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J. H. & R. W. WELCH.

Hydraulic-Engines.

No. 134,115. Patented Dec. 17, 1872.

Fig 1.

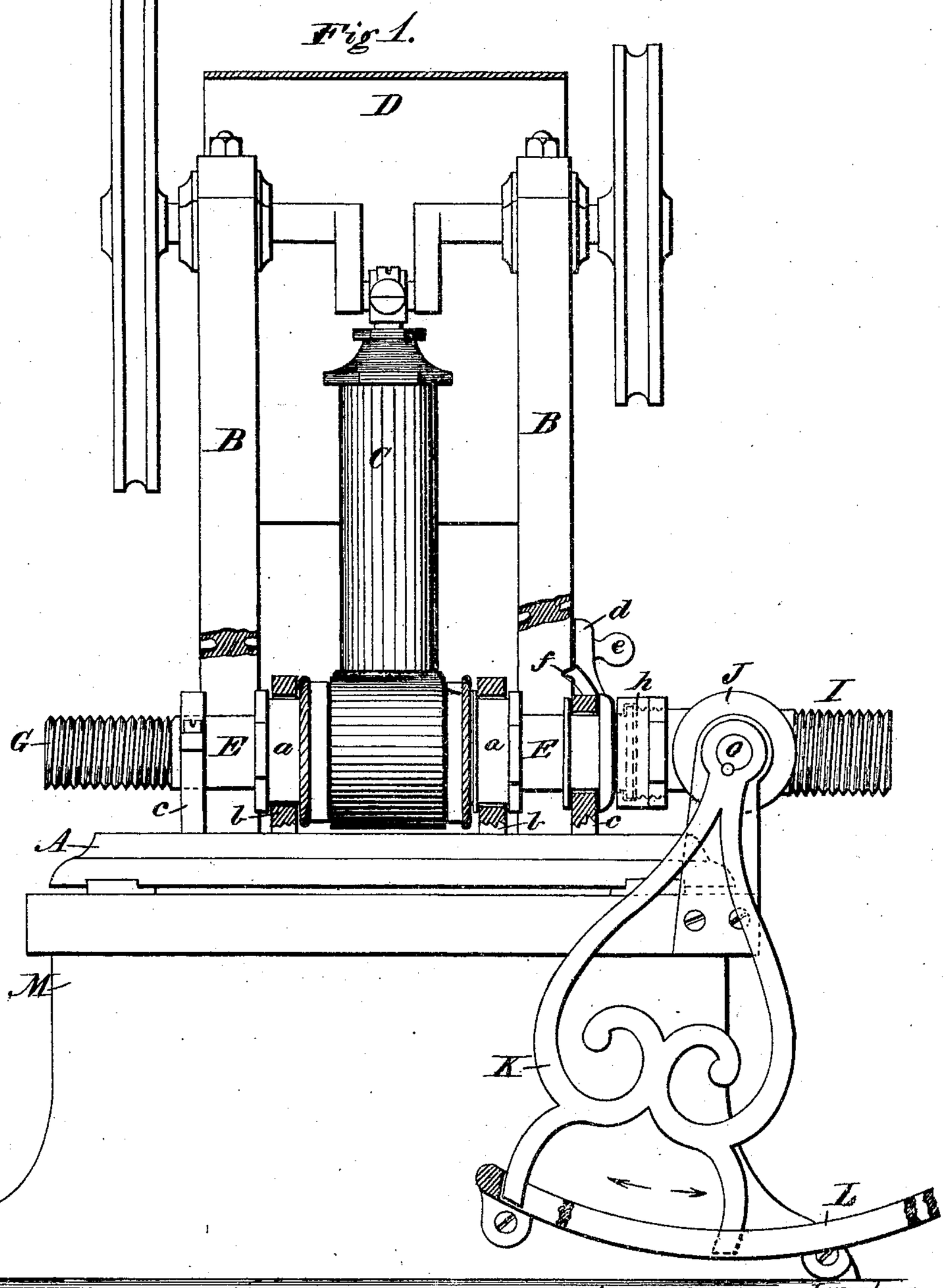

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Fig 2.

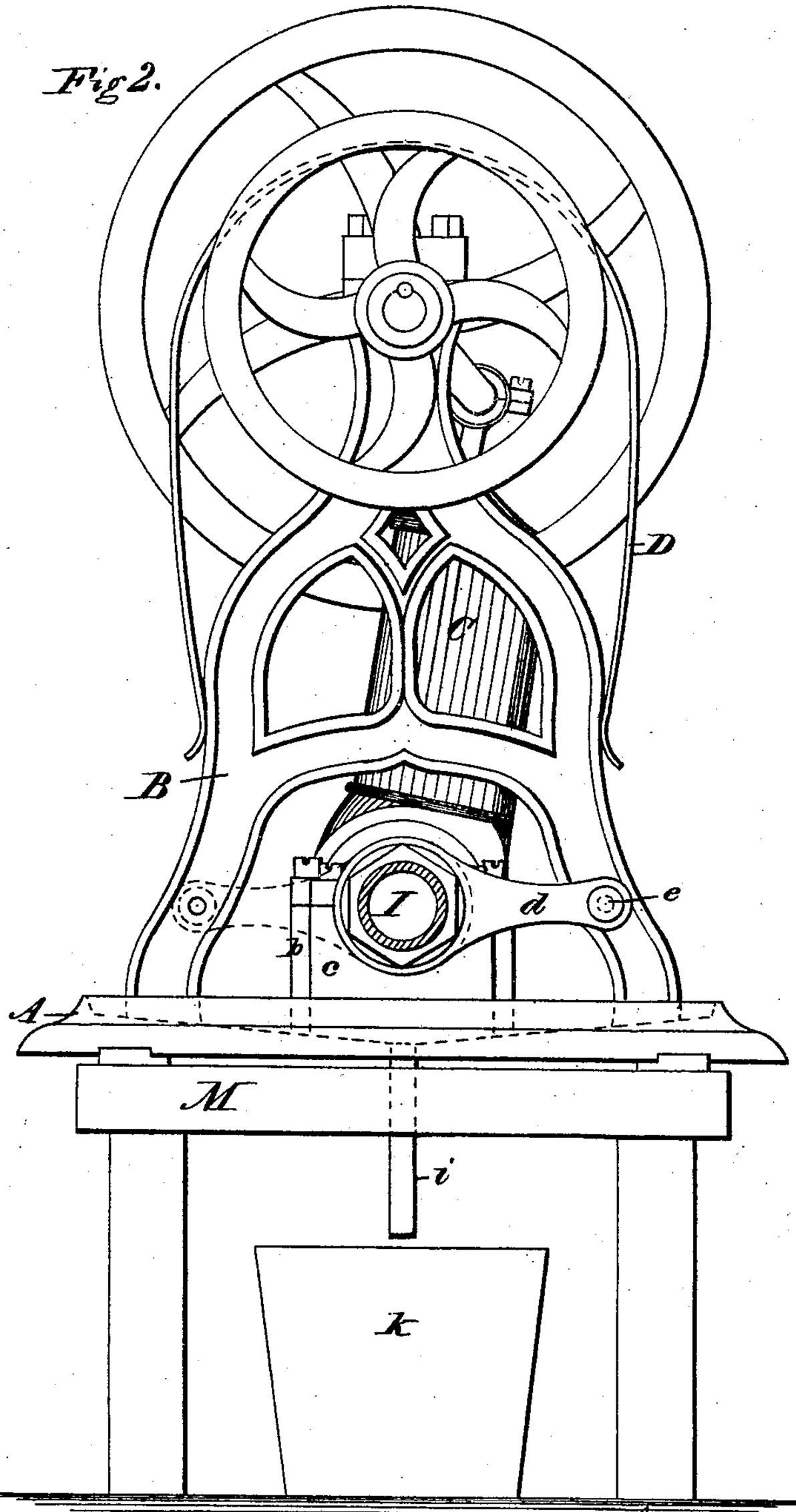

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Fig 5.

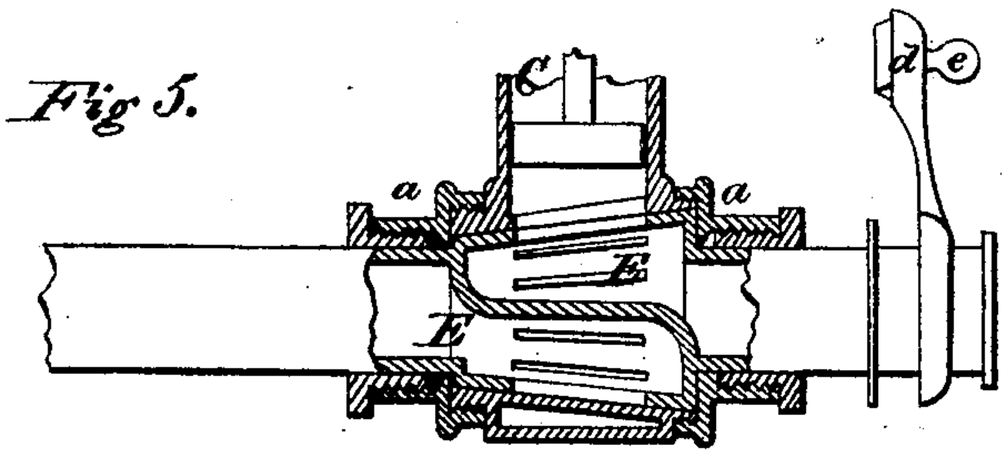


Fig 3.

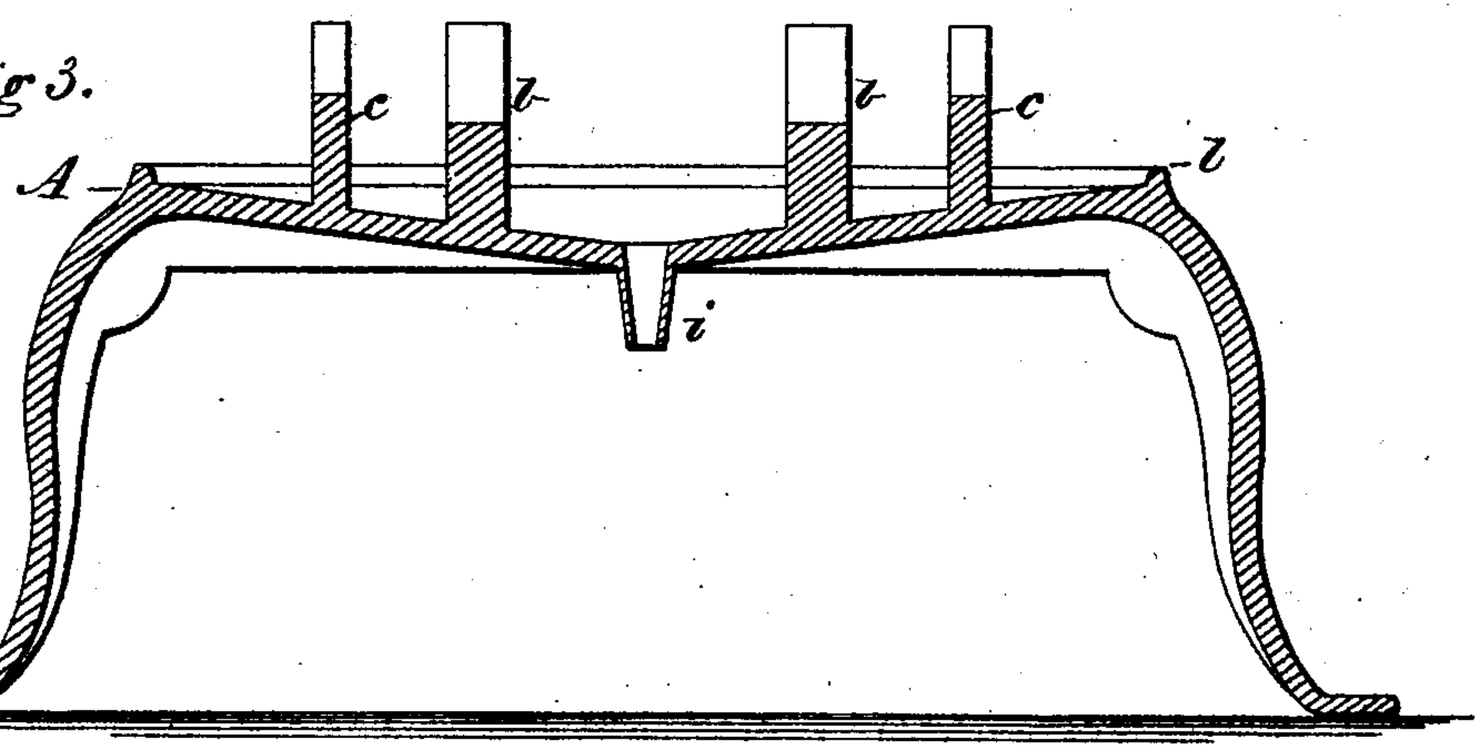
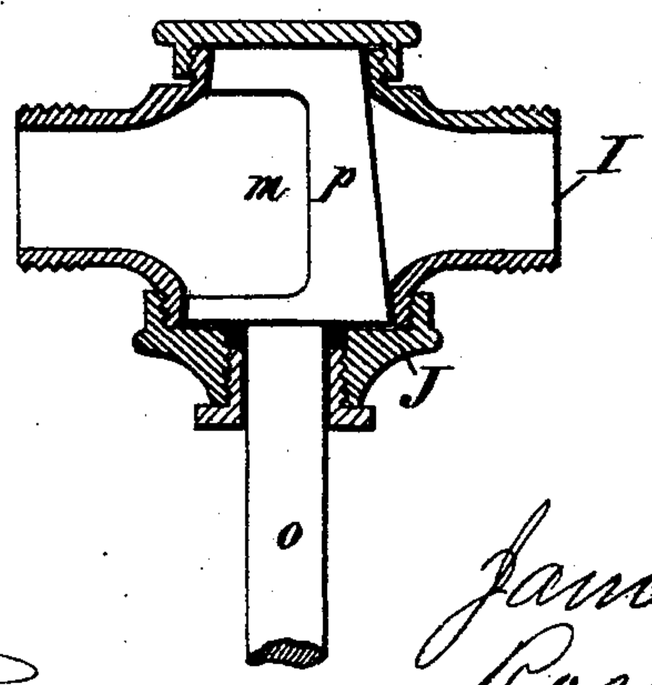


Fig 4.



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UNITED STATES PATENT OFFICE.

JAMES H. WELCH AND ROSIA W. WELCH, OF GEORGETOWN, D. C.

IMPROVEMENT IN HYDRAULIC ENGINES.

Specification forming part of Letters Patent No. **134,115**, dated December 17, 1872.

To all whom it may concern:

Be it known that we, JAMES H. WELCH and ROSIA W. WELCH, of Georgetown, in the county of Washington and District of Columbia, have invented certain Improvements in Hydraulic Engines, of which the following is a specification, reference being had to the accompanying drawing.

Our invention consists in certain improvements upon the motor or engine patented to us November 28, 1871, and reissued April 23, 1872; said improvements consisting in certain details of construction and the addition of certain features whereby the engine as a whole is rendered more perfect and durable, as hereinafter more fully described.

Figure 1 is a front elevation of the improved engine complete, with some portions shown in section for the purpose of more fully illustrating the improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse vertical section of the base-plate. Fig. 4 is a longitudinal section of the valve, and Fig. 5 is a side elevation with a portion broken away to show the reversible plug.

As described in our former patent, the engine proper consists of an oscillating cylinder, having a transverse tubular chamber at its lower end, in which is placed a conical tubular plug, (formerly called a trunnion,) through which the water, steam, or compressed air is fed to and discharged from the cylinder, these parts being constructed as described in said patent, to which reference is hereby made for a more detailed description.

As formerly described, the cylinder had its bearing and worked on this conical plug E, in which case it is obvious that the plug and tubular chamber would be subjected to the entire wear resulting from the operating of the engine. To remedy this, we now construct the cylinder with tubular trunnions *a*, which project laterally at opposite sides, as shown in Fig. 1, and these trunnions *a* we mount in suitable bearings or boxes *b*, cast on, or otherwise secured to the base-plate A, as represented in section in Fig. 1. When the engine is intended to be operated by water these trunnions *a* are made separate, and screwed or bolted fast to the cylinder; the object being to obtain a bearing of less diameter than the body of the plug E, which must be made of considerable size, in order to obtain ports or openings of such a size as to admit the free passage of the water to and from the cylinder. When, however, the engine is intended to be operated by steam or compressed air the ports may be made smaller, as these bodies both expand rapidly when relieved of pressure; and, hence, will readily pass through much smaller ports than are required for water, which is practically incompressible, and in such cases the trunnions *a* may be cast solid on the cylinder, a much smaller plug, E, being required in such cases.

By this method of mounting the cylinder, it will be seen that the plug E is relieved of all the strain and wear, except the mere friction required to keep it tight in its chamber, which is the same and no more than is required in an ordinary cock, the strain and wear being transferred to the trunnions *a* and their bearings or boxes *b*.

As represented in Figs. 1 and 3, two other bearings, *c*, are arranged on the bed or base plate A outside of the bearings *b*, for the purpose of receiving and holding in place the reduced ends of the plug E, though one will suffice, but not as well. These serve to support the plug in line with its chamber, and prevent the weight of the pipes, which are connected to the projecting tubes G and I at opposite sides, from pressing the plug down, and creating unequal and unnecessary wear. The base or bed plate A we make either round or oblong, and provide it with a raised rim or ledge, *l*, around its outer edge, as shown clearly in Fig. 3, at the same time making it slightly concave on its upper side and at the extreme point of concavity, which may be either at the center, as represented in Fig. 3; or near one end or side we provide an opening and a short tube, *i*; the object being to prevent all the drip either of water or oil from running over the edge of the plate, and to cause it to pass off through the tube *i*, where it may be caught in a vessel, *k*, placed underneath the base, as shown in Fig. 2; or where the discharge-pipe of the engine is sufficiently low, the drip may be conducted into it by extending a small pipe from the tube *i* into the discharge-pipe. This base A, as shown in Fig.

3, will have the bearings *b* and *c* cast solid on it; and where it is desired to locate the engine in dwellings and similar places it will also be cast with legs, as shown in Fig. 3. In like manner the frame or supports B for the driving-wheel crank and shaft may also be cast with the base, and where the engine is very small a single support, B, will answer, the bearing for the shaft being suitably elongated. In Figs. 1 and 2 the base-plate A is shown constructed as described, except that instead of having the metal legs it is shown mounted on a wooden frame, M, which serves the same purpose; but we prefer the plan shown in Fig. 3, as being neater and cheaper.

In the engine, as formerly described, the only provision for reversing its motion was to cause the water or other motive force to enter the opposite end of the plug E and flow through the engine in a reverse direction. That may be accomplished easily by a suitable and well-known arrangement of pipes and cocks; but as such arrangement complicates the apparatus, we have devised another and simpler means of accomplishing the same result. It consists in a lever, *d*, Fig. 2, attached to the projecting end of the plug E, by means of which the plug is turned half over in its chamber, as indicated by the dotted lines, which show it reversed. This movement of the plug E reverses the position of the supply and exhaust ports, and hence reverses the motion of the engine. The arm or lever *d* may be provided with a handle, *e*, which may be either screwed into a hole in the support B or the lever may be made to spring sufficiently to cause the inner projecting point of the handle *e* to engage a recess, *f*, in the support B, Fig. 1, and thus hold it in place. In case this movement of the lever *d* is found inconvenient, on account of the location of the engine, a spur-wheel or pinion may be mounted on the projecting end of the plug, in place of the lever *d*, and be operated by a segment having a lever attached and located at either side.

As shown in Fig. 1, at the right-hand side the projecting ends of the plug E must be connected to the pipes I and G by a coupling, *h*, or other loose joint suitably packed, so as to permit the plug to be readily turned without disturbing the pipes at either end and still keep the joints tight. This simple and speedy means of reversing the engine adapts it to many purposes and places where it could not be conveniently used before, and thus greatly enhances its utility and value.

As previously shown in the patent referred to, a hand-valve was used for starting and stopping the engine; but as it is desirable, in operating sewing-machines, dental lathes and drills, and similar machines, for which this engine is especially well adapted, that the operator should have both hands left free for other uses, we have devised a valve to be operated by the foot. It is shown in place at J, Fig. 1. To the stem *o* of the valve we attach a swinging lever, K, its lower end having an opening or space into which the toes of the operator's foot may be inserted, and by means of which it can be moved to the right or left, thus turning the valve J at will and to any required extent, the valve remaining at any point at which it may be left, from full closed to full open. As such a valve, in order to be conveniently operated by the foot, should have but a slight motion to close or open it, we construct it as represented in Fig. 4, where it will be seen that the valve consists of a plug, *p*, cut away at one side, as shown at *m*, leaving a solid portion of sufficient width to close the opening in the pipe I, this plug being fitted in a circular opening passing transversely across the pipe, this opening being closed at one end by a screw-cap and a stuffing-box at the other, through which the stem *o* of the plug protrudes. The case or pipe I, it will be observed, is spread out or widened laterally in line with the plug, thereby making an elongated and enlarged opening, so that a comparatively small movement of the plug will suffice to permit the free flow or shut it off entirely.

We also provide a slotted curved guide-plate, L, and attach it to the frame M, or to the floor if the engine be stationary, in such a position that the lower end of the lever K will enter and work in the slot therein, as shown in Fig. 1, where it is shown with a portion broken away. This guide L serves as a support or rest for the foot, and, while limiting the movement of the lever K, also serves to prevent it from being bent or displaced.

By these several improvements we are enabled to produce a motor or engine that is superior to any heretofore known, especially in its adaptation to household uses. It is extremely simple, cheap, and durable, and can be operated by any person who can turn a faucet, thus especially adapting it to the use of women or children for operating sewing-machines and all similar purposes.

Having thus fully described our invention, what we claim is—

1. The oscillating cylinder C, provided with the hollow trunnions *a* mounted in the bearings or boxes *b*, when used in combination with the plug E, substantially as described, whereby the plug is relieved from wear, as set forth.

2. The concave base-plate A, with the raised rim *l* and opening or pipe *i* for receiving and conveying away the drip or leak of the engine, as set forth.

3. The reversible plug E, provided with the lever *d* or its equivalent, when used in combination with the cylinder C, constructed and arranged as set forth.

4. The combination, with a valve for a motor or engine, of a lever or its equivalent, arranged to be operated by the foot, when the said parts are so constructed and arranged that the valve

will remain or stand at any point to which it may be moved by the foot, substantially as described.

5. In combination with the valve-lever K, the guide-plate L, substantially as described.

6. A valve for water-engines, consisting of the plug *p* fitted in a tube or case, I, which is enlarged or spread out laterally in line with the axis of the plug, whereby a small movement of the plug will afford an opening for the passage of the water equal in area, or nearly so, to the supply-pipe, substantially as described.

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Witnesses:
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J. W. DAVIS.