No. 837,010. PATENTED NOV. 27, 1906.

S. J. VERNSTEN.

GRAIN DRIER.

APPLICATION FILED OCT. 27, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

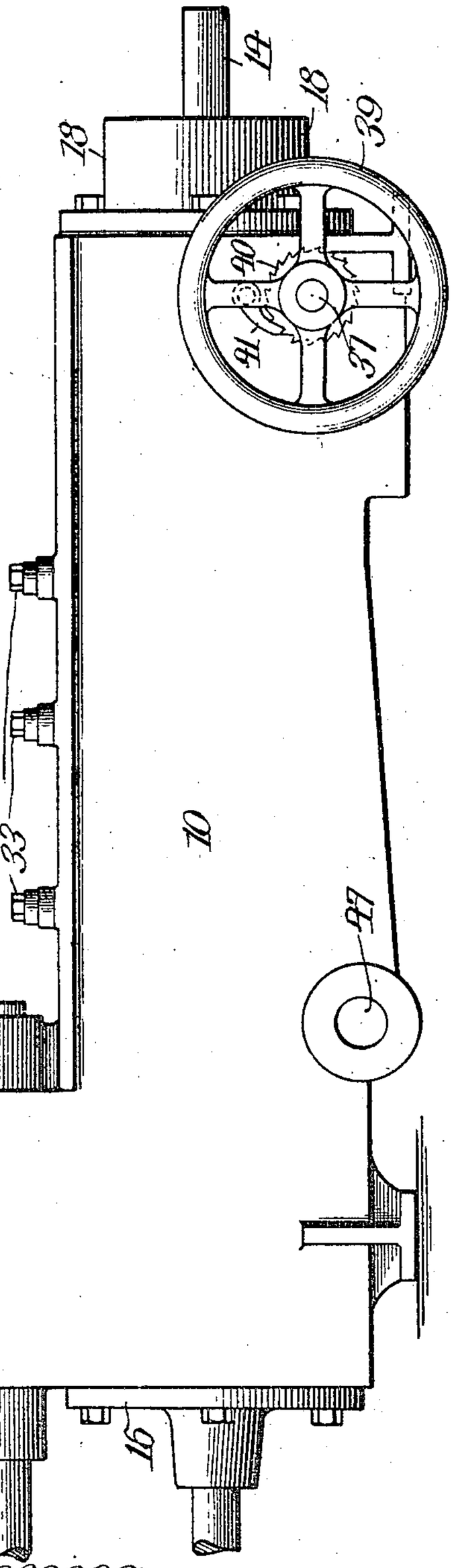
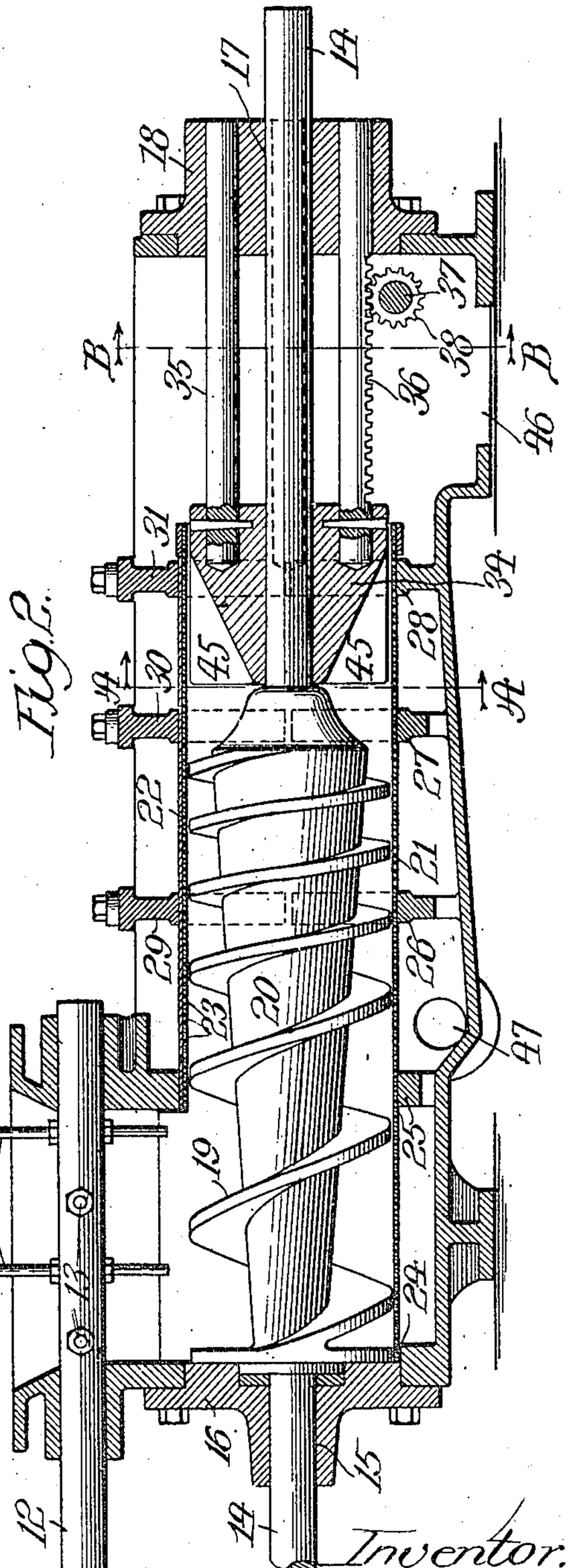


Fig. 2.



Witnesses:
Edw. P. Barrett
M. B. Reeder

Inventor:
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by John Howard McElroy,
his Atty's.

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2 SHEETS—SHEET 2.

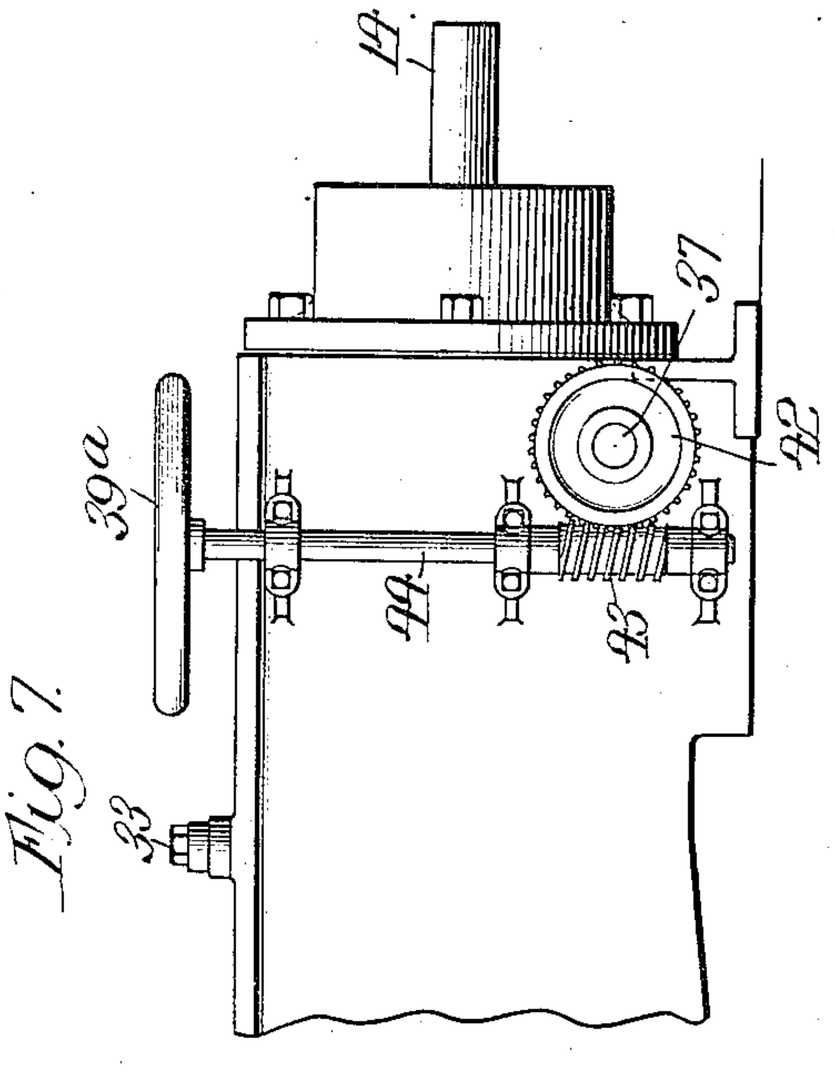

Fig. 7.

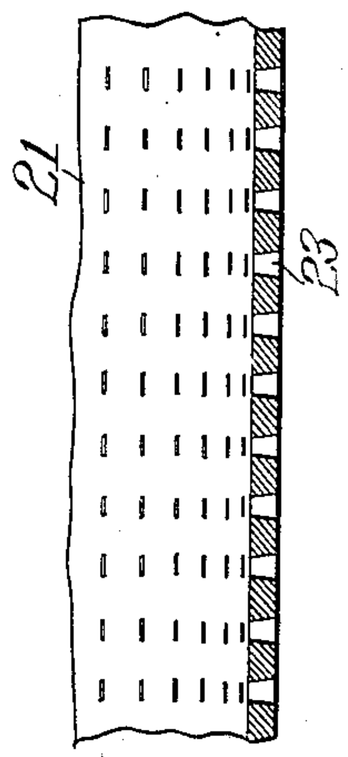

Fig. 5.

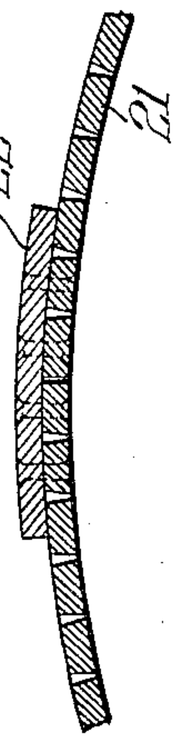

Fig. 6.

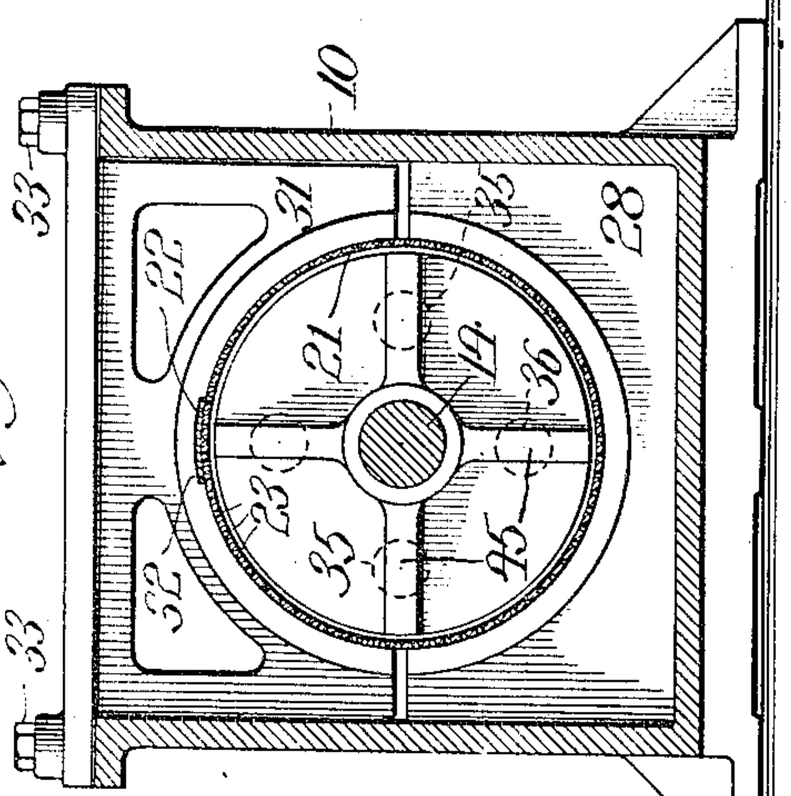

Fig. 3

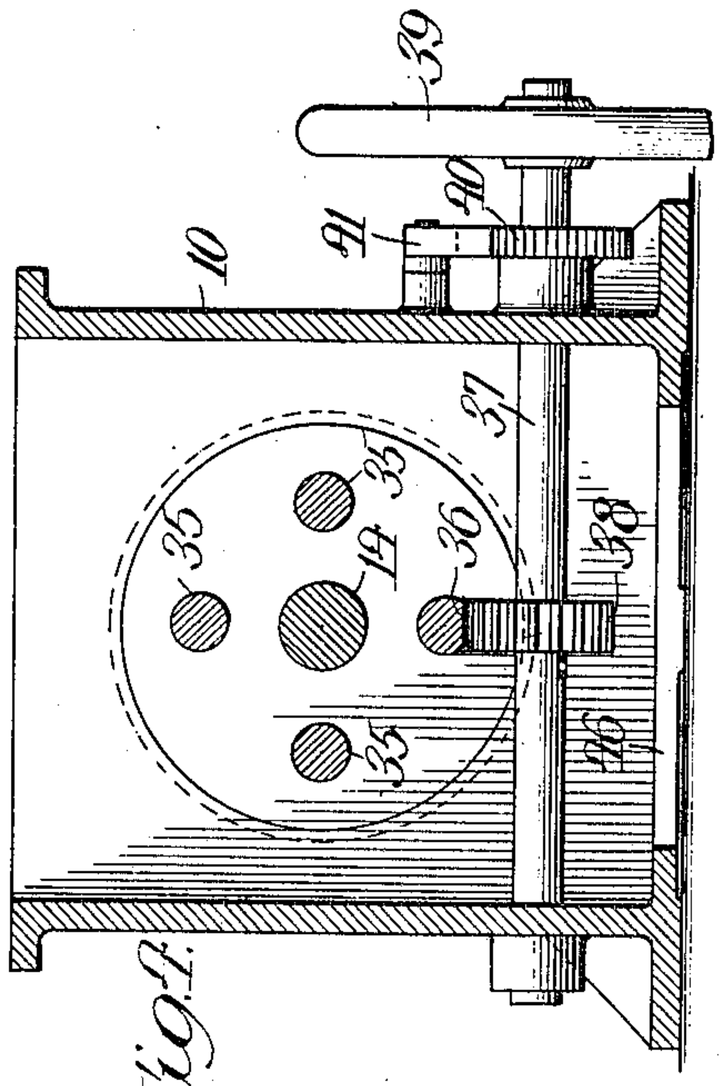

Fig. 2.

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UNITED STATES PATENT OFFICE.

SWAN J. VERNSTEN, OF CHICAGO, ILLINOIS, ASSIGNOR TO C. F. WIGAND, OF STAPLETON, STATEN ISLAND, NEW YORK.

GRAIN-DRIER.

No. 837,010. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed October 27, 1905. Serial No. 284,606.

To all whom it may concern:

Be it known that I, SWAN J. VERNSTEN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Driers, of which the following is a specification.

My invention is concerned with a novel "squeezer," as they are called, for use in connection with drying apparatus for grain, glucose, &c., the function of the squeezer being to squeeze as much water as possible out of the grain before it is passed onto the portion of the drier to which heat is applied.

I will in the following specification first describe in detail the construction of the complete machine and in the claims particularly point out the novel combinations.

To illustrate my invention, I annex hereto two sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a side elevation of the squeezer. Fig. 2 is a central longitudinal vertical section of the same. Fig. 3 is a cross-section on the line A A of Fig. 2. Fig. 4 is a similar section on the line B B of Fig. 2. Fig. 5 is an enlarged longitudinal section through a portion of the bottom of the copper lining to show its construction. Fig. 6 is a transverse view through the top of the same; and Fig. 7 is a side elevation of one end of the squeezer, showing a modification therein.

The mechanism is contained in a trough-like casing 10, which is preferably a casting and which has the hopper 11 formed at the top of one end thereof and adapted to receive the material. A shaft 12, journaled in suitable bearings, extends through the hopper and is provided with the transverse pins 13, which serve to break up the material in case it should be delivered into the hopper in too large chunks to be conveniently operated on by the mechanism hereinafter described. Extending the length of the apparatus is the horizontal shaft 14, which is journaled at one end in a suitable bearing 15, formed in the head 16, closing one end of the trough, and at the other end in a bearing 17, formed in the head 18, closing the other end of the trough. This shaft has secured thereon the worm 19, which is preferably of a constantly-decreasing pitch, as seen, to compress the material in a manner that will be readily understood, and the compression resulting from the decreasing pitch is further increased by making the body 20 of the worm of a constantly-increasing diameter away from the hopper, so that as the worm rotates the material confined in the shell 21 will be at each instant crowded into a smaller and smaller space, so that the moisture therein is squeezed out by a very great pressure. The shell 21 is made of a sheet of copper rolled into a cylindrical form, its abutting ends being brought together, preferably at the top, and riveted to the longitudinal strip 22, which extends the length of the cylinder except the portion beneath the hopper, where it is open to admit the material. As these copper linings or shells have been previously manufactured the perforations 23 therein have been circular, and as a consequence it has been very difficult to make a sufficient number of them to let the moisture escape freely without materially weakening the shell, so as to make it liable to burst, it of course being understood that these perforations must necessarily be very small to prevent the escape of the material through them.

In my improved construction instead of using a circular perforation I use an elongated one, which can be readily punched into the copper and which when the shell is rolled into shape is a very narrow elongated slot on the inside, while it widens toward the outside, so that it is considerably larger at the outer surface than at the inner surface. The cylindrical shell thus formed rests upon the semicircular seats 24, 25, 26, 27, and 28, formed in the casting, one of them being shown in Fig. 3. It is held in place by the coöperating castings 29, 30, and 31, which are of the shape shown in Fig. 3 and have their surfaces engaging the shell 21, semicircular except for the recess 32, which accommodates the strip 22 and prevents the shell from turning under the drag of the rotating screw. These castings 29, 30, and 31 are secured in place by the bolts 33, as will be readily apparent.

The area of the discharge-opening in the end of the shell or cylinder 21 is regulated by the plug or head 34, which is preferably of a truncated conical shape and which serves as a bearing, as it were, for a portion of the shaft 14. This head 34 is preferably guided

and moved by means of the several rods 35, which are pinned therein, as clearly shown, and which are adapted to slide in bearings formed in the head 18, as will be readily apparent. To move the head, I preferably cut rack-teeth 36 on the under side of the lowermost of these rods and journal in suitable bearings the transverse shaft 37, which has secured thereon the pinion 38, meshing with the rack-teeth 36, so that by rotating the shaft 37, as by the hand-wheel 39, secured on the outer end thereof, the position of the cone or plug can be adjusted back and forth as may be necessary. To hold the cone in this forward position against the pressure of the material tending to force it back, I secure on the shaft 37 the ratchet-wheel 40, which is engaged by the detent 41, pivoted to the side of the casing, as shown. A preferred form of the mechanism for rotating this shaft is shown in Fig. 7, where it will be seen that I secure on the outer end of the shaft a small worm gear-wheel 42, which is engaged by the worm 43, secured on the vertical shaft 44, journaled in suitable bearings secured on the side of the trough and provided at its upper end with the hand-wheel 39[a], by which the shaft 44 is rotated, which in turn slowly rotates the shaft 37 so as to bring the head 34 to any desired position of adjustment and hold it there by reason of the engagement of the worm with its wheel. The head 34 is preferably provided with a plurality of ribs 45, which may be of any desired number and which are intended to break up the material, so that it can be more readily forced out of the annular aperture formed between the head 34 and the discharge end of the shell 21. The material escaping through this aperture falls through the opening 46 in the bottom of the trough and is delivered to suitable conveying mechanism to carry it on through the drier. A suitable drain-pipe is connected with the bottom of the trough through the aperture 47, and it will be understood that suitable power is applied to the shafts 12 and 14 for rotating them at the necessary rate of speed.

The operation of the apparatus will be readily apparent, and it will be seen that the loose material passing into the apparatus through the hopper will be very strongly compressed as it reaches the end of the screw, so that the moisture being expressed therefrom will escape through the apertures 23 in the lining, while the material passes on and eventually escapes through the annular aperture between the head 34 and the end of the shell 21, and it will be apparent that by moving the head farther out the size of the annular aperture can be increased so as to allow the material to escape more readily and without being subjected to so great a pressure as it would be if the head were moved in, so as to make the aperture very small. It will of course be understood that it is desirable to vary the degree of pressure, depending upon the amount of moisture in the material, as well as the character of the material being treated.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a device of the class described, the combination with the perforated cylinder, of the screw therein having diminishing capacity, and means for regulating the size of the discharge-aperture from said cylinder consisting of the conical plug adapted to be moved into and out of the end of the cylinder to vary the width of the annular opening and having the ribs on the inclined surface thereof for the purpose described.

2. In a device of the class described, the combination with the trough having the bearing-heads therein, of the screw-shaft journaled in said bearings and having the screw of diminishing capacity thereon, the perforated cylinder concentric with said shaft and coöperating with the screw, and the conical plug longitudinally adjustable on the shaft to vary the size of the discharge-aperture from the cylinder.

3. In a device of the class described, the combination with the trough having the bearing-heads therein, of the screw-shaft journaled in said bearings and having the screw of diminishing capacity thereon, the perforated cylinder concentric with said shaft and coöperating with the screw, the conical plug longitudinally adjustable on the shaft to vary the size of the discharge-aperture from the cylinder, and means for adjusting said plug on the shaft and securing it in any desired position of adjustment.

4. In a device of the class described, the combination with the trough having the bearing-heads therein, of the screw-shaft journaled in said bearings and having the screw of diminishing capacity thereon, the perforated cylinder concentric with said shaft and coöperating with the screw, the conical plug longitudinally adjustable on the shaft to vary the size of the discharge-aperture from the cylinder, means for adjusting said plug on the shaft and securing it in any desired position of adjustment consisting of the rods secured to the plug and sliding in bearings in one of the heads of the trough, a shaft, and rack-and-pinion connections between said shaft and one of the rods.

5. In a device of the class described, the combination with the trough having the

bearing-heads therein, of the screw-shaft journaled in said bearings and having the screw of diminishing capacity thereon, the perforated cylinder concentric with said shaft and coöperating with the screw, the conical plug longitudinally adjustable on the shaft to vary the size of the discharge-aperture from the cylinder, means for adjusting said plug on the shaft and securing it in any desired position of adjustment consisting of the rods secured to the plug and sliding in bearings in one of the heads of the trough, a shaft, and rack-and-pinion connections between said shaft and one of the rods, a worm-wheel on said shaft, and a transverse shaft carrying a worm meshing with said wheel.

6. In a device of the class described, the combination with the shaft 14, journaled in suitable bearings and carrying the diminishing-capacity worm 19 thereon, of the suitably-supported perforated shell 21 concentric therewith, the conical plug 34 adapted to slide on the shaft 14 and partially close the end of the shell 21, and means for securing it in any desired position of adjustment, consisting of the rack 36, the pinion 38 coöperating therewith, the shaft 37 upon which the pinion is secured, and means for rotating and securing said shaft.

7. In a device of the class described, the combination with the shaft 14, journaled in suitable bearings and carrying the diminishing-capacity worm 19 thereon, of the suitably-supported perforated shell 21 concentric therewith, the conical plug 34 adapted to slide on the shaft 14 and partially close the end of the shell 21, and means for securing it in any desired position of adjustment, consisting of the rack 36, the pinion 38 coöperating therewith, the shaft 37 upon which the pinion is secured, and means for rotating and securing said shaft, consisting of the worm gear-wheel 42, and the shaft 44 having the worm 43 secured thereon meshing with the wheel 42.

8. In a device of the class described, the combination with the cylindrical shell made up of a sheet of perforated metal, of the trough having the semicircular seats, the removable bearing-pieces having the semicircular seats coöperating therewith, means for securing the removable pieces to the trough, the screw concentrically mounted in said shell, and means to prevent the rotation of the shell.

9. In a device of the class described, the combination with the cylindrical shell made up of a sheet of perforated metal, of the trough having the semicircular seats, the removable bearing-pieces having the semicircular seats coöperating therewith, means for securing the removable pieces to the trough, the screw concentrically mounted in said shell, and means to prevent the rotation of the shell consisting of the elongated metallic strip secured to the shell and adapted to coöperate with recesses in the removable pieces.

In witness whereof I have hereunto set my hand this 25th day of October, 1905.

SWAN J. VERNSTEN.

In presence of—

JOHN H. MCELROY,

M. S. REEDER.