

## A NEW ELECTRO MAGNET.

The ordinary electro magnet has the inconvenience of ceasing to exert an influence upon the armature at a short distance (generally a quarter of an inch) from its poles.

Mr. Stanley Currie has recently devised a new form, whose field of attraction is much greater, since it acts at a distance of  $3\frac{1}{2}$  inches. This new magnet is a com-

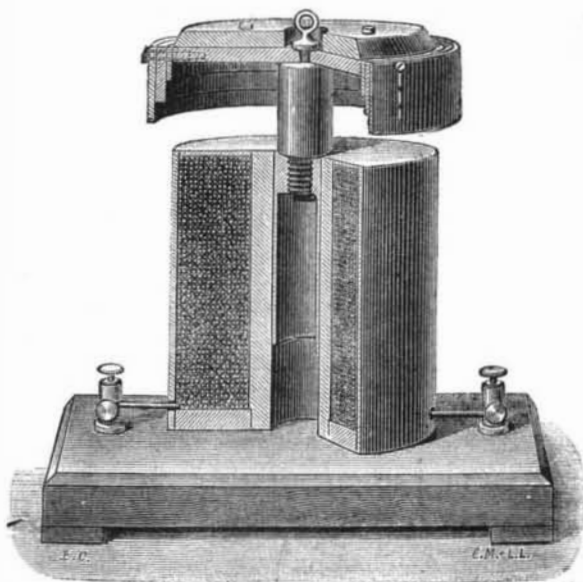


Fig. 1.—CURRIE'S ELECTRO MAGNET.

bination of the horseshoe electro magnet and the solenoid. As shown in the engraving, it consists of a vertical bobbin with a tubular soft iron core. The wire which is wound upon the bobbin is surrounded by an envelope of soft iron of the same weight as the core, with a soft iron tube at the end of the bobbin that connects the core with the external envelope. The top of the bobbin is covered with a brass disk. The copper wire used is No. 18, Birmingham gauge, and 0.048 inch in diameter.



FIG. 2

The armature consists of three parts, viz., of an iron rod inclosed in a brass tube, which is prolonged beneath it so as to guide it in its upward and downward motion in the tubular core, and of a soft iron cover fixed to the top of the central rod, and connected with the cylinder which forms the external envelope of the bobbin. This cover is preferably made with two or more layers of flat plate, so as to facilitate demagnetization, but it must be thick enough not to be saturated by an ordinary current. The cylinder has a rim that enters the field of attraction of the external envelope as soon as the lower extremity of the central rod enters the tubular core. When the effect of such attraction has made itself felt, the upper flat plate is in the field of attraction not only of the envelope, but also of the internal core, and the field of attraction of the magnet is, so to speak, prolonged.

As long as the central rod is exterior to the core of the bobbin, the attraction to which it is submitted is always in ratio inverse the square of its distance from the bobbin; but, as soon as the extremity of the iron rod enters the aperture in the core, the part that rests therein loses its power of attraction. The same diminution of attractive power occurs in the rim of the armature's disk as soon as its lower edge passes under the upper edge of the bobbin. The power of attraction likewise varies directly as the mass of the body attracted, and these two effects have been combined in order to regulate the attraction so that it shall be approximately uniform across the field of  $3\frac{1}{2}$  inches. This is effected by cutting the lower end of the rod of the armature, as well as the rim. If necessary, the thickness of the upper disk and the width and thickness of the rim may be varied. The latter may also have its edge scalloped (Fig. 2), so as to prevent a sudden increase of attraction in measure as the disk approaches the bobbin. The result of this arrangement is to increase the stress upon the disk in measure as the latter approaches the pole of the magnet, when the force of the stress upon the armature rod and rim is diminishing. In this way, and by the combination of a counterpoise, there may be obtained a sufficiently uniform stress with considerable travel, and a violent contact be avoided when the disk reaches the pole of the magnet.

The stress or range of the attraction may be doubled with a pair of these magnets placed at a certain distance apart, and having the same armature rod. The lower armature is fixed to the rod, and the other simply bears against it through a projection. The upper armature is first attracted, and, when it has placed itself upon its own bobbin, the lower one has come

into the field of attraction of its bobbin, and may be attracted to it, so that, by this process, the travel is doubled.—*La Lumiere Electrique*.

## AUTOMATIC FIRE ESCAPE.

A simple automatic fire escape, recently patented by Mr. Frank A. Bone, of Lebanon, O., is shown in the accompanying engraving. It consists of an axis fastened to the center of a governor—shown in cross section in Fig. 1—and passed through the center of a frame. Passing through the bottom of the frame and over a roller on the axis is a rope of cotton or other suitable material, on each end of which is a belt provided with a snap catch. When not in use, one end of the rope is drawn up to the frame, and the other is coiled as shown in Fig. 3. The escape can be kept in any convenient place, and since it weighs but about 12 pounds, it can be carried easily to the place it is to be used, where a strong hook is provided to attach it to. In large buildings these hooks should be placed on all sides, so that escape could be made in any direction.

The escape having been attached to the hook, it is only necessary for the person who wishes to descend to snap the belt (the one which is at the top) about his body, and then swing out of the window, when he will descend at an easy and regular speed to the ground. The opposite end of the rope will then be at the top ready for use by a second person. The governor for regulating the descent is formed with a star shaped center, A, the rapid revolution of which forces the pieces, B, outward, causing them to press against the fixed band, D, which acts as a brake.

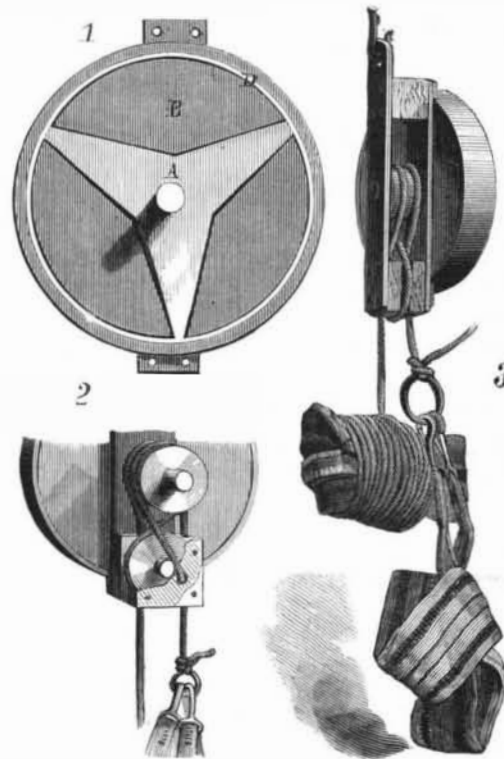
## AN AZTEC WARRIOR.

Mr. Eugene Boban, an antiquarian and traveler, well known to anthropologists and ethnographers, recently invited us to visit his establishment on Boulevard Saint Martin, in order to see the curious restoration he has made of the costume of a young Aztec warrior, a chevalier of the army of Montezuma (*Noctheuzoma*). The personage figures as a very skillfully executed manikin, which we represent in the accompanying cut. This truly remarkable object is designed for one of the largest ethnographic collections of Mexico.

The Mexican warrior of the epoch of the conquest (1521) was, as may be seen, clad in a material spotted to resemble the skin of a tiger, and wore a helmet shaped like the head of that animal. This extraordinary costume is assuredly one of the most remarkable that can be mentioned among military uniforms. The numerous voyages that Mr. Boban has made to Mexico, the innumerable documents that he has collected upon the antiquities of that interesting country, and the ability that the persevering antiquarian has acquired through study and research are so many guarantees of the accuracy of the restoration.

The warrior's mask was moulded upon the head of a

living native of the valley of Mexico. The head of the tiger (*Ocelotl* in Aztec) is made of wood, just as it was by the ancient Mexicans. It is armed with long teeth, and is intentionally enlarged so as to form, through the open jaws, a true helmet. This latter not only served to protect the head of the combatant, but also to strike terror among the enemy. This idea of frightening the enemy was one of the principal studies of the military



BONE'S AUTOMATIC FIRE ESCAPE.

organizers of antiquity, and it has prevailed up to our own epoch, for otherwise we could not explain the presence of tufts of hair and large plumes upon modern helmets. The object of these is assuredly to increase the height of the soldier's head, and make him more imposing in the eyes of those whom he is attacking.

In Græco-Roman times we find that there were soldiers in the armies who were muffled up in lion and tiger skins for the purpose of giving themselves a formidable aspect. This usage still obtains to a high degree at present in the extreme East, among the Chinese and Japanese.

The young Mexican warrior whom we picture wears the *tentell* in his lower lip. This was a cylindrical piece of rock crystal (*teuilotl*), known in Spanish as *sombre-riso*, "little hat." In fact, the object somewhat resembles our high hats. The *tentell* was introduced into a perforation previously made in the lip. This custom of perforating the lips and inserting ornaments of varying size into them exists over the entire American continent, from Cape Horn to Behring Strait, and also in the equatorial parts of Africa.

The rock crystal *tentell* was the badge of the officers of the Emperor's house, and was generally given as a reward to those who had taken prisoners.

Mr. Boban, like the old Mexicans, has used a spotted fabric for manufacturing the warrior's costume, the only difference being that the material is of linen, while that of the Mexicans was of cotton. The warrior is resting his right hand upon his sword—a sort of club armed with thin pieces of obsidian. This was moulded on a specimen brought by Mr. Boban from Mexico with his great collection, that is now on exhibition at the Ethnographic Museum of the Trocadero.

In his left hand the warrior carries a circular shield covered with buckskin. In the center of this is figured a hieroglyphic characteristic of the order of the Chevaliers of the Tiger. Around the wrists and ankles of the warrior are fixed enormous tiger's claws, and his feet are shod with *cactli*, a kind of sandals that are still in use among the aborigines. His head is surmounted with a plume of long, brilliant feathers.—*La Nature*.

METEORIC DUST.—A metallic substance in powder or small granules has been sent to the *Science News* laboratory for examination. It proves to be meteoric dust, largely composed of iron, nickel, and silica. Dr. Batchelder, of Pelham, N. H., who sent the specimen, states that he collected the dust on the walk in front of his house after a smart thunder shower. It is probable that large quantities of this material fall upon the earth, but remain unnoticed. Much of the iron found in soils is due to precipitation from interstellar spaces, the particles becoming entangled in our atmosphere.—*Pop. Sci. News*.



AN AZTEC WARRIOR OF MONTEZUMA'S ARMY.