R. G. MERZ.

CONTINUOUS SCREW PRESS.

APPLICATION FILED APR. 30, 1907.

898,760.

Patented Sept. 15, 1908.

4 SHEETS—SHEET 1.

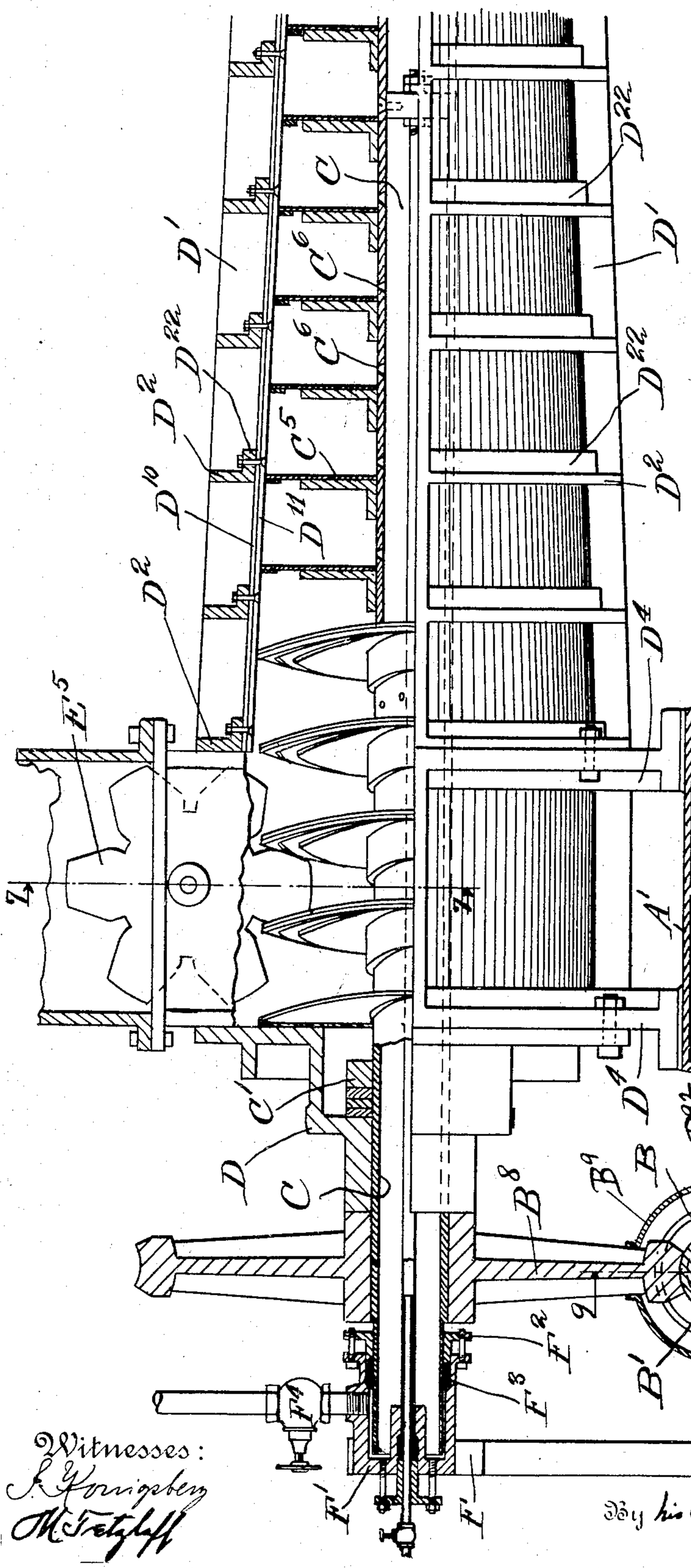

FIG. 1a

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4 SHEETS—SHEET 2.

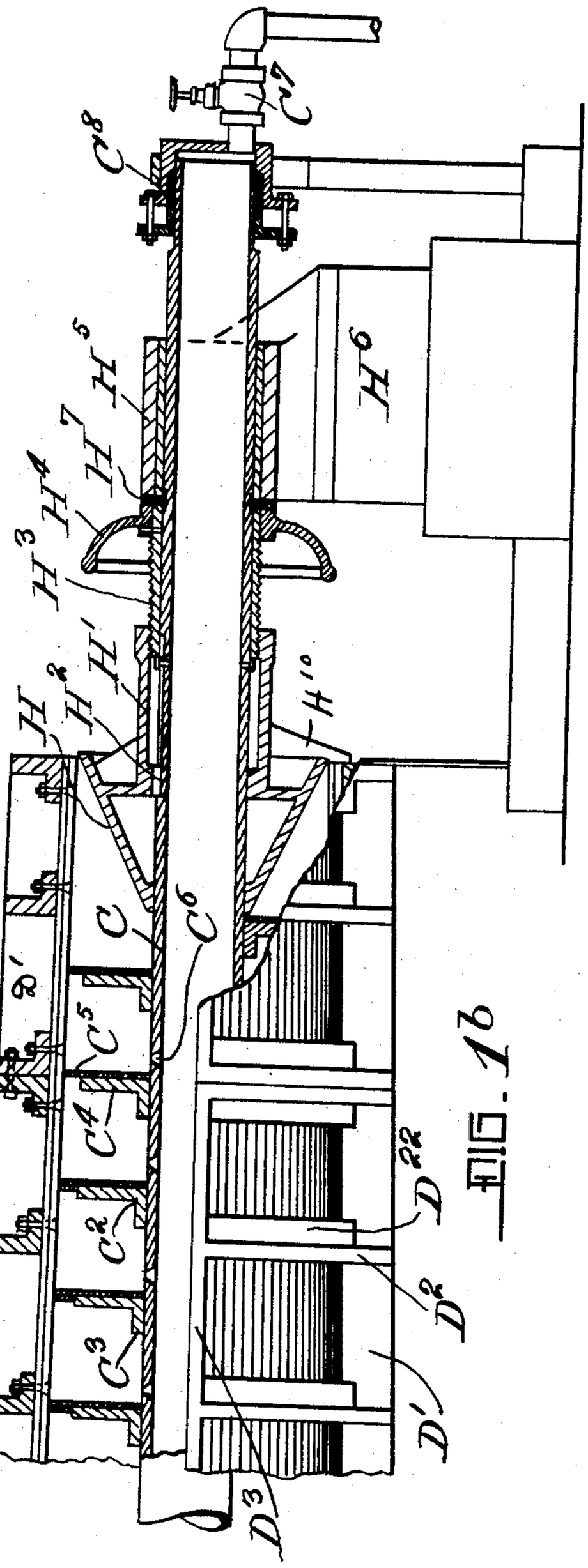

FIG. 1b

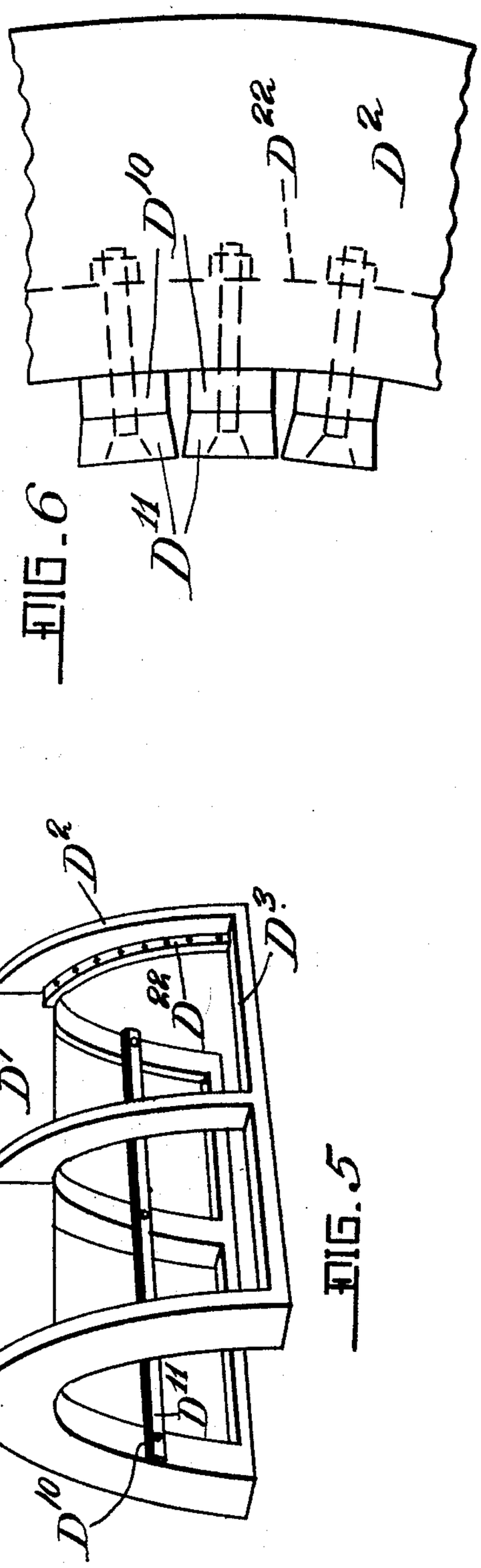

FIG. 6

FIG. 5

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4 SHEETS—SHEET 3.

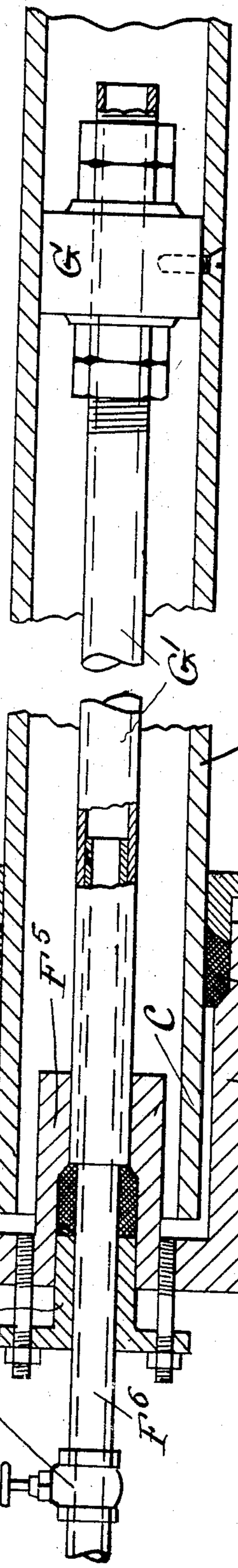

FIG. 2

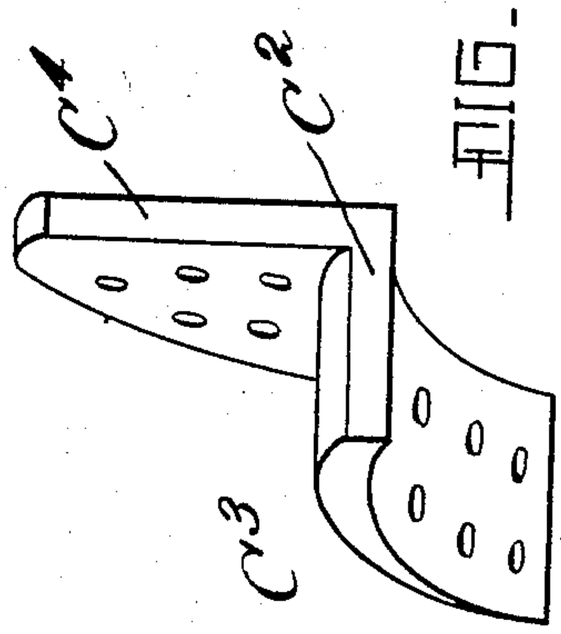

FIG. 4

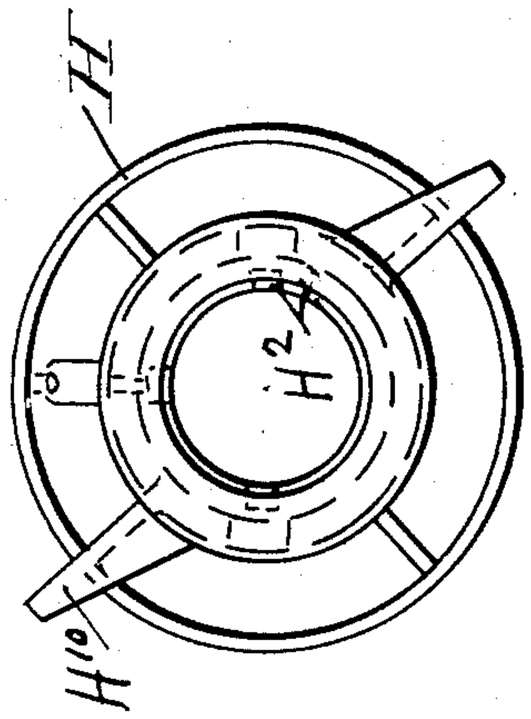

FIG. 3

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4 SHEETS—SHEET 4.

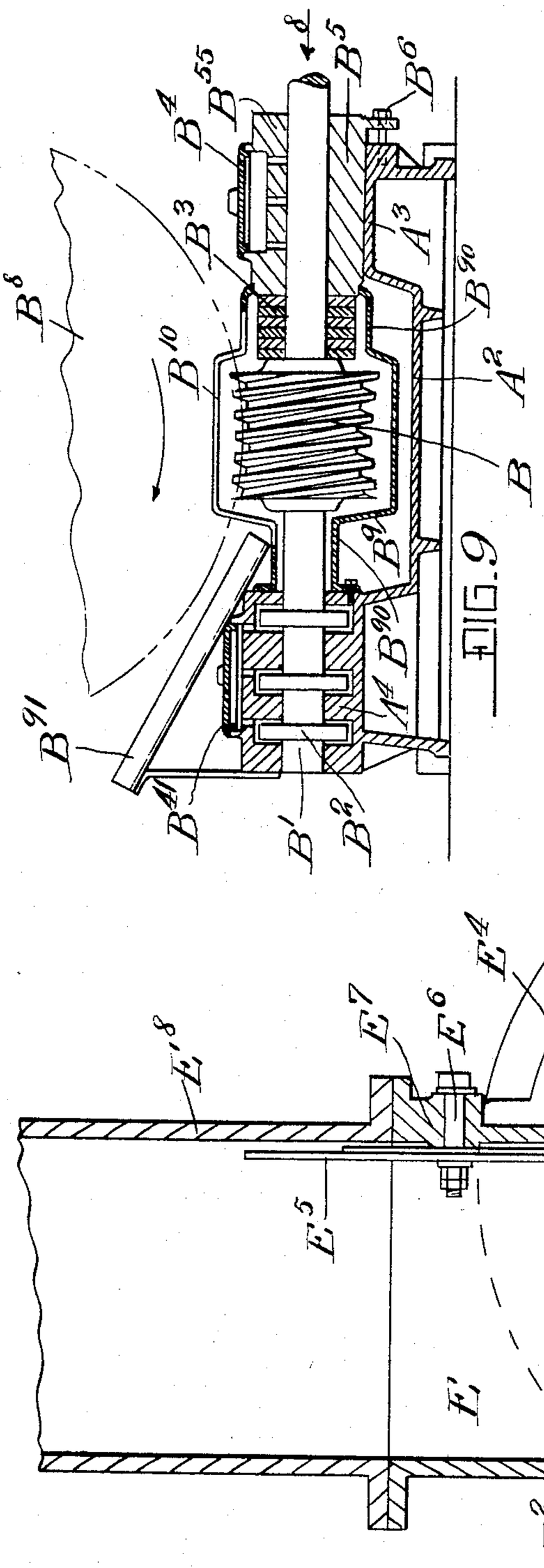

FIG. 9

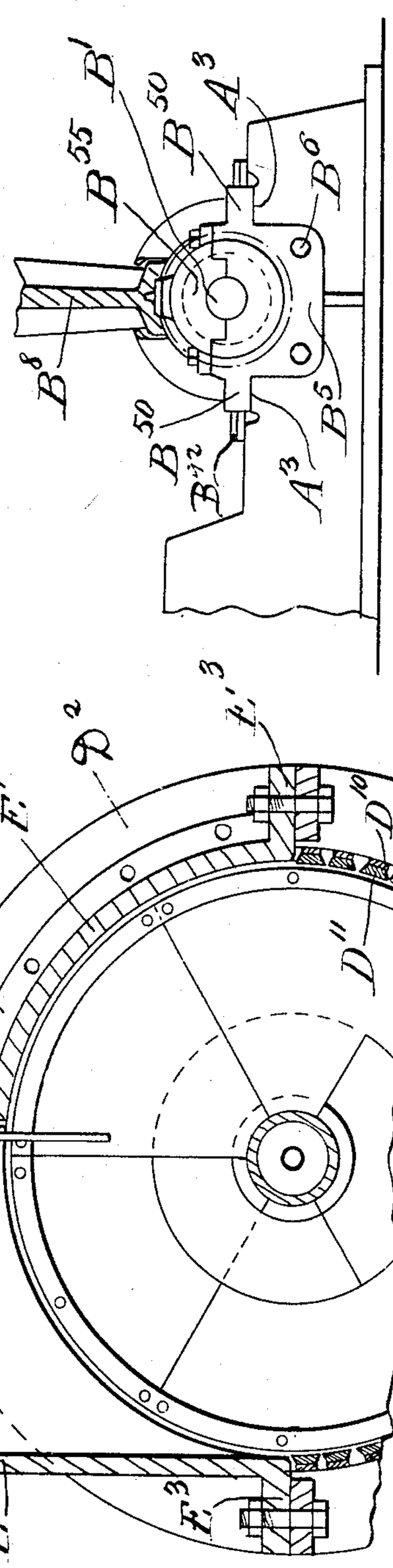

FIG. 8

FIG. 7

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UNITED STATES PATENT OFFICE.

ROBERT G. MERZ, OF NEWARK, NEW JERSEY, ASSIGNOR TO AMERICAN PROCESS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF WEST VIRGINIA.

CONTINUOUS-SCREW PRESS.

No. 898,760. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed April 30, 1907. Serial No. 371,182.

To all whom it may concern:

Be it known that I, ROBERT GEORGE MERZ, a citizen of the United States, and a resident of 57 Ninth avenue, Newark, Essex county, New Jersey, have invented a new and useful Improvement in Continuous-Screw Presses, of which the following is a specification.

My invention relates to an improvement in the construction of the continuous screw press shown in the patent to Bussells, granted Dec. 26, 1905, under No. 808,193, and the object of my invention is to remedy certain defects in the construction of the press of said prior patent and to make the same stronger, more reliable and durable, and altogether more efficient.

In the drawings: Figure 1ª and Fig. 1ᵇ, which are to be read together, show a vertical longitudinal section of the press, certain parts being shown in elevation; Fig. 2 shows an enlarged central section of the devices for feeding steam to the press body; Fig. 3 shows a rear elevation of the frusto-cone and knives at the discharge end of the press; Fig. 4 shows an elevation of a screw bracket to which the screw blades are secured; Fig. 5 is a perspective of the extension frame of the press; Fig. 6 is a detail showing a means for securing the slats to the frame; Fig. 7 is a vertical section on the line 7—7 of Fig. 1ª, the star wheel being shown in elevation; Fig. 8 is a detail showing the adjustable bearing for the driving worm; and Fig. 9 is a transverse vertical section on the line 9—9 of Fig. 1ª of the bearings for the driving worm.

I employ a cast bed plate A having a face A′ upon which rest the feed end of the frame of the screw press. Cast in one piece with this part of the bed plate is an extension containing a trough A², as shown in Figs. 1 and 9, which receives the worm B, a grooved bearing face A³ in and upon which the journal box B⁵ slides, and a recessed and apertured thrust block bearing A⁴. The bed plate A is strengthened by various ribs as is usual in this class of devices.

The worm gear B is mounted on the power shaft B′. This bears at one end in the frame A⁴ and rests at the other end in the two-part journal box B⁵, B⁵⁵. The lower part of the journal box B⁵ is supplied with wings or extensions B⁵⁰ (Fig. 8) which may be caused to slide back and forth on the bearing face A³ of the bed plate by means of the screws B⁶ to adjust the bearing. The upper half B⁵⁵ of the journal box is secured to the lower half by screws in the usual way and is supplied with a cap B⁴ through which oil may be fed to the shaft bearings. A number of collars B³ surround the shaft B′ for the purpose of taking up the wear. But in order to obviate breakage of the parts in certain events, by reason of the enormous pressures involved, I use thrust blocks B² on the shaft B′ working in apertures in the bearing A⁴ which come into action in case the wearing collars B³ are used up or are otherwise destroyed. I also employ an oil-feed and cap B⁴¹, similar to the cap B⁴.

To supply the worm itself with oil, I surround the same with an oil casing B⁹ which has cylindrical extensions B⁹⁰, resting against the thrust block bearing A⁴ and against the journal box B⁵, and has side flanges B⁹² resting on the base plate. A longitudinal slot B¹⁰ in the oil casing B⁹ gives room for the passage of the gear wheel B⁸ which is driven by the worm. The oil, which floods the worm gear B, is carried onto the driving gear B⁸ and, dripping down on the inclined trough B⁹¹, is returned to the oil casing.

The gear wheel B⁸ is rigidly secured to the screw shaft C. The thrust which this shaft exerts is in the direction towards the feed end of the machine and is overcome by shrinking a metal ring C′ upon the shaft, and by interposing between it and the face plate D secured to the machine frame one or more wearing rings of different metals. To this screw shaft C are secured brackets C², having apertured, segmental collars C³ by means of which they are firmly bolted to the screw shaft. The brackets C² also comprise a segment of a screw thread C⁴ to which the working screw faces C⁵ are bolted. In this manner I build up a screw thread on the screw shaft which is exceedingly strong and yet cheap to manufacture and easy to assemble.

The frame of the press remains of the same general structure as is shown in the Bussells patent. Briefly stated it consists of two semi-conical cages of the kind shown in Fig. 5 which are united along a median plane to form a complete frusto-conical cage. Each semiconical cage is composed

of a central longitudinal bar D′ and two lateral longitudinal bars D^3, which are cast in one piece with semicircular transverse connecting arms D^2 which have an apertured extension flange D^{22}. In order to lengthen the frame of the screw press, however, I have added an extension curb which is of the exact structure shown in Fig. 5, and which is bolted to the main frame as shown in section in Fig. 1^b. The part of the frame of the press coterminous with the feed as shown in section in Fig. 1^a is generally made cylindrical. This frame section at the feed end comprises legs D^4 which extend from the connecting arms D^2 to give a firm support on the base plate A′. The frusto conical frame is bolted to the cylindrical frame just referred to, as shown in Fig. 1^a, and the face plate D is also bolted to this cylindrical frame on the side opposite thereto, as also shown in Fig. 1^a. It will thus be seen that the frame of the machine may be said to consist of the face plate D, of the flanged cylindrical frame section at the feed end, of the frusto conical portion and of the extension frame.

In order to effect the double function of strengthening the juxtaposed, parallel longitudianl slats with which the inside of the press is lined and also of providing a shape of slot between contiguous slats which will clear more readily, I adopt the construction indicated in Fig. 6. That is to say I use a straight slat D^{10} upon which rests an outwardly beveled slat D^{11} which are bolted together and to each flange D^{22} on the machine frame. I have found that two separate slats give more strength than a single slat of double the thickness and I have further found that the shape of slot between the slats, as shown in Fig. 6 is unusually efficient for the purpose of clearing.

Coming back to that part of the frame of the machine in which the feeding is effected, I may say that it, like the rest of the machine, is made of two parts which are bolted together. The lower half is of the general cage-like construction shown in Fig. 5 with the legs D^4, shown in Fig. 1^a, added thereto. But the upper half of the frame consists of a feed-box casting E shown in Fig. 7 which has a cylindrical quadrant E′ circularly fitted to and inclosing the outer circumferential edge of the screw thread on its ascending side and a quadrantal feed-box E^2 over that quadrant which represents the descending sides of the screw only. This casting E has flanges E^3 by means of which it is bolted to the lower half of the machine frame, and it has quadrantal flanges E^4 which are bolted to the juxtaposed curved connecting arms D^2 of the frusto conical part of the machine frame and to the face plate D, respectively. In this way I secure a rigid structure which serves to bind together the parts of and to become a rigid part of the machine frame, and I dispense with all baffle plates and projections in the feed box. The star wheel E^5 is carried on a pivot E^6 which has a bearing in a projecting face E^7 on the top of the cylindrical quadrant. A separate trough or chute E^8 is secured to the top of the feed box E. It will be understood that the material which is fed into this box moves downward with the screw since it covers that quadrant only which is over the descending side or quadrant of the screw and that in so far as any material is carried upward by the motion of the screw on the right hand side of Fig. 7, the star wheel E^5, which meshes with the screw threads, holds back this material and keeps it from getting into the path of the material which is being freshly fed through the feed box.

Coming now to the devices by which steam is feed to the hollow screw shaft for the purpose of passing out through perforations therein into the material being treated, we find that upon the standard F is mounted a stuffing-box F′ to which is bolted a collar F^2 compressing a packing F^3, the screw shaft C rotating in the stuffing-box thus formed. The valve F^4 controls the steam supply. The steam on being admitted passes around the end of the shaft C and then along the shaft and outward through the apertures C^6 (Fig. 1^a) on the feed side of a plug G, which is secured within the screw shaft and divides it into two parts in a steam tight fashion. On the other hand the apertures C^6 (Fig. 1^b) on the discharge side of this plug G permit the moisture which is being expressed from the material being treated to get back to the hollow of the screw shaft, where it accumulates and is finally passed off through the valve C^7 at the end of the machine. I note that a stuffing-box C^8 surrounds the screw shaft at the exit of the machine.

In order to blow out the screw shaft at its exit end for the purpose of removing any solid matter which may become lodged therein, I employ the steam blow-out pipe G′ which is rigidly secured to and rotates with the plug G, this plug being in turn secured to the screw shaft C. The stuffing-box F′ has a hollow internal projection F^5 which serves as a bearing in which the end of the blow-out pipe G′ opposite the plug G rotates. A steam supply pipe F^6, controlled by a valve F^7, passes through a sleeve F^8 bolted to the stuffing-box F′, and then proceeds to pass, for a considerable distance, into the blow-out pipe G′. The sleeve F^8, the hollow projection F^5 and the packing in its hollow space therebetween constitute a stuffing-box for the steam supply pipe F^6, which is stationary and does not turn. The steam blow-out pipe G′, however, turns upon the supply pipe F^6 and within the projection F^5. It will be seen that by this means I secure a very strong

and rigid structure and one which is not liable to permit a leak in either of the two separate supplies of steam.

In order to change the degree of compression, I employ a cone H at the discharge end. This cone is cast in one piece with a cylindrical sleeve H′, which is splined to the screw shaft C by a feather H^2. There is an internal screw thread on the rear end of the sleeve H′ which meshes with the thread on the tubular screw H^3. The tubular screw H^3 is free to rotate on the screw shaft C and is secured to a hand wheel H^4 by a pin or in any other suitable way. Between the bearing H^5, which is secured to the base block of the press by standards H^6, and the hand wheel H^4, I place a ring H^7 to prevent sticking of the parts at this point which are being forced together under great pressure. It will now be seen that by turning the hand wheel H^4, the hollow cylindrical screw may be caused to thread farther into or out of the sleeve H′, thus diminishing or increasing the distance between the cone and the rear or bearing face of the hand wheel H^4. The pressure of the material under treatment acting against the cone H will always keep it forced to the right in Fig. 1^b, thus increasing the size of the aperture between the base of the cone and the circle formed by the ends of the slats at the discharge end of the press to the maximum extent permitted by the state of adjustment of the handwheel. This adjustment can be made while the press is in operation and the screw shaft C is turning by taking care to turn the hand wheel H^4 a little more rapidly than the screw shaft, if motion of the cone in one direction is desired, and by stopping the hand wheel for a moment, if motion of the cone in the opposite direction is to be effected. In this way I can readily change the size of the aperture between the cone H and the ends of the slats at the exit end of the machine thus securing different degrees of compression by merely manipulating the hand wheel H^4, and this while the machine is in motion. Knives H^{10} are cast integral with the sleeve H′ and act to cut off the material as it comes out of the press to permit it to readily fall and be carried away.

I claim,

1. A continuous screw press comprising a screw and screw shaft, a frame carrying parallel slats and having legs, a cast bed plate on which the legs are mounted, an integral extension of the bed plate having a trough and a grooved bearing face, a sliding journal box in the grooved bearing face, a power shaft supported in the journal box carrying a worm gear rotating in the trough, and a gear wheel on the screw shaft meshing with the worm gear, substantially as described.

2. A continuous screw press comprising a screw and screw shaft, a frame carrying parallel slats and having legs, a cast bed plate on which the legs are mounted, an integral extension of the bed plate containing a trough and a grooved bearing face, a sliding journal box in the grooved bearing face, a slotted oil casing in the trough, a power shaft rotating in the journal box and carrying a worm gear rotating in the oil casing, and a gear wheel on the screw shaft passing through the slotted oil casing and meshing with the worm gear, substantially as described.

3. A continuous screw press comprising a screw and screw shaft, a frame carrying slats and having legs, a cast bed plate on which the legs are mounted having a trough, a slotted oil casing having side flanges resting on the bed plate and cylindrical extensions for supporting it in the trough, a power shaft carrying a worm gear rotating in the oil casing, and a gear wheel on the screw shaft passing through the slotted oil casing and meshing with the worm gear, substantially as described.

4. A continuous screw press comprising a screw and screw shaft, a frame carrying parallel slats and having legs, a cast bed plate on which the legs are mounted, an integral extension of the bed plate containing a trough, a slotted oil casing supported in the trough, a power shaft carrying a worm gear rotating in the oil casing, a gear wheel on the screw shaft passing through the slotted oil casing and meshing with the worm gear, and an inclined trough for returning the drippings from the gear wheel through the slot to the oil casing, substantially as described.

5. A continuous screw press comprising a frame, a screw and a hollow screw shaft therewithin, a plug in the hollow shaft, a blow-out pipe secured therein and a steam supply pipe passing into the blow-out pipe and upon which the blow-out pipe rotates, substantially as described.

6. A continuous screw press comprising a frame, a screw and a hollow screw shaft therewithin, a plug in the hollow shaft, a blow-out pipe secured therein, a steam supply pipe entering the blow-out pipe, a sleeve through which the supply pipe passes, a bearing for the end of the blow-out pipe, and packing between the sleeve and bearing constituting a stuffing-box for the parts, substantially as described.

7. A continuous screw press comprising a frame, a screw and a hollow apertured screw shaft therewithin, a plug in the hollow shaft, a blow-out pipe secured therein, a steam supply pipe entering the blow-out pipe, a stuffing-box, packing and collar in which the end of the screw shaft rotates, a sleeve secured to the stuffing-box through which the supply pipe passes, a projection within the stuffing-box in which the end of the blow-out pipe turns, and a packing between the sleeve and projection constituting a stuffing-box for the parts, substantially as described.

8. A continuous screw press comprising a frame, a screw and a hollow apertured screw shaft therewithin, a plug in the hollow shaft, a blow-out pipe secured therein, a steam supply pipe entering the blow-out pipe, a stuffing-box in which the end of the screw shaft rotates, a sleeve secured to the stuffing-box through which the supply pipe passes, a hollow internal projection within the stuffing-box in which the end of the blow-out pipe turns, and a packing in the hollow of the projection constituting a tight joint for the parts, substantially as described.

9. A continuous screw press comprising a screw, a screw shaft and a frame comprising a feed-end section having a cylindrical quadrant circularly fitted to and inclosing the outer circumferential edge of the screw thread on its ascending side and rising into a projecting face, a quadrantal feed box, over the descending side of the screw, of which the projecting face constitutes a part, and a rotating star wheel, meshing with the screw, pivoted on the projecting face, substantially as described.

10. A continuous screw press comprising a screw and screw shaft, a frame having legs, a cast bed plate on which the legs are mounted having a trough and a grooved bearing face, a shaft carrying a worm gear rotating in the trough, a gear wheel on the screw shaft meshing with the worm gear, and an adjustable two-part bearing for the worm shaft sliding in the grooved bearing face, substantially as described.

11. A continuous screw press comprising a screw and screw shaft, a frame having legs, a cast bed plate on which the legs are mounted having a trough and a grooved bearing face, a shaft carrying a worm gear rotating in the trough, a gear wheel on the screw shaft meshing with the worm gear, and an adjustable two-part bearing having wings sliding on and in the grooved bearing face, substantially as described.

12. A continuous screw press comprising a screw and screw shaft, a frame, a cast bed plate on which the frame is mounted having a grooved bearing face, a trough and thrust block apertures, a shaft carrying a worm gear rotating in the trough and thrust blocks taking within the apertures therefor, an adjustable bearing supported on the grooved bearing face for the shaft, and a gear wheel on the screw shaft meshing with the worm gear, substantially as described.

13. A continuous screw press comprising a screw and screw shaft, a cage-frame carrying straight parallel slats, and outwardly beveled slats supported thereon and bolted thereto to increase the strength and the clearance, substantially as described.

14. A continuous screw press comprising a screw and screw shaft, a frame comprising longitudinal bars and flanged semicircular transverse connecting bars, straight parallel slats, outwardly beveled slats supported thereon and bolts connecting the straight and beveled slats to the flanges of the transverse bars, substantially as described.

15. A continuous screw press comprising a screw and screw shaft, brackets having apertured segmental collars bolted to the shaft, and segmental threads, and working screw faces secured to the segmental threads of the bracket, substantially as described.

16. A continuous screw press comprising a frame, a screw and a screw shaft therewithin, a cone and internally screw-threaded sleeve sliding on the shaft at the exit end, a rotatable tubular screw meshing with the threaded sleeve at one end and a bearing for the opposite end of the screw to take the thrust, substantially as described.

17. A continuous screw press comprising a frame, a cone and internally screw-threaded sleeve splined to the shaft at the exit end, a rotatable tubular screw meshing with the threaded sleeve at one end, a bearing for the opposite end of the screw to take the thrust, and a hand wheel or the like secured to the screw, substantially as described.

18. A continuous screw press comprising a frame, a screw and a screw shaft therewithin, a cone and internally screw threaded sleeve carrying knives sliding on the shaft at the exit end, a rotatable tubular screw meshing with the threaded sleeve at one end and a bearing at the opposite end of the screw to take the thrust, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT G. MERZ.

Witnesses:
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