

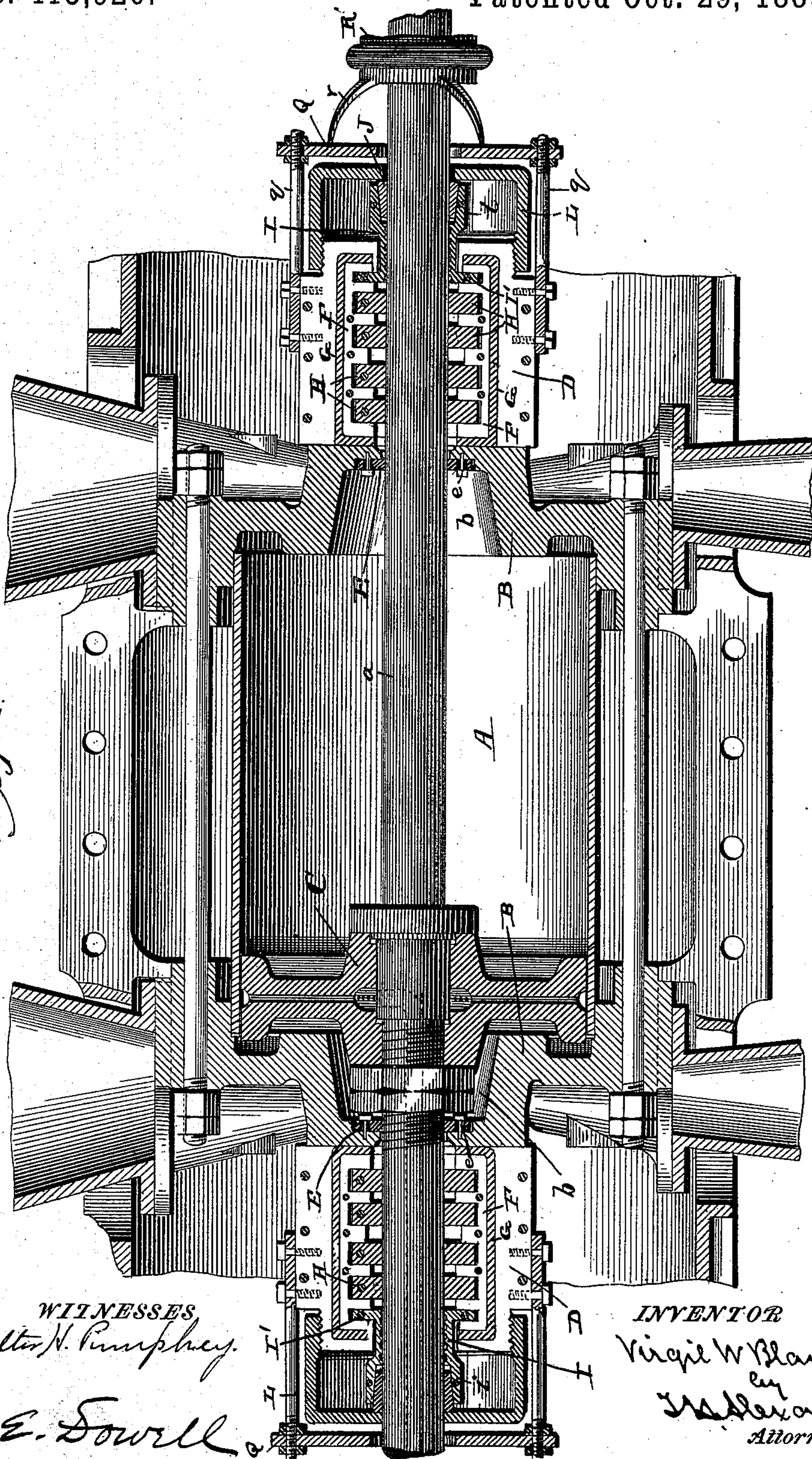
(No Model.)

3 Sheets—Sheet 1.

V. W. BLANCHARD.  
PISTON ROD PACKING.

No. 413,926.

Patented Oct. 29, 1889.



*WITNESSES*

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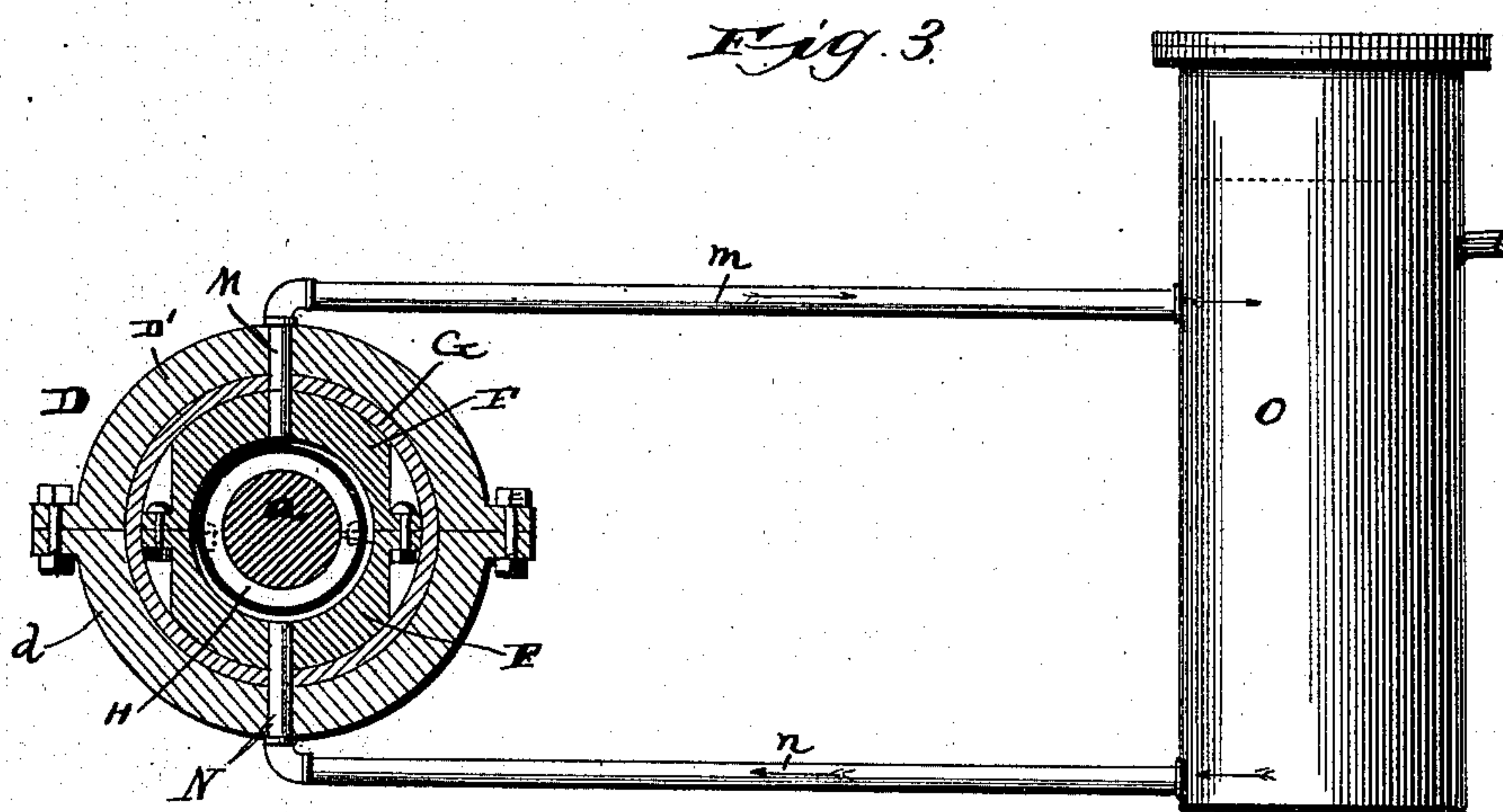
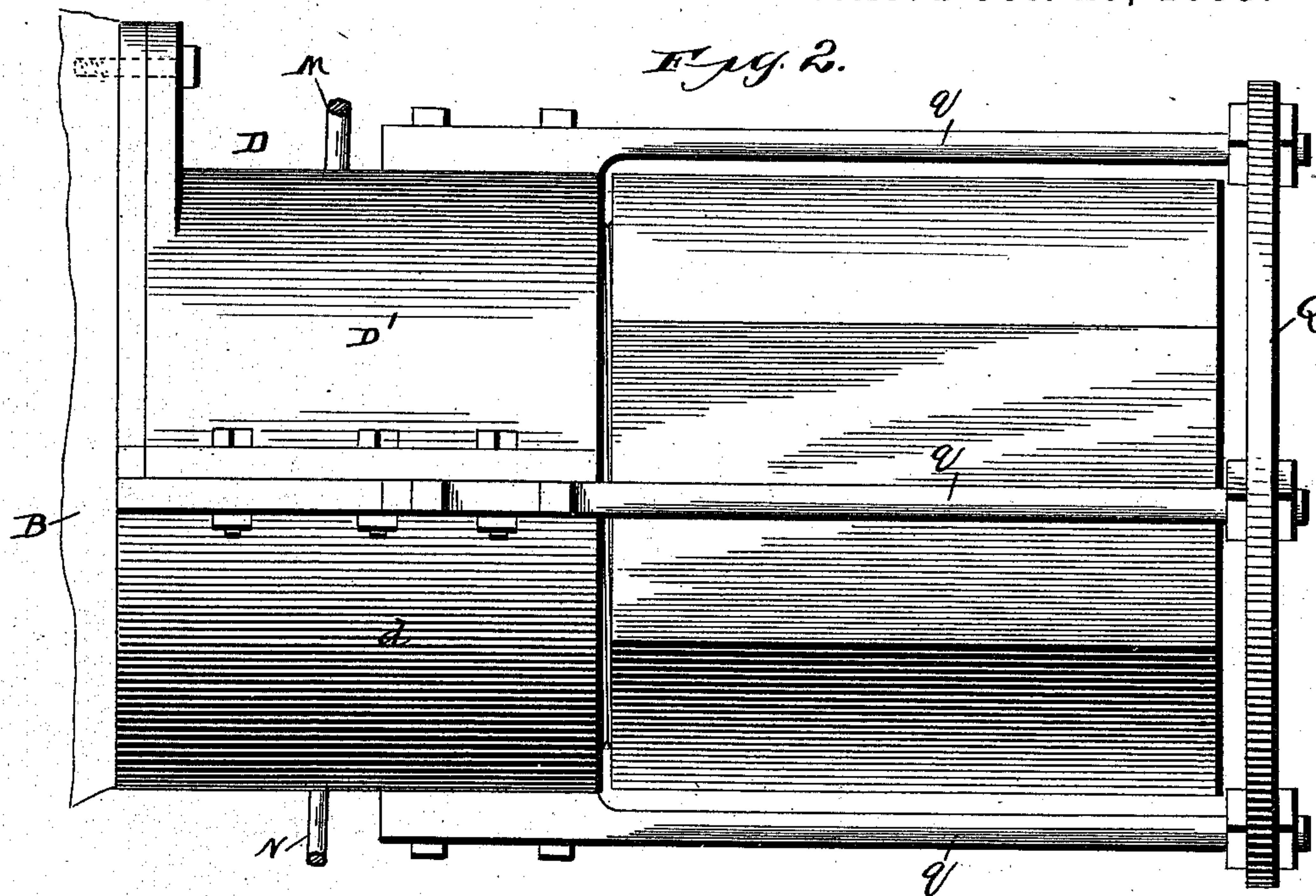
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PISTON ROD PACKING.

No. 413,926.

Patented Oct. 29, 1889.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 6.

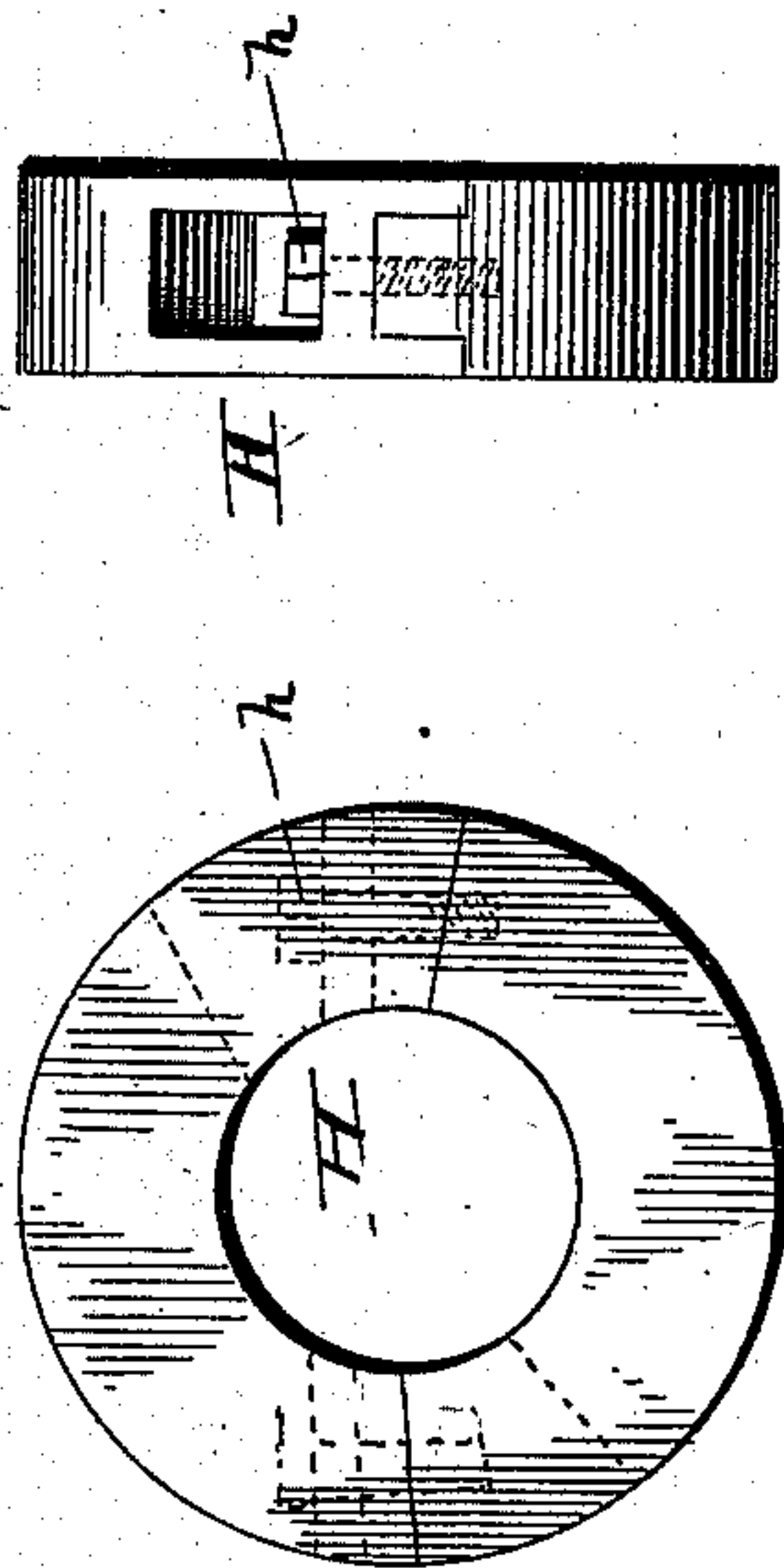


Fig. 7.

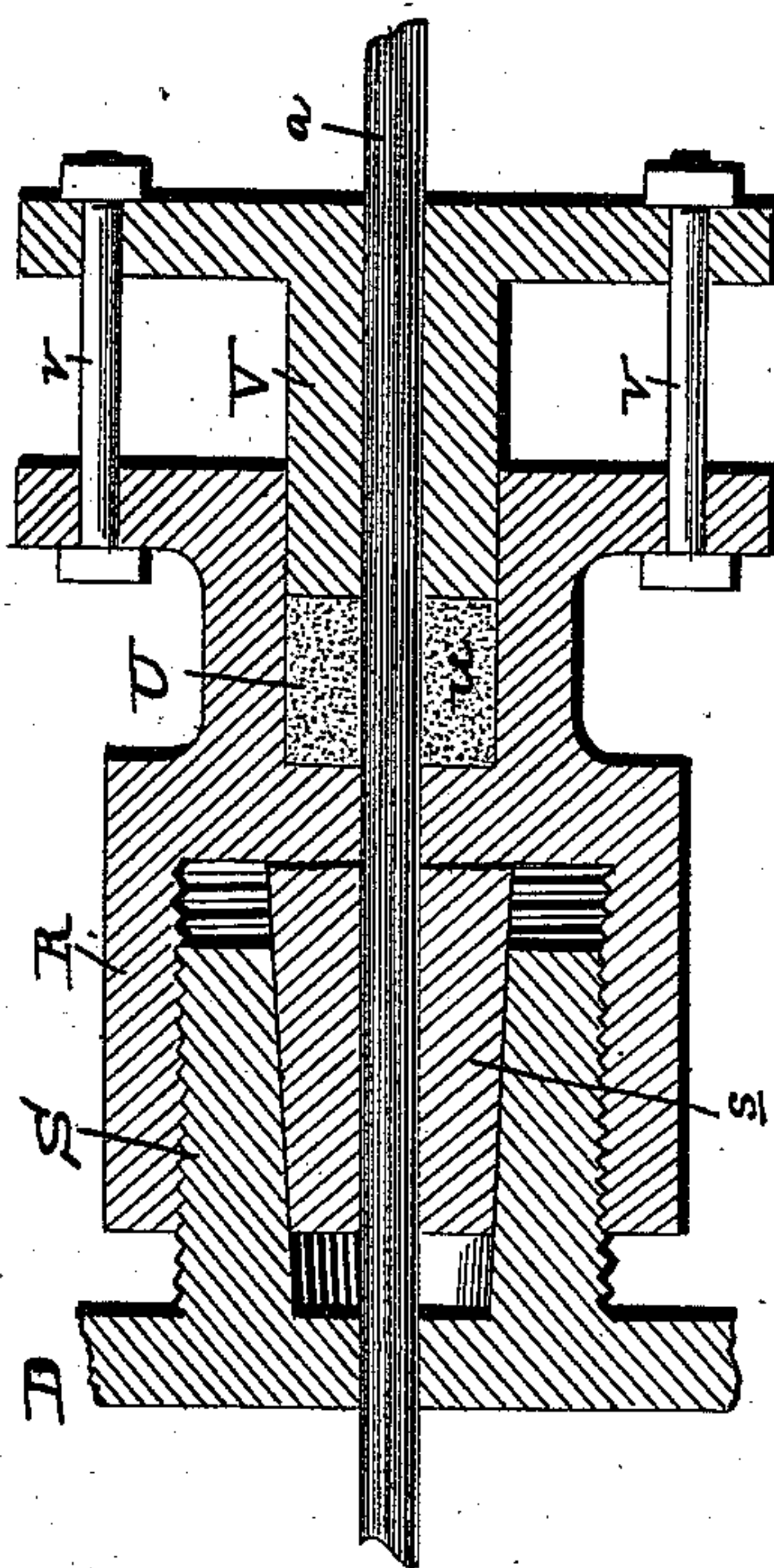


Fig. 5.

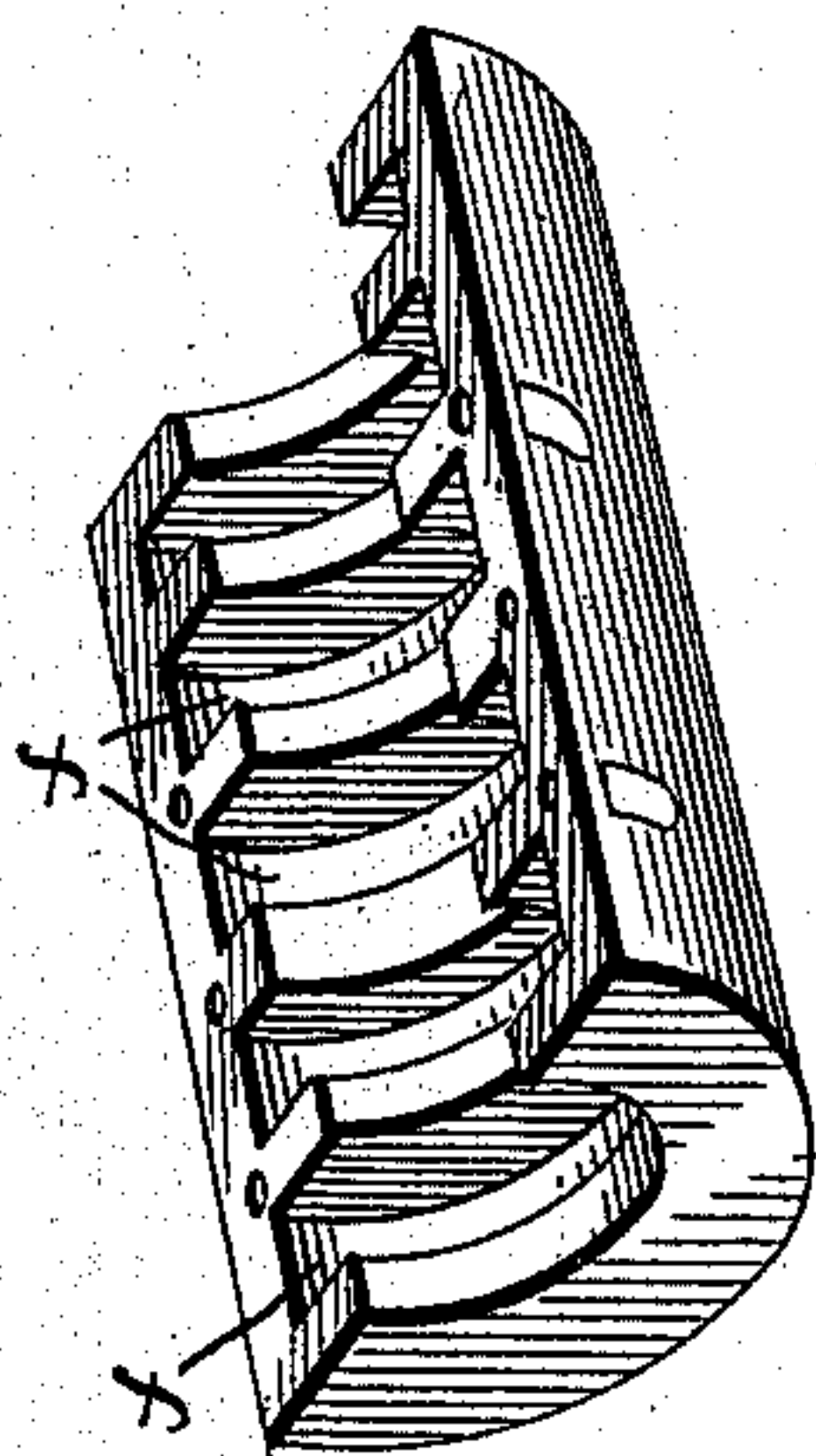
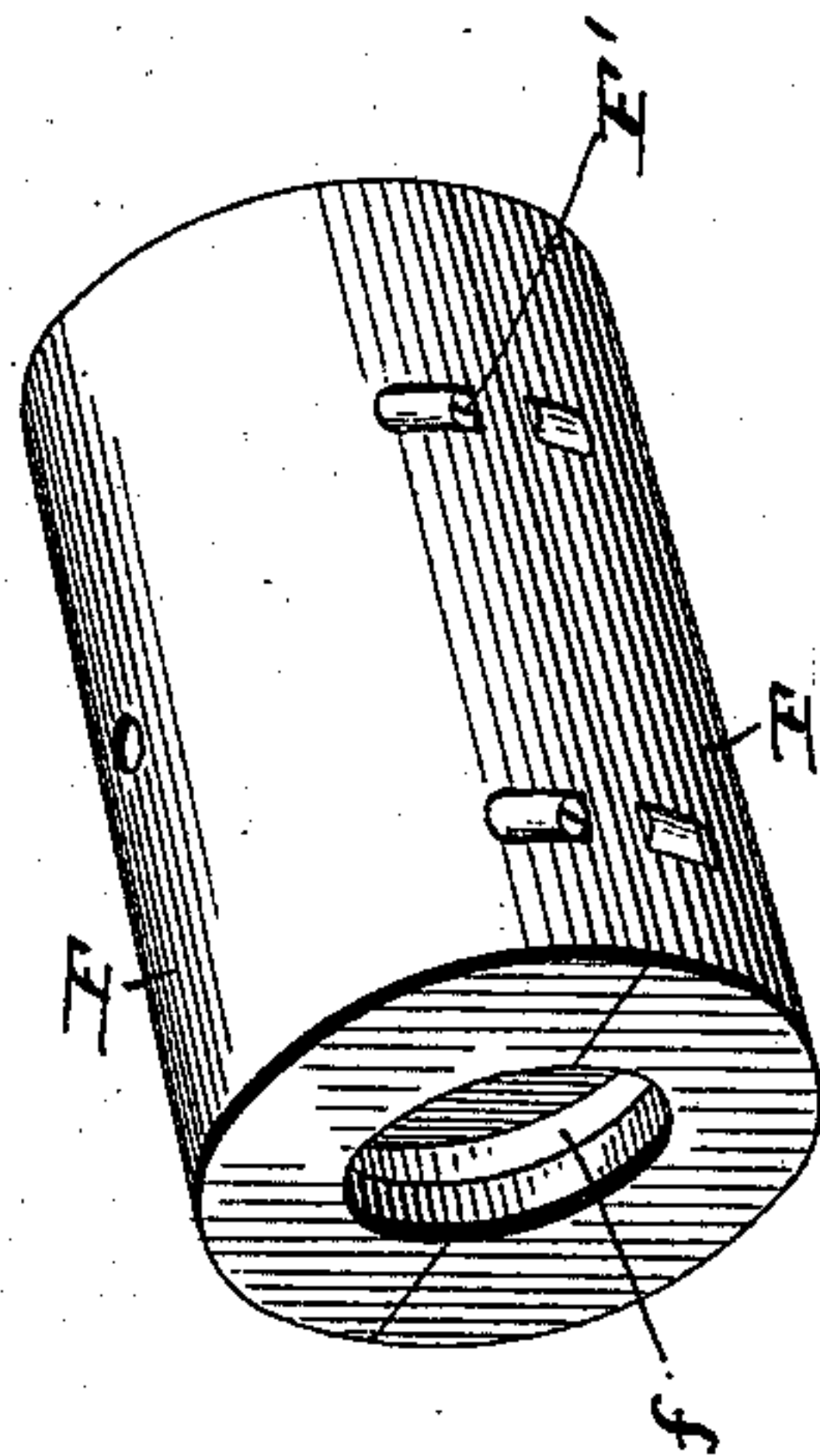


Fig. 4.



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# UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH A. DAVIS, OF SAME PLACE.

## PISTON-ROD PACKING.

SPECIFICATION forming part of Letters Patent No. 413,926, dated October 29, 1889.

Application filed April 17, 1889. Serial No. 307,613. (No model.)

*To all whom it may concern:*

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Piston-Rod Packing; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a central horizontal section through my improved engine-cylinder, showing the piston-rod and piston and the improved packing for said rod in the stuffing-boxes at the end of the cylinder. Fig. 2 is an enlarged side view of one of the stuffing-boxes. Fig. 3 is a reduced transverse section through one of the boxes, showing my device for lubricating the same with water. Fig. 4 is a perspective view of the cylindrical box containing the packing-rings removed from the stuffing-box. Fig. 5 is a perspective view of one of the halves of said box. Fig. 6 represents a side and face view of one of the packing-rings. Fig. 7 is a detail sectional view of a rod-packing head.

This invention is an improvement in engines, and it has especial reference to the packings for the piston-rods of steam-engines, whereby leakage of steam is absolutely prevented, wear of the parts readily compensated, and wherein water is used as a cooling and lubricating agent for the piston-rod in its passage through the stuffing-boxes.

The invention therefore consists in the novel construction and arrangement of the packing and in certain other novel details of construction, as will be clearly explained hereinafter and claimed.

Referring by letter to the drawings, A designates the cylinder of the steam-engine, having heads B B, which are centrally perforated for the passage of the piston-rod *a*, the engine illustrated being of the class in which the piston is mounted on a rod that passes entirely through the cylinder and is supported on slideways exterior thereto, (not shown in the drawings,) so that the piston moves without wear or friction within the

cylinder. C designates the piston mounted on said rod. The heads B B have central recesses or chambers *b b*, which receive the bosses on the hub of the piston and the securing-nuts and collar thereof when the piston is at either end of its stroke. On the outer faces of the heads B B are formed cylindrical stuffing-boxes D D, as shown. On the inner faces of the heads and seated in the bottoms of the respective recesses *b* are annular plates E, fitted closely on rod *a* and secured to the heads B B by pins or bolts *e*, which pass through slots in the said plates at the sides of the piston-rod, by which the plate can have a certain amount of play in recesses *b* with rod *a*. These plates cover the openings in the heads through which the rod passes, which are of larger diameter than said rod to permit its adjustment in aligning and centering the piston accurately in the cylinder, and when steam is admitted at one side of the piston the plate E closes the opening in the cylinder-head and prevents any considerable escape of steam through the head into the stuffing-box exterior thereto. The stuffing-boxes D have an outer cylindrical or tubular wall *d*, which is divided horizontally, the upper part D' being removable and having side flanges and a top flange, as indicated in Fig. 2, by which it is bolted to the cylinder-head and lower half of the wall *d*.

F F designate the similar halves of a cylindrical box in which the packing-rings are received. Each half is interiorly grooved, as at *f f*, forming, when the halves are united, annular channels or seats for the packing-rings. The halves are made, preferably, of brass, and are nicely matched by means of dowel-pins and united by screws or bolts F' F'. The said box has an axial bore through it of larger diameter than the piston-rod. The box is secured and centered in the stuffing-boxes D by means of a filling of Babbitt metal G, which is run between the outer wall of the halves F and the inner face of wall *d*, as indicated and hereinafter referred to.

H H designate the packing-rings, which are made in two sections, preferably, united by locking joints and bolts *h*, as indicated in Fig. 6, so that they can be fitted accurately



upon the piston-rod *a*, and are respectively in the annular seats within boxes F F, above referred to, but are of less diameter, so that they can move laterally therein with rod *a* while the latter is being aligned. In the outer seat or channel in box F F is seated the inner end of a stuffing-annulus I, which is also made in longitudinal halves, and has on its inner end an annular flange I', which is engaged in the outermost annular seat of box F F. The annulus I projects through the ends of said box and wall *d*, as indicated in the drawings, fitting closely around the piston-rod, as indicated, and having a conical flaring mouth *i* outside the stuffing-box, in which is a conical annular packing J, made of Babbitt or other soft metal which will not abrade the piston-rod.

The packing thus far described can be conveniently placed in position as follows: The lower half-boxes F are placed in the stuffing-boxes D, the tops of which are removed. The piston and rod *a* being properly centered, the rings H H (four in number, as shown) are then fitted onto the rod at each side of the cylinder and engaged with their respective annular seats in half-boxes F, forming tight joints with the lateral walls, but not touching the peripheries of said grooves, as indicated in the drawings, Figs. 1 and 3. The half-box F is then properly adjusted in relation to the rings, and melted babbitt preferably is poured around the same, as above described, which, when cold, securely binds the half-box F in position. The lower half of annulus I is also put in place at the same time rings H are adjusted, there being a tight lateral joint between its flanges and the walls of the annular groove in which said flange rests, but a loose peripheral joint, as indicated. There is also a loose joint between the exterior wall of said annulus and the heads of the stuffing-box wall *d* and box F F. The top half-boxes F are then fitted in place over rings H and secured to the lower half-boxes, the upper half of annulus I having been previously properly secured over the rod in position. Then the upper part D' of the stuffing-box wall is put in place, a packing of Babbitt metal, with a small addition of bismuth, being run between the joints thereof, the top being at once bolted securely in place. When the babbitt and bismuth alloy cools, it expands, thereby giving a perfectly steam-tight joint between top part D' and the head B and lower part of the wall *d*. I then have a metal packed stuffing-box absolutely steam-tight and with perfect joints, and yet one in which the packing-rings and piston-rod can have a certain amount of lateral play sufficient to permit the proper adjustment of the latter in aligning the piston.

The conical packing-plug of soft metal J in the mouth of stuffing-annulus I is forcibly seated therein by means of a screw-cap L, which has interior threads on its end engaging with screw-threads formed exteriorly on

the end of stuffing-box D, as indicated in the drawings. By turning said cap properly packing J is forced inward and compressed around the rod, forming a steam-tight joint therewith, and at the same time it forces annulus I inward, causing its flange I' to bind tightly and make a close joint with one of the lateral walls of the groove in box F F, with which said flange is engaged, as is evident. By these several arrangements I produce a non-leaking joint capable of withstanding extreme steam-pressure; but in order to lubricate the packing-rings and to form an auxiliary packing in the box I employ water as follows:

M designates a pipe or channel passing through the top of each stuffing-box and communicating internally with the central annular channel or groove in the box F F, as indicated clearly in Fig. 3. N designates a similar communication through the lower part of the stuffing-box.

O designates a water-receptacle, which is connected by pipes *n n*, respectively, to the upper and lower communications M N, and thus a continuous current of water can circulate from vessel O to and through the stuffing-box D and back to vessel O. A portion of the water in the channel in the stuffing-box will be vaporized or highly heated by the heat of the piston-rod derived from the superheated steam in the cylinder and will assist in establishing a current, and as the piston-rod reciprocates enough water will adhere to it to insure its lubrication in the stuffing-box, and the water boiling at the vessel O will assist in keeping down the temperature of the piston-rod and stuffing-boxes exterior to the piston-chamber.

Q designates index-plates mounted in front of the stuffing-boxes D D by means of arms *q q*, which are bolted at rear to the sides of said boxes, as shown.

Spiders R', having index-fingers *r*, are mounted on the piston-rod outside the cylinder, and by the coincidence of the index-fingers with marks on said plates the engineer can determine whether the piston is in proper alignment or not.

In Fig. 7 is represented a modification of the piston-packing adapted for use at the extremities of the stuffing-boxes. In lieu of the cap L a screw-cap R is employed. This has a threaded end engaging an exterior thread on a tubular sleeve S on the end of the stuffing-box wall, which sleeve has an enlarged conical bore, in which is an annular conical packing *s* of Babbitt or soft metal, the piston-rod passing centrally therethrough, as shown. When screwed home, the cap R compresses the packing *s* around the piston-rod, as is evident. In the outer end of cap R is formed a stuffing-box U, in which fibrous packing *u* may be placed and compressed by a plunger V, attached to the cap by bolts *v* engaging ears on the cap and plunger, as shown in said figure. By this means an absolutely tight



joint is presented, the fibrous packing being preserved from contact with steam by the metallic packing. This packing may also be used for forming steam-tight joints between sliding joints, and revolving shafts and a steam-containing vessel.

The pipes *m n* might be connected directly to the water-space of the boiler, if desired, to receive water therefrom under pressure, or the vessel *O* might be tightly closed and connected by another pipe with the boiler, so as to insure a constant pressure in the stuffing-boxes.

Having described my invention, I claim—

1. A piston-rod packing for the stuffing-box of a steam-engine cylinder, consisting of packing-rings applied in annular cavities, in combination with means for conducting a current of water or other fluid through an annular cavity between the rings in the stuffing-box, substantially as described.

2. The combination, with the stuffing-box, of the cylindrical box centered and secured therein by a Babbitt or soft metal filling, substantially as and for the purpose specified.

3. The combination of the stuffing-box, the cylindrical interiorly-channeled box secured therein, and the packing-rings resting in the annular cavities of the latter box, and the stuffing-annulus *I*, constructed and arranged substantially as and for the purpose specified.

4. The combination of the stuffing-box having an internal annular cavity and annular grooves on each side of said cavity with packing-rings fitted in said grooves and the water inlet and outlet pipes leading to and from said cavity, as and for the purpose set forth.

5. The herein-described stuffing-annulus *I*, having flanges *I'* and conical flaring mouth *i*, as and for the purpose described.

6. The combination of the annulus having a conical bore, a conical soft-metal plug, and a screw-cap, all substantially as specified.

7. The combination of the stuffing-box having horizontally-divided walls, the divided packing-rings, and longitudinally-divided cylindrical annularly-grooved box, constructed and arranged substantially as specified.

8. The combination, with the stuffing-box and the stuffing-annulus *I*, having a conical bore, of the conical packing *J* and the screw-

cap, constructed and arranged substantially as set forth.

9. The herein-described box *F F*, consisting of two semi-cylindrical pieces having semi-annular grooves in them and united, substantially as set forth.

10. The combination, with a stuffing-box having a conically-bored extension at its end, of the conical soft-metal stuffing-ring, the screw-cap engaging threads on the stuffing-box for tightening said conical ring, and also having an auxiliary stuffing-box in its extremity, for the purpose and substantially as described.

11. The combination, in a piston-rod packing, of the cylindrical annularly-grooved box *F F*, the packing-rings *H H*, annulus *I*, and the plug *J*, substantially as described.

12. The combination, in a stuffing-box, of the half-boxes *F F*, internally grooved, the soft-metal packing *G*, packing-rings *H*, and stuffing-annulus *I*, all substantially as described.

13. The combination of the cylindrical internally-grooved box *F F*, the packing-rings *H H*, annulus *I*, and the water-supply pipes, all substantially as described.

14. The combination of the half-boxes *F F*, rings *H*, annulus *I*, plug *J*, and screw-cap *L*, all substantially as set forth.

15. The combination, with the cylinder-head and piston-rod, of the annular plate *E*, substantially as set forth.

16. The combination, with the cylinder-heads having exterior stuffing-boxes and the piston-rod extending therethrough, of the annular plates fitted around the piston-rod and secured loosely to the inner faces of the cylinder-heads, all substantially as set forth.

17. The combination, in a piston-rod packing, of the half-boxes *F F*, the packing *G*, the packing-rings *H H*, packing-annulus *I*, plug *J*, and the screw-cap for compressing said plug, all constructed and arranged substantially as and for the purpose specified.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

VIRGIL W. BLANCHARD.

Witnesses:

W. R. KEYWORTH,  
F. O. MCCLEARY.