

scene of a shepherd with a crook in his hand, sitting on the right with two ewes and a lamb. The other spandrel represents the triumph of Ceres, and is on the north front. Ceres, the central figure, is represented as standing erect, holding a sheaf of wheat in her left hand and a shepherd's crook in her right. Further down on the pediment are other reliefs. On the left is a reproduction of Flora, Bacchus, and other mythological deities seated in a chariot drawn by two tigers. Over against this relief on the right hand is a figure of Mercury and pastoral deities in a car drawn by two dragons. The statuary is all the work of William Philip Martini of New York, with the exception of Diana, which is the work of Mr. Augustus St. Gaudens.

In addition to these decorations and ornamentations in staff, there are six mural paintings on the exterior walls, four on the west face and two on the east. These paintings consist of female figures gracefully draped, with flowers and fruit in their hands typifying the fruitfulness of nature. These paintings were executed by Mr. George W. Maynard. In the main entranceway are four mural paintings similar to the others in style and effect. One of these, representing "Fertility," carries a sheaf of wheat and a basket of fruit. The other figure, "Abundance," carries a shock of grain in one hand, while in the other there is an overturned horn of plenty, from which fruit and flowers are flowing out in abundance. Two other figures painted on the side walls of the entranceway represent mythological beings. One is a male figure driving a chariot drawn by dragons, the other a female figure in a chariot drawn by lionesses. The ornamental painting in connection with these figures was done by Charles Schladermaundt.

Thirty-seven States in this country and thirty-five foreign nations and states have exhibits in this building. The interior arrangement is such as to provide over fourteen acres of desirable space for purposes of exhibiting.

AN IMPROVED UNICYCLE.

A wheel which can be easily steered and propelled, and which is designed to enable a rider to attain a high rate of speed, is shown in the accompanying engraving, and forms the subject of a patent issued to Mr. James Imlah, of Barre, Vt. This wheel has an inner wheel supporting a suitable framework and having a double rim, the two parts of which engage ball bearings of inner annular flanges connected by spokes with the tire of the outer wheel, so that as the latter travels on the ground the inner wheel rolls off on the flanges, and the rider in his seat holds the framework in normal position, the inner wheel not revolving. Between the two ball bearings in the rim is an internal

gear in mesh with a gear wheel on a shaft in the framework, a sprocket wheel on this shaft being connected with a similar wheel on the treadle shaft, by the operation of which the large gear wheel is rotated to give motion to the exterior wheel. By means of a brake lever pivoted on the steering lever, a brake may be applied to the shaft of the large gear wheel to stop the machine. The steering lever is arranged in front of the rider's seat, and by means of the mechanism connected therewith friction rollers may be brought into engagement with opposite edges of the double



IMLAH'S UNICYCLE.

rim, the roller coming in contact with one edge of the rim, turning the wheel in the opposite direction, and when engaging the other edge moving the wheel in the reverse direction. One can easily get into the machine by turning the framework half way around, allowing the saddle to come back into place after stepping in.

THE PEARL BUTTON INDUSTRY.

The pearl oyster shells from which pearl buttons are made come principally from the coast of Australia and the South Pacific islands. The oysters are gathered in the spring, beginning in the month of March and ending in May. Fully 200,000 persons are employed in gathering the oyster during the season. When the boats arrive at the grounds, the divers are stripped naked and well oiled; their noses and ears are stuffed

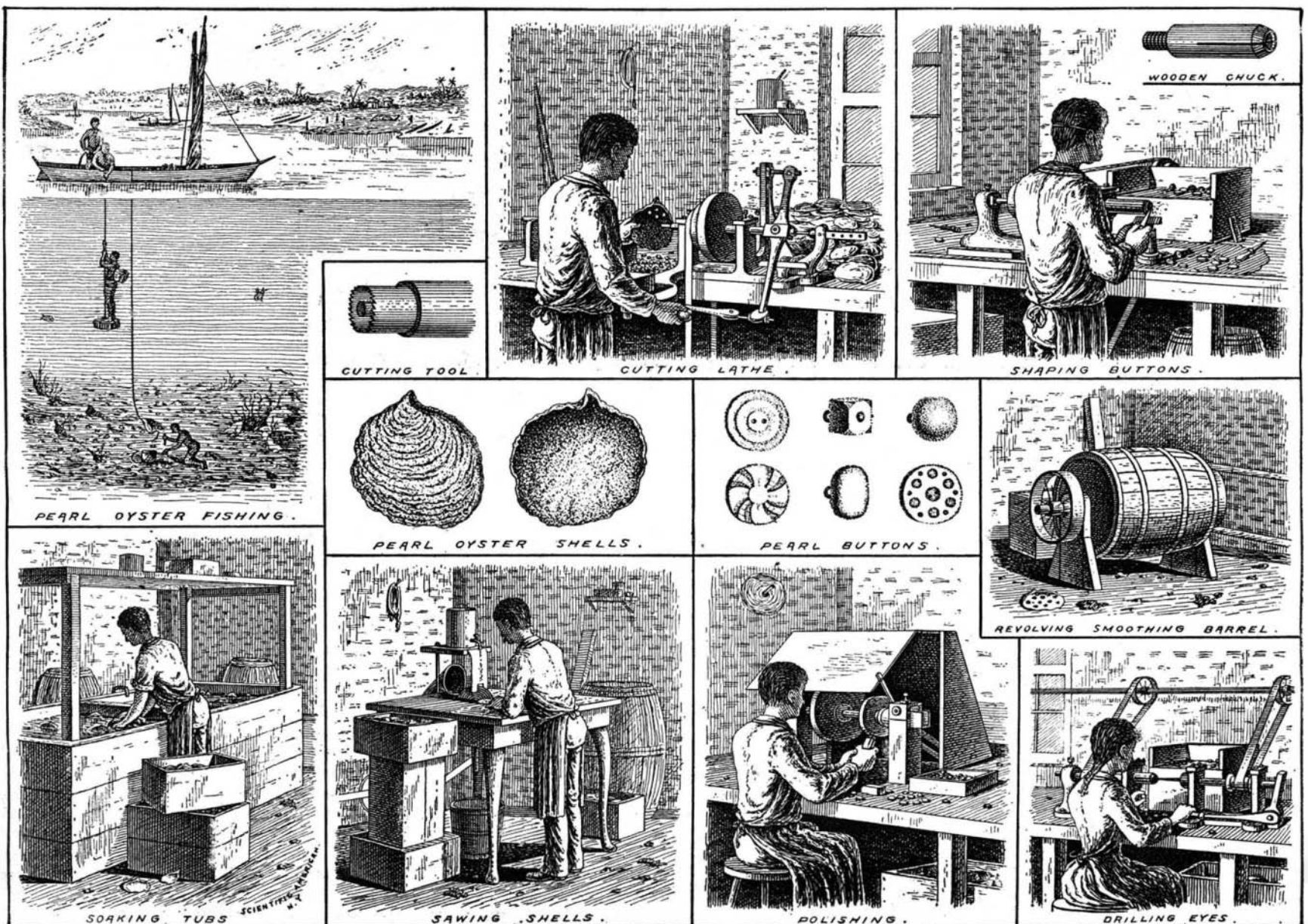
with cotton and a sponge dipped in oil fastened to one of their arms. Armed with knives, they and their baskets are then lowered to the bottom of the sea by means of large 40 or 50 lb. stones attached to ropes. The divers remain under water from 50 to 80 seconds. As soon as a basket is filled it is drawn up and the diver comes up to the surface. After resting a few moments he again descends, filling the basket again, and so on until he becomes exhausted, when another man takes his place.

The fishing is done in about 8 to 10 fathoms of water. The shells are imported into this country. There are two varieties, the white and the black or smoked pearl. They run from 2 x 3 inches to 6 x 8 inches in diameter, the largest of the shells being about a half inch in thickness near the joint. The shells are very brittle when they arrive in this country, and have to be soaked in water before they can be worked. This soaking brings them back more to their natural state. After soaking in tubs they are taken to the cutting lathe.

The operator, taking the shell in one hand, by means of a lever forces a hollow saw-edged tool against the shell, which cuts its way through, the circular piece dropping out of the hollow tool when drawn back by the lever. This operation is continued until the entire shell is perforated. The teeth of this sawing tool are 1-32 part of an inch in length.

These circular pieces are then taken to another lathe to be trimmed and formed. The circular piece of pearl is placed in the end of a slotted dogwood chuck which is hollowed out the same shape as the button. The attendant, by the use of sharp-pointed tools made of saw files, trims and forms the button as it revolves. Fancy designs on the faces of the buttons are made with ball and circular saw-shaped tools, which are placed in lathes, the operator holding the button in his hands and pressing it against the tool as it revolves. The drilling of the eyes is also done on a lathe, the button being placed in a chuck similar to that on the forming machine. The attendant by means of a lever forces the drill against the button, which cuts out the eyes.

For smoothing off ridges the buttons are put into a revolving barrel with a mixture of powdered pumice stone and water. The polishing wheels are 6 and 14 inches in diameter and made of 54 separate pieces of unbleached muslin clamped together at the center on the shaft of the machine. The revolving of the shaft causes the circular pieces to stick together, forming a perfect wheel. The attendant puts a button in the end of a small wooden chuck, rubs a little rouge made of a mixture of tripoli, flour and tallow, and presses it up against the muslin wheels, which give it a beauti-



THE PEARL BUTTON INDUSTRY.

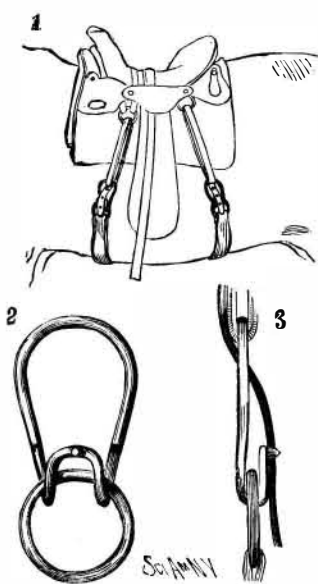
ful polish. These wheels make 3,000 revolutions per minute.

After polishing the buttons are placed on cards and ready for sale. Fifty hands can turn out about 150 gross per day of buttons. The shells cost from 40 to 50 cents per pound. The buttons when finished cost from 40 cents to \$25 per gross wholesale. The annual consumption of pearl buttons in the United States amounts to about \$3,500,000.

The sketches of this subject were taken from the plant of E. Huebner & Son, Newark, N. J.

AN IMPROVED SADDLE ATTACHMENT.

A combined loop and hook, for quickly and easily forming the connection between the saddle straps and

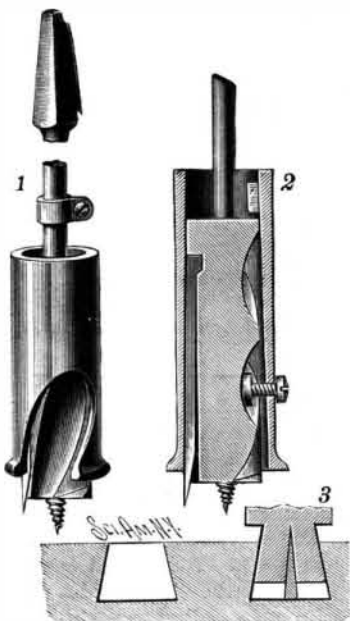


KOHLER'S SADDLE ATTACHMENT.

belly girths, and securely fastening them in position, is shown in the accompanying illustration, Fig. 1 showing the loop and hook in use on a saddle, Fig. 2 being a side view, and Fig. 3 showing the attachment to a girth ring. This improvement has been patented by Mr. John F. Kohler, No. 906 Columbus Avenue, New York City. The elongated metallic loop is slightly larger at its upper end, so that a strap may be passed through it several times if desired, and at the lower end it is doubled upon itself to form a hook adapted to engage the girth ring, a portion of the hook surface being flattened and having an outwardly extending stud to engage perforations in the saddle strap. The tension of the girth and straps is designed to hold the saddle in place so that it cannot accidentally get loose, and the strap is easily and quickly fastened to the stud.

A TOOL TO DRILL CONICAL RECESSES.

Fig. 1 shows a perspective and Fig. 2 a sectional view of an improved tool, patented by Mr. Charles A. Cutting, of Middletown, Va., and which may be used to conveniently drill conical recesses to receive posts, dowels, etc., as indicated in Fig. 3. At the lower end of the bit, between the twists, is held a removable cutter, an offset on its upper end fitting into a recess in the upper end of the bit and forming a pivot for the cutter to swing outward on, so that it will stand at angles to the axis of the bit. A shell or sleeve, slightly enlarged at its lower end, fits loosely over the cutter and bit, the lower end of the sleeve having a recess through which shavings may escape. A clamp on the shank of the tool regulates the depth of the cut, which is limited by the clamp coming in contact with the upper end of the sleeve. The space formed by the twist in the bit is engaged by a plate on a screw screwing in the shell, so that in revolving the tool the shell revolves with it, while the tool is free to move downward in the shell as the latter rests on the material being bored.



CUTTING'S RECESS BORING TOOL.

A lug in the upper end of the shell prevents the bit from being accidentally withdrawn therefrom. In operation, as the tool cuts into the material, and its lower end moves out of the shell, the point of the cutter is pushed outward to assume an angular position relative to the bit, thus forming conical recesses, as shown in Fig. 3. A wedge set in the bottom of this recess is adapted to engage the bottom of a post or dowel, splitting it and wedging its sides in contact with the walls of the recess.

PITCH pine beams will shrink in thickness from 18½ inches to 18¼; spruce from 8½ to 8¼; white pine, from 12 inches to 11½; yellow pine, a trifle less. Cedar beams will shrink from a width of 14 inches to 13¼; elm from 11¼ to 10¾; and oak from 12 to 11½ inches.

The Wire Gun.

The first public test of the Brown segmental wire-wound gun was made at Birdsboro, Pa., April 15, and was attended with much success. Government experts, representatives of foreign powers and a number of invited guests from New York, Philadelphia, and other cities were present. Three shots were fired, and the gun successfully withstood a pressure which the experts declared would blow any other gun in the world to atoms. The tests broke all records, and one of the enthusiasts declared they placed the United States in the van in gun making.

On the third and final test the charge was thirty pounds of powder, the projectile sixty pounds weight. The gun recoiled about 15 feet, and a section of the stone quarry rose in the air as the projectile struck.

The test gauges were set to show a pressure of between 40,000 and 60,000 pounds; it was found that the pressure had gone beyond the larger figure and exceeded the means at hand for measurement. The pressure was declared by experts to be something above 70,000 pounds. The standard army requirements are only 37,000 pounds.

The gun has just been finished as a sample for the United States government. It was built at the Diamond Drill Works at Birdsboro, under the personal supervision of John Hamilton Brown, the inventor. It is built on a new system, which is the winding of a steel wire around a segmental core of steel. The core is made of twelve pieces of steel 19 feet long, and with a cross section like the key of an arch. The core is 3 inches in thickness at the breech, and three-quarters of an inch at the muzzle.

This is wound with thirty-three layers of steel wire seven one-hundredths of an inch in thickness. The gun is about 15 inches in diameter at the breech and 10 inches at the muzzle. The gun is 1½ feet in length and weighs three and one-third tons.

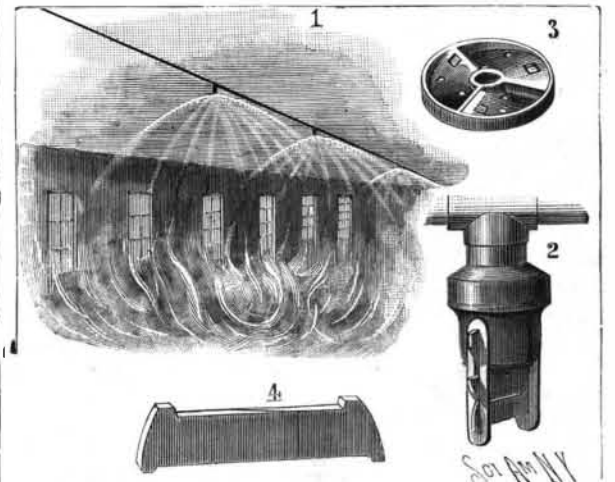
Venetian Mosaics for the Fair.

The British vice-consul at Venice says that the splendid mosaics now produced there continue to take the first place in the artistic markets of the world. Among the important works recently executed by the Venice and Murano Company, a well-known mosaic manufactory, is a large mosaic panel representing Columbus being received by Queen Isabella and King Ferdinand of Spain, after his return from America. This panel, measuring about 200 square feet, shows Columbus when kneeling before the sovereigns, presenting to them the natives of the newly discovered land and some products of the soil. The persons represented are about thirty-eight in number, many of them of the natural size, formed in three principal groups. In the most important is Columbus, having at his side the Crown Prince, and the sovereigns surrounded by the dignitaries of the court, ladies and nobles, and pages holding the standards. In the middle group, but more to the left, are the native Indians, and near the entrance of the hall other Spanish nobles, and the companions of Columbus. The gorgeous and various attire of all the figures, their warlike implements, the splendid stuffs of all sorts and tints, the rich decoration of the hall, the pageantry of the court, the strange costumes of the natives in full contrast with the others, and the various attitudes of all these personages, form a whole in perfect harmony with the details of the scene, owing to the excellent distribution of the figures and the perfect fusion of tints. The work is so delicately executed, says the vice-consul, that no one can believe that the panel is not painted until on touching it he discovers that it is entirely composed of small enamel cubes, put together without any aid of color or cement, and worked according to the mode of the old Venetian mosaic school. This panel is to form the pendant of another, representing Columbus landing in America, and which will shortly be executed by the Venice and Murano Company. These mosaic works are executed for Mr. H. Furber, of Chicago, who is now building a palace near the Exhibition, which is to be called Columbus Palace, and will, it is said, be the largest in America. The two panels are to be placed in the entrance hall. The author of the cartoons is Prof. Chev. E. Paoletti, an artist well known in Venice, and affirmed to be one of the best painters who still maintain the traditions of the great Venetian school. As a work of art, the mosaic is said to be the most remarkable modern specimen ever exhibited.

AN AUTOMATIC SPRINKLER TO PUT OUT FIRES.

Many of the insurance companies now stipulate for the employment of automatic sprinklers in manufacturing establishments which they underwrite, or, in the absence of such sprinklers, charge a higher rate for insurance. A sprinkler of this kind, which has been patented by Mr. Thomas Holmes, of Chicago, Ill., is shown in the accompanying picture, Fig. 1 representing the operation of these sprinklers in a room, and Fig. 2 being a larger perspective view of the device attached to a pipe by which water is supplied under pressure. Within the body of the sprinkler a valve is held to close the water supply opening, and to have a limited fall as the valve opens, the stem of

the valve extending below the body and having on its lower end a disk-like turbine water sprinkler, shown in Fig. 3. It may have any number of spray perforations, and is adapted to rotate freely, the perforations being so inclined that the water pressure causes its rapid rotary movement. Within two pendent links supported from lugs on opposite sides of the body of the sprinkler is held a saddle bar, on which the head of the valve stem rests, and this bar rests upon a coupling bar, shown in Fig. 4, whose outer ends have lips which lock over the lower edges of the pendent links. This coupling bar may be made entirely of fusible metal, but preferably consists of two pieces of brass or other metal, lap-folded and united, as shown, by a solder which will fuse at a temperature below that of boiling water. The fusing of this solder, when a fire starts in the vicinity of the sprinkler, causes the two pieces of the coupling bar to be

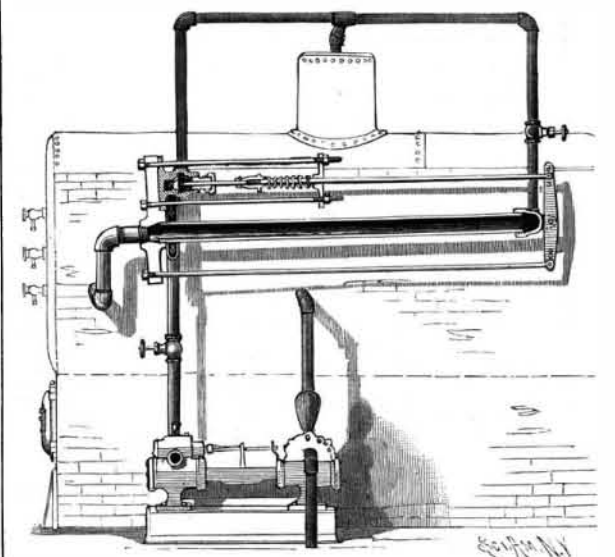


HOLMES' AUTOMATIC SPRINKLER.

separated, lets down the saddle bar, pushing the pendent links outwardly, and allows the valve with its turbine disk to drop, the force of the escaping water then causing its widespread spraying distribution. Further information relative to this improvement may be obtained of Mr. C. H. Matthiessen, P. O. box 655, Chicago, Ill.

AN IMPROVED FEED-WATER REGULATOR.

An automatically operating regulator of the feeding of water to a steam boiler, designed to hold the water in the boiler at all times at about its normal level, is shown in the picture, and forms the subject of a patent issued to Mr. Emory M. Carr, of New Castle, Ind. A slightly inclined pipe arranged alongside the boiler, with its upper end at about the normal water level, is connected by a pipe at its lower end with the water space of the boiler, and a pipe connects its other end with the steam space. Both ends of the longitudinal pipe are secured in heads, and on the head on its higher end is fulcrumed a lever, the lower end of which is connected by a longitudinal rod with the other head, while its upper end is connected by a rod with



CARR'S FEED-WATER REGULATOR.

a valve in the steam pipe connecting the boiler with the feed-water pump. On the latter rod also is a coiled spring, normally holding the valve to its seat. With the water at its normal height, it fills the longitudinal pipe, and the feed pump is still, but as the water falls the pipe becomes filled with steam, the heat of which causes an expansion of the pipe and an outward movement of the lever fulcrumed on its upper end, thus pulling the rod connected with the valve in the steam pipe leading to the feed pump, and setting the latter in motion. As the boiler is filled by the incoming water the longitudinal pipe is also filled, and by its contraction as it cools the lever fulcrumed at one end is moved to close the valve in the steam pipe leading to the feed pump, the spring on the rod also assisting to close the valve.