions came in contact with the sides of the cylinder, condense. Sometimes half an hour would elapse before this effect took place. In now struck me that if I brought a wire from an electrifying machine into the neck of the cylinder, the air would immediately become charged with electricity, which would cause each portion of the smoke to fly to the sides of the cylinder, and that thus more rapid condensation would take place. The effect produced was perfectly magical. The slightest turn of a small electrifying machine produced immediate condensation. It was astonishing to see how small a quantity of electricity produced a most powerful effect. I am not aware that attention has ever been drawn to this subject; and the question will probably arise—Has electricity anything to do with the condensation of steam in the condenser?"

For a harness blacking, use boneblack, 4 ounces; linseed oil, 2 ounces; sulphuric acid, ½ ounce; treacle, 2 ounces; gum arabic, 1 ounce; vinegar, 1 pint.

A Hairless Calf.

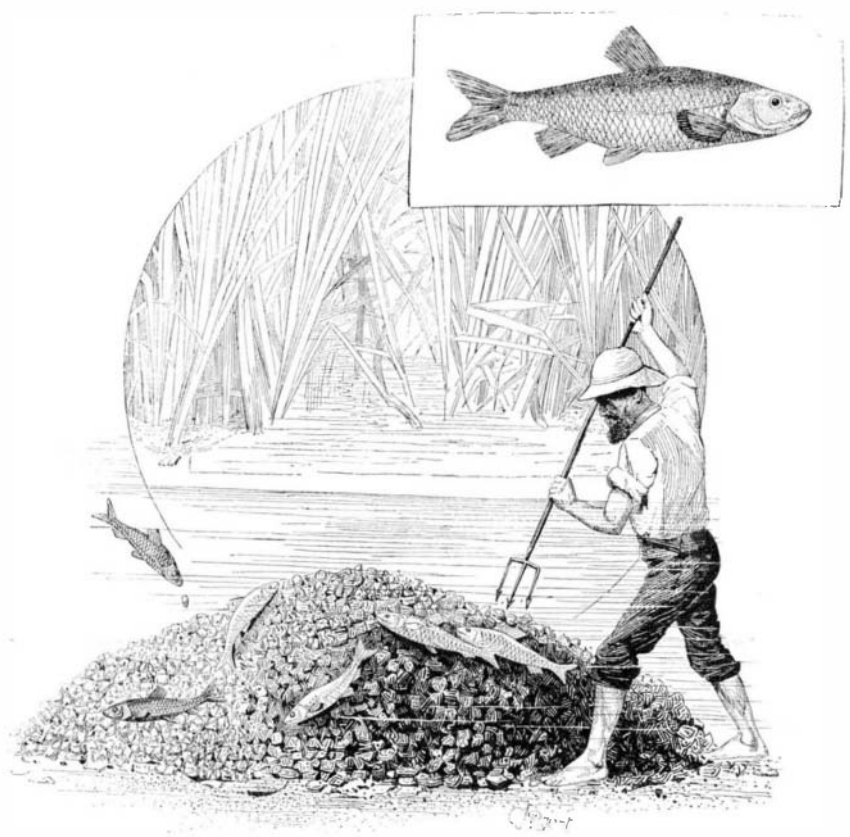
A curiosity in the shape of a perfectly hairless calf was born at Pawnee City, Nebraska, in the middle of March last. The animal, now about five months old, is well formed and apparently in perfect health, but its skin is quite destitute of hair. It is a male, weighs over two hundred pounds, and shows an appearance of horns. So far as can be learned, there is nothing in its pedigree to account for this departure from the normal type. Both of its progenitors were pure-bred short horns. Should this unique animal survive, it would be a matter of considerable scientific interest to keep track of its descendants, in order to determine whether this apparently accidental variation is capable of transmission or whether it disappears with its first possessor. The owner of the animal, Mr. J. H. Bray, has named it Young America.

CONSTRUCTIVE ABILITY OF FISHES.

BY C. F. HOLDER.

In previous numbers of the SCIENTIFIC AMERICAN the writer has shown the nest of the antennarius and paradise fish, the former being made of gulf weed wound in and out and bound together by gelatinous bands of some secretion taken from pores in the abdomen; the latter formed of bubbles of air inclosed in a mucous envelope.

In the accompanying cut is shown a nest of an entirely different character, where the material is stone, and to accumulate which much have involved a vast amount of labor and patience on the part of the finny workers. It has been my privilege during the present summer, spent on the St. Lawrence River, to examine a large number of the nests or heaps, and some of them for their great size almost challenge belief. The boatmen of the St. Lawrence know the heaps as chub beds, yet it is a curious fact that some of them differed widely in their opinions as to the makers. One man was positive that the piles were the work of the black bass (*Micropterus salmoides*), and that the stones were piled up with their tails. When asked for his reasons, he said that he had seen big bass on the heaps, and speared them there. Another man, born in sight of the nests, was positive that they were the work of muskrats (*Fiber zibethecus*), his reason being that he had speared *muskrats* swimming about the nest. I give these opinions to show how little confidence can be placed upon the opinions of unskilled observers, though, in justice to the men, it should be said that they were given in good faith.



CONSTRUCTIVE ABILITY OF FISHES.

Quite a number of men had seen muskrats around the heaps, and Mr. Andrew Clerk, of Jersey City, with whom I was fishing when these investigations were made, suggested that the muskrats were after the chub spawn; and to show that not only muskrats but field mice are fond of it, he cited the following instance, that will be of interest to naturalists:

Some years ago he owned a salmon river in the Provinces, and had unusual opportunities for many years of observing the habits of salmon and other fishes in the locality. Wishing to ascertain the natural feed of the sea trout, he directed his guide to save the stomachs of twenty or thirty. Examination of a dozen or so of these showed that in each was a field mouse (*Arvicola rutilus*, I should judge from the description, etc.), and in one stomach were two. It occurred to Mr. Clerk that the mice had been caught while diving for spawn. This opinion he expressed to a friend connected with the New Jersey State fisheries, who said that his eggs were so depleted by common mice, that would dive into the water to obtain them, that he was obliged to protect the eggs by wire screens. So it would seem that mice and muskrats are among the possible enemies of the spawn of game fishes and others.

The chub beds are found on gravelly or sandy shores on almost every island between Clayton and Alexandria Bay, and I found them in all stages of growth. One of the best localities was in the entrance to the Lake of the Islands, where, on the north shore of an island belonging to La Rue, are five or six large nests, all within a small area, and all visible from the boat at once. The largest of these was at least ten feet across the base, and, as near as I could judge, almost four feet high. The stones were all about the same size, and those that I could reach from the boat, and which brought the top of the heap to within a foot of the surface, weighed four ounces; and at the base were others that I should judge would weigh twice as much. They were of all shapes, and the entire heap looked like a load of stones that had been dumped carefully, so that it retained a somewhat regular cone-shape. Some resembled hay mows, and were flat on top; others were pointed, and I found quite a number where the work was just commenced; and, whether from design or accident I cannot say, there was a rude outline, as if the builder had a definite plan, the stones having been dropped in a semicircle before any had been placed in the center. In these new nests there were generally numbers of shells, evidently a *Unio*.

As some of the large nests were some distance from gravel beds, and the stones numbered tens of thousands, each heap weighing perhaps a ton and a half, the amount of labor done by these fishes can well be imagined, especially when it is known that the stones are brought in the mouth of the fish.

I was not fortunate in observing them at work, but it is well known how they proceed, and Mr. Clerk was fortunate in knowing a gentleman who had seen the chubs carrying stones. The largest nests were within a foot of the surface, and would undoubtedly form an obstruction to boats drawing two or three feet of water, should they run along shore. Exactly how high the chubs would build their nests it is difficult to determine, as every winter the nests are frozen in solidly, and during the breaking up in the spring are denuded of some of the stones. That the nests are renewed year after year is evident from their size, and again, the rocks on the top were usually much fresher in appearance than those below, showing that they had been recently handled. The nests are constructed for the preservation of the eggs; in other words, to protect them from the eels, bull-heads, and various fishes that affect spawn.

The breeding time is in the last of May, June, and perhaps into July, or about the same as black bass, and during this time large chubs are seen resting on the heaps. The eggs, when deposited, are washed into the crevices and interstices of the heap, and there find protection until the young appear; and they undoubtedly remain near it until they are strong enough to care for themselves. I could not find that the male remained near the nest, or exercised any care over the young. This, however, would be unnecessary, as the stone pile is quite protection enough.

The nests are undoubtedly the work of several chubs, how many, I have not been able to determine; but as fifty or more lamprey eels have been seen at work conjointly, it is not unlikely that the nests are the work

of a colony of fishes. Quite a number of fishes are known as chubs, and several genera and species are called stone toters and rollers, from their habit of making heaps, though not as large as the above.

The chub in question is one of the *Cyprinidæ*, the *Semotilus bullaris* or *Leucosomus cataractus*, of Baird, a very attractive fish, attaining a length of twenty inches and a weight of two and sometimes three pounds. The head is distinct from the body, as regards absence of scales, and of a dark olive hue; the back brownish, with blue and sometimes green reflections. The sides, when turned to the sun, flashed a beautiful silvery tint, and the scales being large, it was, all in all, a very attractive creature. Mr. Clerk and myself frequently took them on a fly, and agreed that, so far as making a desperate fight for liberty was concerned, they were not far behind the black bass. They were also taken while trolling with a minnow bait; though this can hardly be considered their natural food, the somewhat large, fleshy lips being seemingly adapted for a vegetable diet. They are extremely common in the St. Lawrence, frequenting clear water, and abound in New England streams and as far south as Virginia, and probably have a much wider range to the west through the great lakes. In all localities they have local names, some of which are fall fish, dace, roach, horned dace, etc.

PHOTOGRAPHIC NOTES.

How to Remedy Flare or Ghost Spots in Lenses.—In an interesting paper read before the Buffalo Photographers' Convention by Mr. J. Traill Taylor, editor of the *Photographic Times*, we find the following practical directions for disposing of the flare spot frequently met with in combination lenses of the symmetrical or rectilinear type:

"Concerning flare spots," he says, "they are never seen when the lenses are used in the studio, but only when a bright sky forms part of the included subject, and only then when a very small stop or diaphragm is used.

To ascertain whether a lens has a flare spot, it should be screwed on to the camera and brought into a room lighted by a gas flame or oil light.

Go to a distance of several feet, and examine the flame on the ground glass.

The image will be sharp, bright, and inverted, now move the camera slightly, so as to cause the inverted image to be a little to one side of the center of the focusing screen, and in nine cases out of ten there will be seen a ghostly image at the opposite side of the center.

This secondary image is non-inverted, and upon rotating the camera it moves in the opposite direction to the primary image. The nature of this secondary image or ghost, and the cause of its formation, may be examined in the following way: Move the camera so that the ghost shall be near the margin, and then, placing the eye in the line of that image and the lens, withdraw the ground glass, when the posterior surface of the lens will be found to be quite luminous. That the false image is, in this case, caused by a reflection from the back surface of the anterior lens is demonstrable by unscrewing the cell containing it until it almost drops out of the tube; and then, keeping an eye upon both the primary and secondary images on the ground glass, move or slightly wriggle the front cell, which by its being nearly unscrewed may now be easily done, when it will be seen that while the primary or legitimate image of the flame remains motionless, the ghostly image caused by the reflection from the front lens dances about all over the plate.

But observe further, there is a certain distance between the front and back lenses at which this secondary image is sharp and bright, and in proportion as either the front or back lens cells is screwed in or out, so does the image become more attenuated and expanded, till at last it ceases to be seen altogether, while all this time the real image is not seen to suffer in any way. This tendency of the ghostly image to pass out of focus with such extreme rapidity, upon separating the lenses by a few turns of the screw, or by making them come nearer each other, provides the means by which this evil may be cured.

The most perfect mount for lenses of this class would be that in which the privilege was afforded the user of making an adjustment to suit work of any nature by the separation of the lenses to a very limited extent, so as to be used under the most perfect conditions for the special work in hand. With a lens of about eleven inches focus, a sliding adjustment of half an inch has been adopted with beneficial results."

Photographing the Interior of Guns.—Experiments have been made at the Royal Gun Factories, Woolwich, in order to test the application of a new electric lamp designed for making examinations and photographs of gun interiors. The system of somburizing the bores of guns by means of electricity has only been a short time in use, and has proved of great value; but the want of an electric dynamo has prevented its general adoption at many places where it would have been of considerable use, and the authorities have now taken up readily a portable battery designed by Messrs. Johnson & Phillips for the purpose of supplying the place of a dynamo in such cases. The battery, without being necessarily powerful, is chiefly serviceable on account of its constancy, as it can maintain a light of unerring brilliancy for inspections with all the leisure they may desire. The experiment was to try the battery and a dynamo in competition. Two 8 inch guns were placed side by side in the new boring mills, and photographs were taken of their interiors by both processes, the results as far as could be judged being equally satisfactory.

Rendering Paper Prints Translucent.—At a meeting of the London and Provincial Photographic Association, we take from the report published in the *British Journal of Photo.* the statement of Mr. G. H. E. Sutton, of how he makes paper prints translucent by means of burnt linseed oil. He first raised the oil to the boiling point, then taking it to an open field where there was no danger of fire, he burnt it until it reached the stage desired; this he found by testing from time to time with a knife. The oil, when well burnt, was always green and of the consistence of treacle. It was mixed with litharge, sugar of lead, and soap, and when cold was rubbed over the back of the print with a piece of rag. It dried quickly on the prints, which did not cockle. To one pint of oil was added litharge and acetate of lead each equal in bulk to the size of a walnut. In place of making the burnt linseed oil, it is suggested by the editor of the *British Journal of Photo.* that it can be purchased already made of three different consistencies, "thin," "middle," and "strong," under the title of "burnt oil," from all dealers in printing materials.

WALTER BENTLEY WOODBURY.

The well known inventor of the Woodbury process of photo-printing died suddenly from an overdose of laudanum at Margate, England, an English watering place, on the 5th ult., and was buried in Abney Park Cemetery, near the remains of other departed notables in photography.

Says the *Photo. News:* "Mr. Woodbury, who was fifty-one years of age at the time of his death, had practiced photography as a profession since he was seventeen years of age, he having then commenced work in Australia. Soon after this he established a studio in Java, and produced excellent work under very trying circumstances. Some of his views taken in Java were published by Negretti and Zambra about twenty-five years ago.

About this time he came to London, but shortly returned to Java, and established himself on a somewhat larger scale in Batavia, but soon afterward he came to London and introduced the process now so well known under the name of Woodburytype.

Since then he has been actively engaged in devising and perfecting many processes bearing on photography, and in writing in such a way as to popularize science.

Among his inventions may be especially mentioned—setting aside his very notable invention, the Woodburytype—the photo-filigrave, the Goupil method of photo-gravure, and various block processes; but he made a host of minor inventions, and since 1864 took out nearly thirty patents."

From the above brief sketch it will be seen that Mr. Woodbury largely contributed by his industry and perseverance to the successful working of many of the photo-printing processes in use at the present time, and it was in acknowledgment of the fundamental character of his invention of the Woodbury type in its relation to photography that he was awarded one of the seven gold medals issued in the Photographic Department of the recent International Inventions Exhibition, held in London.

His first patent taken out in this country was in 1866, followed by three in 1868, one in 1882, and one during the present year.

Briefly described, the Woodbury process consists in making a solution of gelatine prepared with a slight admixture of Indian ink and potassium bichromate, then spreading the same upon a leveled glass plate, letting it dry.

The film may be stripped from the plate and exposed to the light behind a negative in the usual manner, or it may be printed on the plate. An unusual length of time is required in printing, because of the comparative slow sensitiveness of the bichromated film.

Development is made by hot water, as in the carbon process. The film when dried possesses a strong relief and is exceedingly hard and tough, and when compressed against a soft metal, like lead, acts as a die, making a corresponding reverse in the same. It was the capability of the tough, hardened gelatine film to resist great pressure that Mr. Woodbury made use of. Accordingly, he devised a special hydraulic press arranged to prevent the film from spreading horizontally, but at the same time subjecting it to a contact pressure of several hundred tons upon soft type metal. The metal impression was then placed in a peculiar printing press, inked over with a compound of gelatine and India ink, and a sheet of hard pressed smooth paper laid upon it; a plate of heavy plate glass now comes down upon the back of the paper, pressing it against the metal mould, and after a pressure of two or three minutes is raised; upon lifting the paper, a beautiful impression in permanent printing ink is seen.

The ink may be varied in color, permitting a large variety of colored impressions to be made. Thousands of copies may be pulled from one metal impression, and the number obtainable from a single gelatine relief is almost incredible.

In 1880 Mr. Woodbury further improved and simplified the process by dispensing with the heavy hydraulic press and adopting instead the pressure of two rollers.

His method is as follows: A positive is made upon a glass plate instead of a negative; from this a relief mould of bichromated gelatine is produced as before, which is attached to a heavy, smooth plate of glass, so that its level character may be depended upon.

When dry, a sheet of tin foil is placed upon the gelatine mould, and, to force the thin metal securely into every crevice, mould and tin foil are sent through an ordinary rolling press. The mould with its tin foil lined surface is now removed from the glass plate and put into the Woodbury printing press, from which impressions equal in every respect to those taken from a hydraulic pressed lead relief are readily turned out.

This simple process is the subject of an American patent taken out during the present year, and, we may say, is one of Mr. Woodbury's last improvements.

We refer those of our readers who are interested in obtaining further details to the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 213 and 243. A beautiful example of a Woodbury print may be found in the *British Journal Photographic Almanac* for 1884.

Trout Killed by Mosquitoes.

Mr. C. H. Murray, of Denver, writes to Professor Baird the following:

In the middle or latter part of June—I think it was—in 1882, I was prospecting on the headwaters of the Tumiche Creek, in the Gunnison Valley, Col. About nine o'clock in the morning I sat down in the shade of some willows that skirted a clear but shallow place in the creek. In a quiet part of the water, where their movements were readily discernible, were some fresh-hatched brook or mountain trout; and circling about over the water was a small swarm of mosquitoes. The trout were very young, still having the pellucid sac puffing out from the region of the gills, with the rest of their body almost transparent when they would swim into a portion of the water that was lighted up by direct sunshine. Every few minutes these baby trout—for what purpose I do not know, unless to get the benefit of more air—would come to the surface of the water, so that the top of their head was level with the surface of the water. When this was the case, a mosquito would alight, and immediately transfix the trout by inserting his probescis, or bill, into the brain of the fish, which seemed incapable of escaping. The mosquito would hold his victim steady until he had extracted all the life juices; and when this was accomplished, and he flew away, the dead trout would turn over on his back and float down the stream. I was so interested in this before unheard of destruction of fish, that I watched the depredations of these mosquitoes for more than half an hour; and in that time over twenty trout were sucked dry, and their lifeless shells sent floating away with the current. It was the only occasion that I was ever witness to the fact, and I have been unable by inquiry to ascertain if others have observed a similar destruction of fish. I am sure the fish were trout, as the locality was quite near snow line, and the water very cold, and no other fish were in the stream at that altitude. From this observation, I am satisfied that great numbers of trout, and perhaps infant fish of other varieties in clear waters, must come to their death in this way; and, if the fact has not been heretofore recorded, it is important to those interested in pisciculture.

The Seal Fishery.

During the past month the steamers from provincial ports engaged in the seal fishery have been returning home, having had one of the most successful seasons ever made in that business. Full returns will be given later.

The following from the *Island Press* is of interest:

"The seal fishery has been unusually successful this year. Many steamers have returned from the sealing grounds loaded down almost to the water's edge. Steamer Ranger, with over 200 men on board, returned to St. John's with 35,600 prime young harp seals, the largest catch for her tonnage ever taken into any port in the world, every nook and corner of the ship being jammed full. She was compelled to steam slowly from the time of leaving the ice, to prevent upsetting, and had to creep home inch by inch. Fortunately the sea was calm all the way. Her deck, covered to the top of her rails with 7,100 seals, was a sight never before seen in St. John's. The companion-way was covered in, only room enough being left for a man to squeeze himself into the doorway. The lazaret contained 720, and 250 were stowed under the bunks in which the men slept. Eight puncheons were filled with oil, and the rest was stowed in the hold."