

SCIENTIFIC SHOWS.—SWORD SWALLOWERS.

When a physician introduces his finger, the handle of a spoon, or a pencil into the throat of a patient, the latter experiences an extremely disagreeable sensation. Any touching, however slight it be, of the pharynx causes strangling, pain, and nausea, and the organ reacts with violence against the obstacle that presents itself to free respiration. There is no one who has not more than once experienced this disagreeable impression, and for this reason we are justly surprised when we meet with people who seem to be proof against it, and who, for example, introduce into their pharynx large, solid, and stiff objects like sword blades, and

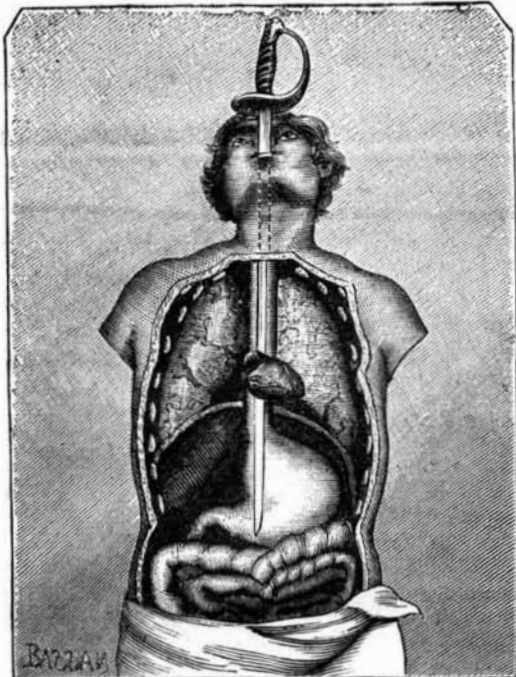


Fig. 3.—POSITION OCCUPIED BY THE SWORD BLADE IN THE BODY.

cause these to penetrate to a depth that appears incredible. It is experiments of this kind that constitute the tricks of sword swallowers.

These experiments are nearly always the same. The individual comes out dressed in a brilliant costume. At one side of him there are flags of different nationalities surrounding a panoply of sabers, swords, and yatagans, and, at the other, a stack of guns, provided with bayonets (Fig. 1). Taking a flat saber, whose blade and hilt have been cut out of the same sheet of metal (Fig. 2), the blade being from 55 to 60 centimeters in length, he introduces its extremity into his throat, taps the hilt gently, and the blade at length entirely disappears. He then repeats the experiment in swallowing the blade at a single gulp. Subsequently, after swallowing and disgorging two of these same swords, he causes one to penetrate up to its guard, a second not quite so far, a third a little less still, and a fourth up to about half its length, the hilts being then arranged as shown in Fig. 2 (C).

Pressing, now, on the hilts, he swallows the four blades at a gulp; and then he takes them out leisurely, one by one. The effect is quite surprising. After swallowing several different swords and sabers, he takes an old musket, armed with a triangular bayonet, and swallows the latter, the gun remaining vertical over his head. Finally, he borrows a large saber from a dragoon who is present for the purpose, and causes two-thirds of it to disappear. As a trick, on being encored, the sword swallower borrows a cane from a person in the audience, and swallows it almost entirely.

A certain number of spectators usually think that the performer produces an illusion through the aid of some trick, and that it is impossible to swallow a sword blade. But this is a mistake, for sword swallowers who employ artifices are few in number and their experiments but slightly varied, while the majority really do introduce into their mouth and food passage the blades that they cause to disappear. They attain this result as follows:

The back parts of the mouth, despite their sensitiveness and their rebellion against contact with solid bodies, are capable of becoming so changed through habit that they gradually get used to abnormal contacts. This fact is taken advantage of in medicine. It daily happens that persons afflicted with disorders of the throat or stomach can no longer swallow or take nourishment, and would die of exhaustion were they not fed artificially by means of the œsophageal tube. This latter is a vulcanized rubber tube which the patient

swallows, after the manner of sword swallowers, and through the extremity of which an aid introduces milk or bouillon. But the patient, before being able to make daily use of this apparatus, must serve a genuine apprenticeship. The first introduction of the end of the tube into the pharynx is extremely painful, the second is a little less so, and it is only after a large number of trials, more or less prolonged, that the patient succeeds in swallowing 30 or 40 centimeters of the tubing without a disagreeable sensation.

The washing out of the stomach, performed, by means of a long flexible tube which the patient partially swallows, and with which he injects into and removes from his stomach a quantity of tepid water by raising the tube or letting it hang down to form a siphon, likewise necessitates an apprenticeship of some days; but the patient succeeds in accustoming his organs to contact with the tube, and is finally able, after a short time, to swallow the latter with indifference at least, if not satisfaction.

With these sword swallowers it is absolutely the same; for, with them, it is only as a consequence of repeated trials that the pharynx becomes sufficiently accustomed to it to permit them to finally swallow objects as large and rigid as swords, sabers, canes, and even billiard cues.

Swallowers of forks and spoons serve an analogous apprenticeship. As known, the talent of these consists in their ability to introduce a long spoon or fork into their throat while holding it suspended by its extremity between two fingers. This trick is extremely dangerous, since the œsophagus exerts a sort of suction on all bodies that are introduced into it. The spoon or fork is, then, strongly attracted, and if the individual cannot hold it, it will drop into his stomach, whence it can only be extracted by a very dangerous surgical operation—*gastrostomy*. It was accidents of this kind that made the "forkman" and the "knifeman" celebrated, and, more recently, the "spoonman," who died from the effects of the extraction from his stomach of a sirup spoon 24 centimeters in length.

All sword swallowers do not proceed in the same way. Some swallow the blade directly, without any intermediate apparatus; but in this case, their sabers are provided at the extremity, near the point, with a small bayonet-shaped appendage over which they slip a gutta-percha bale without the spectators perceiving it (Fig. 2, F and G). Others do not even take such a precaution, but swallow the saber or sword just as it is.

This is the mode of procedure of an old zouave especially, who has become a poor juggler, and who, in his experiments, allows the spectators to touch, between his sternum, the projection that the point of the saber in his stomach makes on his skin.

But the majority of sword swallowers who exhibit upon the stage employ a guiding tube which they have previously swallowed, so that the experiments they are enabled to perform become less dangerous and can be varied more. This tube, which is from 45 to 50 centimeters long, is made of very thin metal. Its width is 25 millimeters, and its thickness 15 (Fig. 2, B). These dimensions permit of the easy introduction of flat-bladed sabers, among other things; and

or become less; the angle that the œsophagus makes with the stomach becomes null; and, finally, the last-named organ distends in a vertical direction and its internal curve disappears, thus permitting the blade to traverse the stomach through its greater diameter; that is to say, to reach the small cul-de sac (Fig. 3). It should be understood that before such a result can be attained the stomach must have been emptied through fasting on the part of the operator.

The depth of 55 or 60 centimeters to which these men cause their instruments to penetrate, and which seems extraordinary to spectators, is explained by the dimensions of the organs traversed. Such lengths may be divided thus:

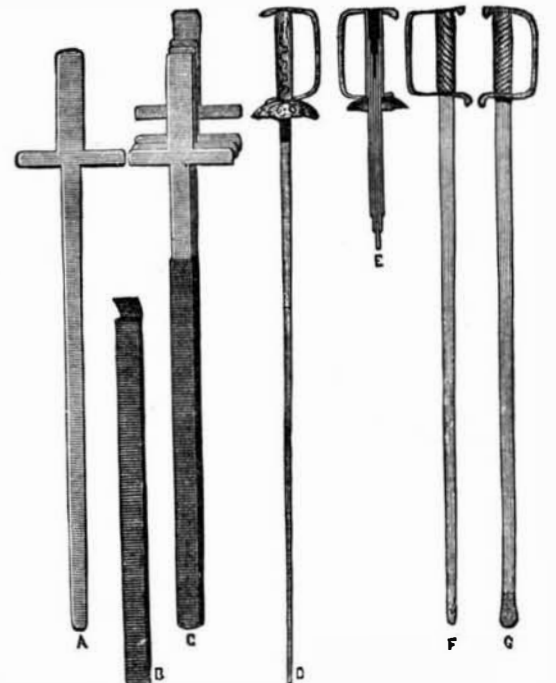


Fig. 2.—VARIOUS APPARATUS FOR SWORD SWALLOWERS.

Mouth and pharynx.....	10 to 12
Œsophagus.....	25 to 28
Distended stomach.....	20 to 22

55 to 62

According to the stature of the individual, a length of organs of from 55 to 62 centimeters may give passage to swallowed swords without inconvenience.

Sword swallowing exhibitors have rendered important services to medicine. It was due to one of them—a swallower of both swords and pebbles—that in 1777 a Scotch physician, Stevens, was enabled to make the first studies upon the gastric juice of human beings. In order to do this, he caused this individual to swallow small metallic tubes pierced with holes and filled with meat according to Reaumur's method, and got him to disgorge them again after a certain length of time. It was also sword swallowers who showed physicians to what extent the pharynx could become

habituated to contact; and from this resulted the invention of the Foucher tube, the œsophageal tube, the washing out of the stomach, and the illumination of the latter organ by the electric light.

It sometimes happens that sword swallowers who exhibit in public squares and at street corners are, at the same time, swallowers of pebbles, like him whose talents were utilized by Stevens, that is to say, they have the faculty of swallowing pebbles of various sizes, sometimes even stones larger than a hen's egg, and that, too, to the number of four, five, or six, sometimes more, and of afterward disgorging them one by one through a simple contraction of the stomach. Here we have a new example of the modification of sensitiveness and function that an individual may secure in his organs by determination and constant practice.

In conclusion, let us say a word in regard to the tricks that produce the illusion of swallowed swords or sabers. One of these, which deceives only at a certain distance, consists in plunging the saber into a tube that descends along the neck and chest under the garments, and the opening of which, placed near the mouth, is hidden by means of a false beard. Another, and much more ingenious one, which has been employed in several enchantment scenes, is that of the sword whose blade enters its hilt, and which is due to Mr. Voisin, the skillful manufacturer of physical apparatus. In its ordinary state this sword has a stiff blade, 80 centimeters in length, which, when looked at from a distance of a few meters, presents no peculiarity (Fig. 2, D); but when the exhibitor plunges it into his mouth, the spectator sees it de-

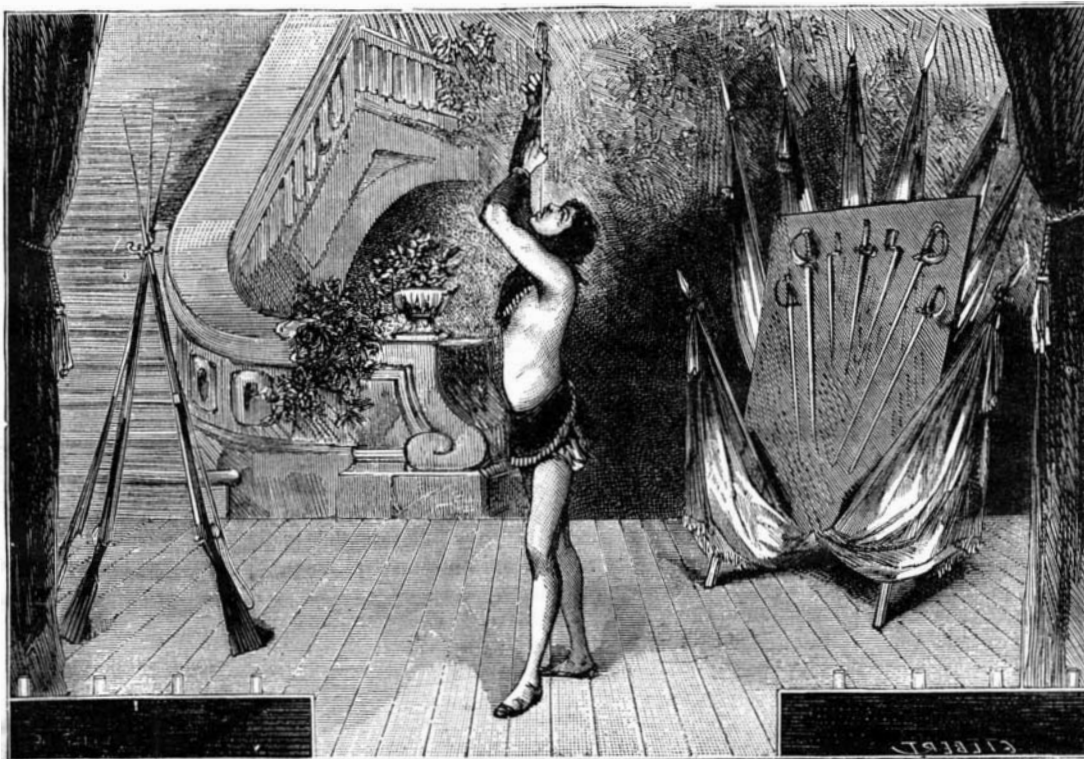


Fig. 1.—A SWORD SWALLOWER.

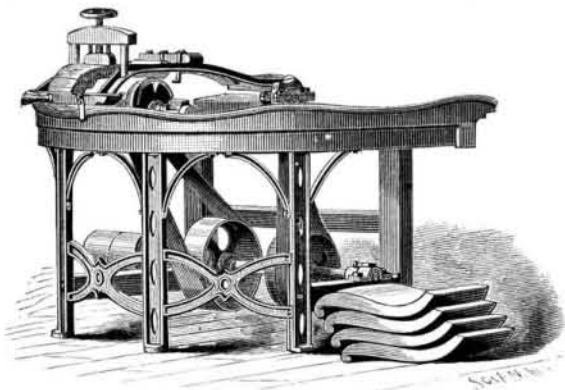
of the performance of the four saber experiment, and of the introduction of sabers and swords of all kinds.

To explain the matter from a physiological standpoint, the saber swallowed by the performer enters the mouth and pharynx first, then the œsophagus, traverses the cardiac opening of the stomach, and enters the latter as far as to the antrum of the pylorus—the small cul-de-sac of the stomach. In their normal state these organs are not in a straight line, but are placed so by the passage of the sword. In the first place, the head is thrown back so that the mouth is in the direction of the œsophagus, the curves of which disappear

scend by degrees, and finally so nearly disappear that but a few centimeters of the blade protrude. In reality, the blade has entered into the hilt, for it possesses a solid tip that enters the middle part, which is hollow, and these two parts enter into the one that forms the base of the sword. The blade is thus reduced to about 25 centimeters, a half of which length enters the hilt. There then remain but a few centimeters outside the exhibitor's mouth, so that he seems to have swallowed the sword (Fig. 2, G and E). This is a very neat trick.—*La Nature*.

ROCKER SEAT WORKER.

We give an engraving of a very simple and efficient machine for working the seats of rocking chairs. This machine has a block carrier which is moved over a guide or form, and also over the rotary cutter, which shapes the wood uniformly and rapidly. The manufacturer informs us that this machine has a capacity of from 400 to 600 rocker seats per day. No particular skill is required to



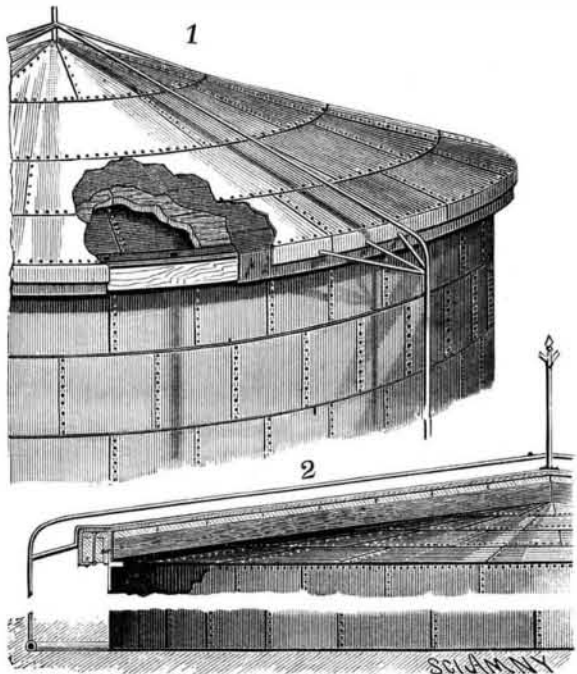
CROSS' ROCKER SEAT WORKER.

operate it. It is not liable to get out of repair, and it is not an expensive machine, considering the amount of work it will do.

Mr. S. W. Cross, of Dodge Centre, Minn., is the manufacturer of this machine.

DEVICE FOR PROTECTING OIL TANKS FROM LIGHTNING.

After almost every thunderstorm we hear of oil tanks having been fired by lightning, causing the destruction of a vast amount of property. Up to the present time there has been no very reliable means of averting this loss, although various plans have been suggested. We give an engraving of an invention intended to prevent the destructive action of lightning. It consists of a roof with wood or iron rafters, on which are secured boards extending to the outer edge of an angle iron, secured to the top of the outer surface of the tank or building. An asbestos sheathing is tacked on the boards, then lapped over the edge of the angle iron, and lapped against the outer side and bottom edge of a wooden strip held to the bottom of the horizontal flange of the angle irons by bolts passed through the flange and strips, as shown. The edge of the asbestos sheathing is tacked to the strip. The heads



PROTECTION FOR OIL TANKS.

of the bolts are below the asbestos sheathing, and are countersunk in the upper surface of the horizontal flange of the angle iron.

A sheet iron covering is placed on the sheathing and projects beyond and down over the edge of the angle iron. A series of conductors extend over the roof, and are connected with the edges of the metal covering, and are then carried down to the ground and connected to a gas pipe surrounding the tank and buried in the ground. A conductor extends from the gas pipe to suitable ground plates in marshy or other moist ground.

The asbestos insulator makes the tank fireproof, and is a non-conductor of electricity. If lightning strikes the tank and does not immediately pass down the conductors, it will

pass down the metal covering and then through the conductors to the gas pipe.

This invention has been patented by Mr. Henry C. Thomas, of Rock View, N. Y.

The Factory Numbering of Yarns.

All yarns, whether of cotton, woolen, worsted, or other material, are numbered according to their size. A No. 1 cotton yarn contains 840 yards to the pound, and a No. 10 contains ten times that amount, or 8,400 yards. No. 40 cotton yarn contains 40 times 840, or 33,600 yards to the pound, and its diameter consequently only one-fortieth as great as that of No. 1.

Woolen yarns are measured in "runs" of 1,600 yards to the pound. Two run yarn contains 3,200 yards to the pound, three-run 4,800, ten-run 16,000, and so on.

No. 1 worsted yarn always measures 560 yards to the pound, and No. 10 is one-tenth as large, and measures 5,600 yards to the pound. As a matter of fact, but little if any worsted yarn is spun coarser than No. 10, and the finest commonly made is No. 65, though some mills run as small as No. 90. No. 90 worsted yarn contains 50,400 yards to the pound, and its smallness can therefore be readily imagined. The No. 16 worsted yarn, in most common use for knitting, contains only 8,960 yards to the pound, but is generally made of very fine wool.—*Textile Gazette*.

Tile Making in Holland.

The tiles manufactured in Holland are flat, hollow, S shaped, or with a square opening in the middle to let in a pane of glass, being much used for lighting lofts and garrets all over the Low Countries. They are either red, gray, or blue, or glazed on one side only. The flat paving tiles are about 8½ inches square by 1 inch thick; they are used principally for cisterns and for bakers' ovens. The clay for tiles, it is to be noted, is in all cases more carefully prepared than that for bricks, being ground up wet in a pugmill or tub, with a shaft carrying half a dozen blades. By this means, roots, grass, etc., are got rid of. The clay comes out of the pugmill of the consistence of potter's clay, and is kept under a shed, where it is kneaded by women, with their hands, to the rough form of a tile, on a table dusted with sand. These pieces are carried off to the moulders, who are two in number, a rough moulder and a finisher. The tiles are then dried under sheds, and afterward in the sun. With regard to the flat paving tiles, they are at first rough-moulded about an inch larger than the subsequent size, and a little thicker, and then laid out to dry under a shed, until such time as the thumb can hardly make an impression on them. They are then taken to a finishing-moulder, who, on a table quite level and slightly dusted with sand, lays one of the tiles, and strikes it twice or thrice with a rammer of wood larger than the tile, so as to compress it. He then takes a mould of wood, strengthened with iron and with iron cutting edges, and puts it on the tile, which he cuts to the size. The mould is of course wetted each time it is used. The tiles are then regularly dried. In Switzerland and Alsace an iron mould is used.

The tile kiln is generally within a building, and about 16 feet long (in ordinary dimensions), 10 feet wide, and 10 feet high. The walls are from 4½ feet to 5 feet thick, secured outside with great beams, and so secured together as to form a square frame. Some of the largest of them are pierced with four flue holes, as in brick kilns; but the flues are formed by a series of brick arches, about 2½ feet wide by 16 inches high. The opening of the flue hole is about 10 inches by 8 or 9 inches high. On their upper surface, these series of arches form a kind of grating, on which the tiles are laid. The kiln is covered in at the top with a brick arch, pierced with holes of different sizes. The kilns are charged from an opening which is constructed in one of the side walls, which opening is, of course, during the burning, blocked up and well secured. The fuel used is turf, as in the brick kilns, and the fire is kept up for forty hours together, which is considered enough for the burning. Three days are then allowed for cooling, and they are afterward taken out of the kiln. Those tiles which are to be made of a grayish color are thus treated. It having been ascertained that the tiles are burnt enough, and while still red hot, a quantity of small fagots of green alder with the leaves on is introduced into each flue. The flue holes are then well secured, and the holes in the roof each stopped with a paving tile, and the whole surface is covered with 4 inches or 5 inches of sand, on which a quantity of water is thrown, to prevent the smoke from escaping anywhere. It is this smoke which gives the gray color to the tiles, both internally and externally. The kiln is then left closed for a week, when the sand is taken off the top, the door and roof holes are opened, as also the flue holes, and the charcoal produced by the fagots taken out. Forty-eight hours after, the kiln is cool enough to allow of the tiles being taken out, and the kiln charged again. Whenever any of the tiles are to be glazed they are varnished after they are baked; the glaze being put on, the tiles are put in a potter's oven till the composition begins to run. The glaze is generally made from what are called lead ashes, being lead melted and stirred with a ladle till it is reduced to ashes or dross, which is then sifted, and the refuse ground on a stone and resifted. This is mixed with pounded calcined flints. A glaze of manganese is also sometimes employed, which gives a smoke-brown color. Iron filings produce black; copper slag, green; smalt, blue. The tile being wetted, the composition is laid on from a sieve.

The manufacture of tiles is principally carried on near Utrecht, in the province of Holland, which, like most of the great cities of Holland, has facilities for the transportation of its produce by water communication all over the country.—*Glassware Reporter*.

IMPROVED FRYING PAN.

The engraving shows a novel frying pan recently patented by Mr. Oliver E. Worden, of Pierre, Dakota Territory. The design of the invention is to do away with the smoke that results from frying meat and other articles of food, and to prevent grease from spattering out of the pan.

The pan is made double; the inner one is of ordinary con-

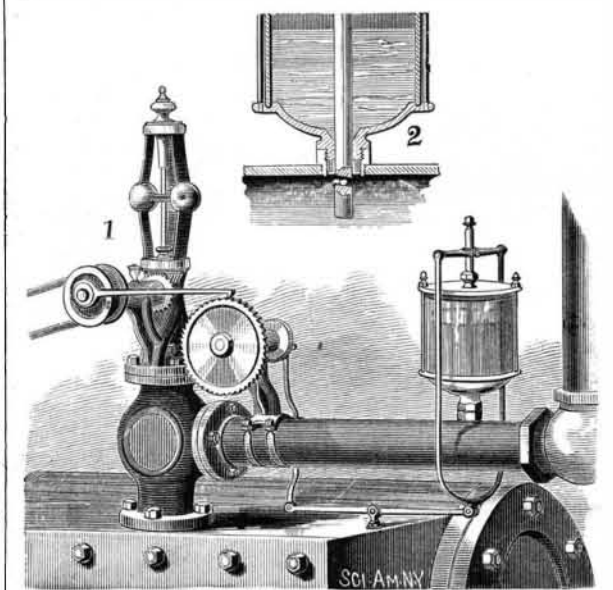


IMPROVED FRYING PAN.

struction; the outer one is made larger in diameter than the inner one and has no bottom. The inner pan is supported on a cross bar extending across the outer one, and a space is left all around to permit the smoke to escape to the fire space or flue of the stove or range. The removable cover of the outer pan covers both.

FORCE FEED LUBRICATOR.

In this lubricator the oil cup is situated on the steam supply pipe of the engine, and is provided with a plunger rod, which passes through a stuffing box in the bottom of the cup, and enters the steam pipe. This plunger rod is connected by means of a yoke with a lever, which takes its motion from a crank on the end of a shaft carrying a ratchet wheel. A slow rotary motion is imparted to the ratchet wheel by a pawl reciprocated by an eccentric in some moving part of the machine. In the present case the eccentric is placed on the governor shaft. This arrangement of mechanism slowly reciprocates the plunger rod, so that a transverse hole formed in it near its lower end is alternately raised up into the oil cup to receive oil, and plunged down into the steam pipe to discharge it. The oil is carried by the steam to the valves, piston, and internal surfaces of the cylinder.



WHEELER'S FORCE FEED LUBRICATOR FOR STEAM CYLINDERS.

This device is entirely automatic and positive. There is no steam pressure in the cup, consequently the cup can be of glass, which will permit of seeing when the oil is exhausted. The oil is supplied only when the engine is running, consequently there can be no waste.

This invention has been patented by Mr. J. A. Wheeler, of Vandalia, Mo.

THE Rev. A. P. Happer, D.D., figures out a steady decrease in the population of China. He says the present number of inhabitants cannot exceed 300,000,000. Chief among the causes of the diminution is opium. He believes that the population of India will soon exceed that of China, the latter ceasing to be the most populous country on the globe.