## IMPROVED CARPET LOOM.

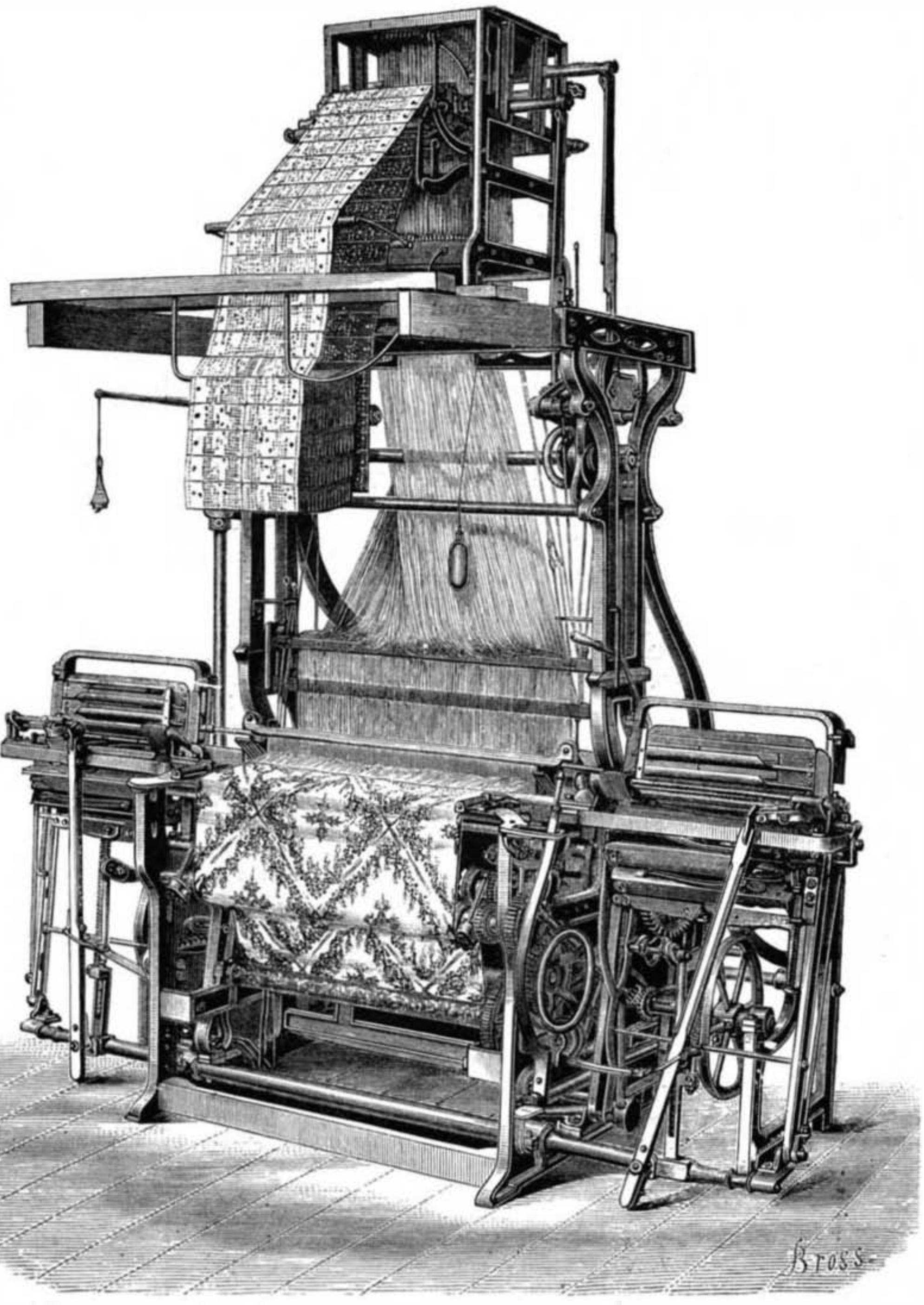
The loom herewith illustrated is the invention of Mr. Josiah Gates, and has a considerable number of practical improvements embodied in its construction, which mark it as a distinct step in advance of our present looms. One prominent feature is the use of a combined set of reciprocating and revolving shuttle boxes, thus allowing an exceptionally large number of different colors or shades to be used when desired, namely, as many as sixteen. The use of shaded colors in producing a graduated succession of tints in lighter and darker shades is certainly a most artistic improvement over the vividly contrasted colors so largely in use in our present carpet and general woven fabrics.

The use of the combined set of revolving reciprocating shuttle boxes permits the use of a few shuttles only when a small number of colors are all that are required. That is to say, the three upper shuttle boxes and the uppermost box of the revolving set make a set of four reciprocating shuttle boxes without the use of the revolving gear at all, which may then be thrown out of action, and all the wear and tear of its working parts thus be saved. The reciprocating and revolving action of the shuttle boxes are obtained in the ordinary way by the use of fingers upon the usual perforated cardboard pattern, and which, upon dropping through the pattern, cause the corresponding shuttle box to be brought into the requisite position for delivery across the material.

The loom is fitted with a peculiar double-beat lay, and combined positive motion of the shuttle, which is of great value in the weaving of heavy fibrous material, such as rattan, matting, and other long coarse fibrous substances. The double-beat lay is obtained by means of grooved cams upon the main shaft, and acting upon connecting rods or levers slotted on the shaft and connected with the lay, the cams being constructed with two eccentric operating or pressing points and a depression between them. At each revolution of the shaft and the cams the two eccentric points of each cam successively act upon the roll of the slotted lever, and thus produce the double beat or repeating action of the lay. Either of the eccentric or operating points of the cams may be varied, and one may extend beyond the other to produce one full beat and one partial beat, which in some cases may be preferable, as the repeating action is intended for clearing the sheds and for more thoroughly beating up the filling. By giving the second beat a greater amount of force a firmer and closer texture of fabric may be produced, since the second beat of the lay takes place on the cross shade or as the new shade is formed.

A double-beat action of the lay has already been used in England in many looms; but to the best of our knowledge, it has hitherto been produced by the duplex action of a toggle joint, which can only give two successive blows of equal travel and intensity. By the use of the double-throw cams in the Gates loom the two beats may be timed at any suitable interval after each other, and the blows may be varied in intensity to suit any requirements.

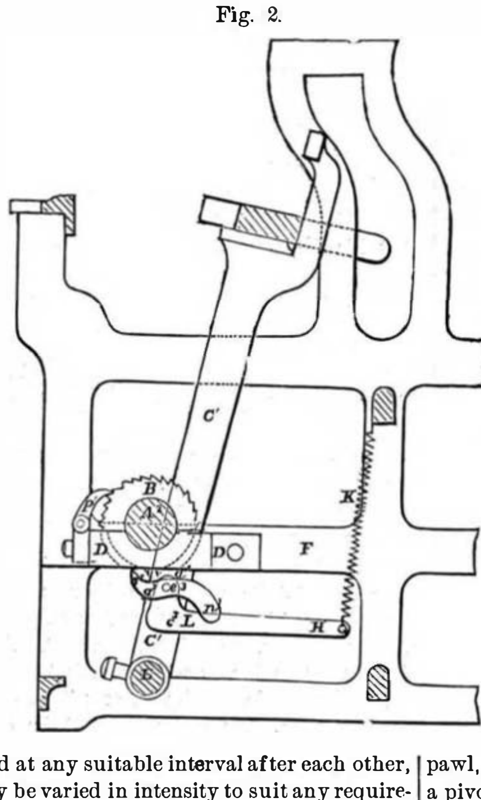
This loom is also provided with an improved take-up apparatus, in which the tension is very ingeniously exactly suited to the draught of the material so as at no time to injuriously strain the fabric. This improvement we illustrate in detail, Fig. 2. $A^2$ represents the cloth roll, and it has a ratchet wheel, B, on one end, a little inside the sword, C, rising from the rocker shaft, E, and arranged to work in the usual way. The cloth roll is shorter than the loom, and it is supported in bearings on an open bracket, D, projecting inward from the end frame, F, leaving room between the frame and the bracket for the oscillating sword and the ratchet wheel.



THE GATES POWER CARPET LOOM.—Fig. 1.

At the forward side of the loom, and hung to the bracket or other support, is a pawl, P, to hold the wheel against the draught or unwinding action of the cloth upon the roll. In practice the pawl, $P^1$, is in two parts, that is, a long and a short pawl to catch and hold on the distance of half a tooth, one pawl catching ahead of the other, and *vice versa*. To the lower portion of the sword, $C^1$, a lever of a peculiar construction is pivoted at $C^3$, and a lug or arm, $d^1$, rises at right angles to the lever, and to this ear a counterbalance pawl, $g^3$, is hung near its center by any easy working joint or a pivot, $e^3$. The outer end, $n^1$, being most weighty, holds the catch end, $S^2$. in contact with the teeth of the wheel, $B^1$.

Fig. 2.



The arm, H, of the lever extends rearward, as shown, and a spring, K, is attached to its end and to some fixed object or part of the frame. The backward and forward motions of the sword impart the same motions to the lever and the pawl, $g^3$, causing the latter to engage with the teeth of the wheel, and when the cloth is slackened by the introduction of filling in the web, and by the action of the let-off mechanism, the motion and power of the oscillating sword causes the connected pawl, $g$, to turn the wheel and the roll, and to wind up the cloth as fast as it is woven. The introduction of the tension spring, K, is here most valuable. At some occasions during the weaving of the cloth and the winding, the rate of let-off may not exactly correspond to that of the winding on, and at the same time there is always a certain tension most suitable for taking up the cloth. When the forward motion of the sword brings the pawl into contact with the tooth of the wheel, the wheel may be either driven forward, or, if the resistance be great, the spring, K, will yield and allow the end of the lever, H, to depress under the action of the rock of the sword, instead of the ratchet wheel being driven by the pawl. The tension with which the cloth is wound up will thus depend upon the tension of the spring, and thus will remain tolerably regular, and may be adjusted to any required winding-up tension.

The other detail we illustrate is an improved bobbin catch, by means of which the momentum of the bobbin is allowed to be gradually taken up by the action of a longitudinal spring. When the shuttle is set in sudden motion by a blow, the bobbin in this case first compresses the spring, and thus more gradually acquires its velocity, thereby saving a considerable portion of the filling, which, in an ordinary bobbin, is either separated or loosened. The same gradual stoppage of the bobbin by a spring cushion takes place when the shuttle is driven home, and many filling bobbins are thereby saved, which, in an ordinary shuttle, are split by the sudden stoppage of the shuttle.

Fig. 3 is an underside view, and Fig. 4 a longitudinal section of the rear end of a weaver's shuttle, with the spring recoil above referred to. A is the bobbin catch, constructed with a longitudinal slot, $b$, and a rising rear end, $d^3$, and furnished with a spiral spring, E, and a retaining pin, $f^2$, while the shuttle is supplied, near the forward end of the bobbin-catch mortise, with a stop or bar, $c^1$, as a bearing for the forward end of the spring.

The usual fulcrum pin, $e^6$, passes through the slot, $b$, and this allows the bobbin catch and the bobbin to move forward, or to yield to the action of the blow of the shuttle when its forward end strikes. The spring, $E^1$, instantly returns the bobbin and catch, or draws them back after each blow of the forward end of the shuttle. The spring acts between the bar, $c^4$, secured to the substance of the shuttle, and the ear, $d^3$, rising from rear end of the bobbin catch plate, while the pin, $f^2$, projecting forward from the ear, holds this end of the spring in position, not only when in action but also when the rear end of the bobbin catch is passed upward to release the catch end from the groove, $g^6$, in the bobbin.

Fig. 3.

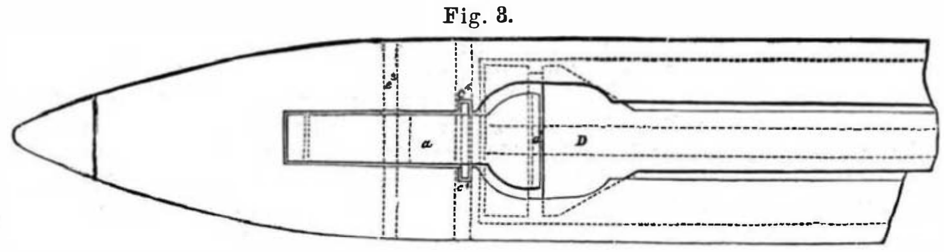
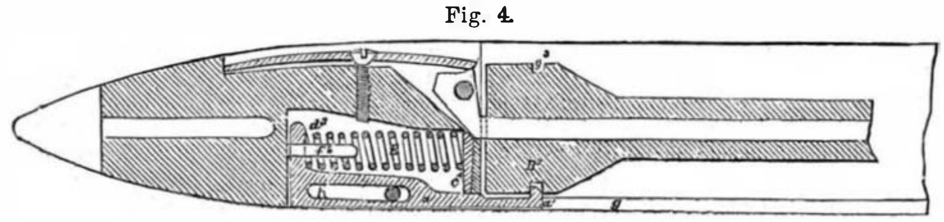


Fig. 4.



The Gates machine is supplied with a most perfect automatic gear by means of which the action of the filling beat is at once checked and thrown out of action if the shuttle has not been fully returned home after its last traverse across the warp. In this way, should a shuttle be caught and not reach its box, the action of the lay is instantly suspended, and the shuttle replaced without any injury having been done to the warp.

This loom is being introduced into England, and as many as 225 of them are running in this country. The speed at which the looms may be run seems also to be exceptionably high—so much so as to give a maximum production, with skilled labor, of 35 yards of carpet per day. The general all-round average production per day, amongst a variety of labor, is about 25 yards per day, which certainly speaks well for the construction and easy working of the loom.

### THE WATER SNAKE—HOW IT EATS.

BY C. FEW SEISS.

If we wish to keep serpents alive and healthy in captivity they must of course be fed. They must, with few exceptions, have living food. I have endeavored in various ways to entice them to eat raw beef, without, however, any success. In only one instance, I believe, did I ever succeed in making a serpent devour a lifeless object. This was a water snake which I enticed to seize and swallow a dead minnow by moving it rapidly about in the snake's bath tub, with a piece of slight wire. But even after the fish was seized, I was obliged to move the minnow's tail from side to side, to imitate life, for fear the snake should perceive his mistake and relinquish his hold.

Garter snakes must be fed upon toads and frogs, and water snakes upon frogs, tadpoles, and fishes.

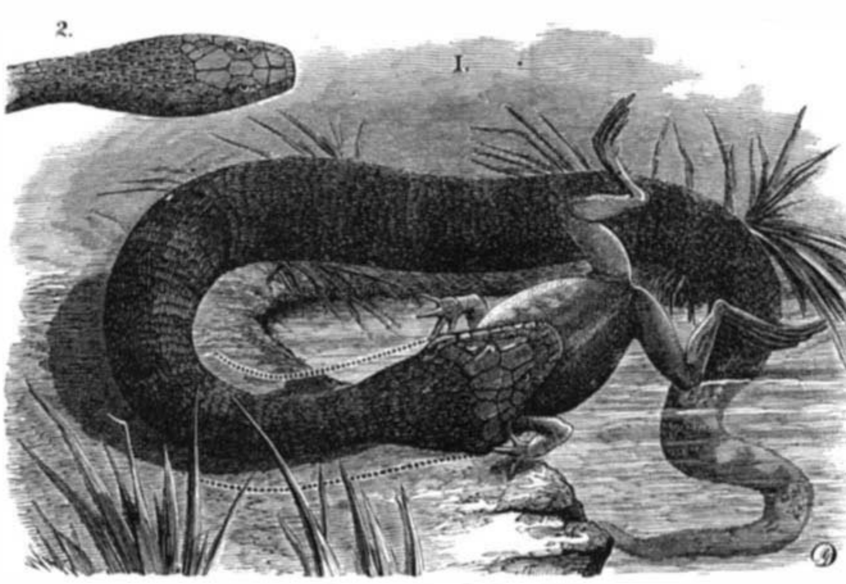
I cannot say I enjoy seeing a snake swallow a frog. The last time I witnessed our water snake (*tropidonotus sipedon*, Linn.) devour a frog, I must confess a feeling of pity for the little frog came upon me. The snake first, by a sudden dart through the water, caught the frog by one of its hind legs. The frog struggled in terror, and madly endeavored to free itself from its ferocious captor. It struggled in vain, for the snake slowly drew the frog into the dark vale from whence no frog ever returns. From the instant the frog was seized, until it was entirely swallowed, and the snake's mouth closed, it cried most piteously, first loudly, but by degrees growing fainter and fainter, until entirely hushed in the gullet of the snake. I imagine I can yet hear that young frog's death cry. It was repeated at intervals, and sounded something like the words "quaak! uck! uck! quaak! uck! uck!" uttered in a plaintive tone.

While the frog was passing through the œsophagus of the snake, and even after it had arrived in the ophidian's stomach, I observed by the external agitation of the snake's body how violently the frog kicked and writhed to extricate itself from its untimely tomb.

It may be said of most serpents that rather than eat, in the general sense of the word, they drag their jaws over and around their prey, previous to swallowing it.

Supposing the object to be made food of by a water snake is a frog. After seizing it, the snake unhooks from the frog the teeth of one side of its upper jaw, and forces them further forward upon the frog, where it rehooks them, and draws them backward; then the teeth of the opposite side of the jaw performs the same action, and thus they move alternately and regularly, the inferior jaw going through much the same action, until the head of the snake is drawn completely over the frog. The snake then forces the frog through its œsophagus to its stomach by violently contracting the muscles of its neck and body, at the same time its neck is contorted in a horizontal waving manner.

When the object swallowed is passing through the œsophagus, and into the stomach of the serpent, that is if the prey be of any considerable size, the ribs expand, widely distending the skin of the neck and body, leaving spaces between the scales, which, being generally light in color, cause the serpent, especially if it be a dark one, to have the appearance of being prettily speckled with white.



THE WATER SNAKE.

Fig. 1 represents a *tropidonotus sipedon* in the act of devouring a frog. The movable quadrate bones are forced outward, thus widely distending the head and neck of the serpent. The dotted line indicates the size of expansion while the frog is passing through the œsophagus of the serpent. Fig. 2 represents the same serpent in a state of quiet. The occipital plates of this specimen are somewhat smaller than they generally are in this species.

SUGAR of lead ground in linseed oil is a good paint dryer.

### Reynier's New Electric Lamp.

The author's object in this invention has been to produce an electric lamp capable of acting for 24 hours. He has succeeded in almost completely suppressing the occultations hitherto supposed inherent in the use of discs. M. Cance submitted to the Academy of Paris a novel system of electro-magnets with a multiple nucleus, analogous to that of M. Camacho, but in which the tubular nuclei are replaced by series of small rods of soft iron in juxtaposition and enveloping in pairs the different layers of spirals.

### Requirements for a Good Ship's Compass.

In order that a compass may be good, the needle should be very hard and well magnetized so as to retain its power, the cap should be of ruby or agate, carefully hollowed so as to be even and smooth, and the point should be hard, fine, and sharp.

No dirt or dust should be permitted to get into the cap, as it will make the needle sluggish, and enable the point to grind into the cap. The point should be examined from time to time and kept sharp. It is important also that the point should be exactly in the intersection of the two diameters passing through the gimbals, and that it should be exactly at the same height as the centers of the gimbals, a matter frequently neglected by the maker. It has been shown that a compass is more steady, and that the quadrantal correction is more perfect when the card has two parallel needles, the ends of which intersect the circumference of the card at points 60° apart. The admiralty compass has four needles.

If the bowl is of copper, or better if a stout copper ring surrounds the card, the vibrations of the needle will be calmed, that is their amplitude will be reduced, while the time of vibration will remain the same, owing to an action being set up which appears to be due to currents generated by the relative motion of the needle and the copper. It may be suggested that no means of cutting off the action of the ship's iron from the compass can be effectual, since anything which will do that will also cut off the action of the earth's magnetism also, and render the compass useless.—*From Fairman Rogers' work on "The Magnetism of Iron Vessels."*

### THE CURLY-HAIRED ANTELOPE.

Very little is known of this antelope in its wild state. Siebold, in his "Fauna Japonica," calls it *antelope crêssue*, and mentions that it is known to the Japanese by the name of "Nik," but that it is rarely found, and only then in the highest mountains of the Island of Niphon and Sikok. The appearance of the animal would indicate that it is a hardy inhabitant of a mountainous country.


THE CURLY-HAIRED ANTELOPE.—(JAPANESE CHAMOIS).