(No Model.) 3 Sheets—Sheet 1.

F. F. VOIGT.

SCREW THREADING MACHINE.

No. 485,245. Patented Nov. 1, 1892.

Fig. 1.

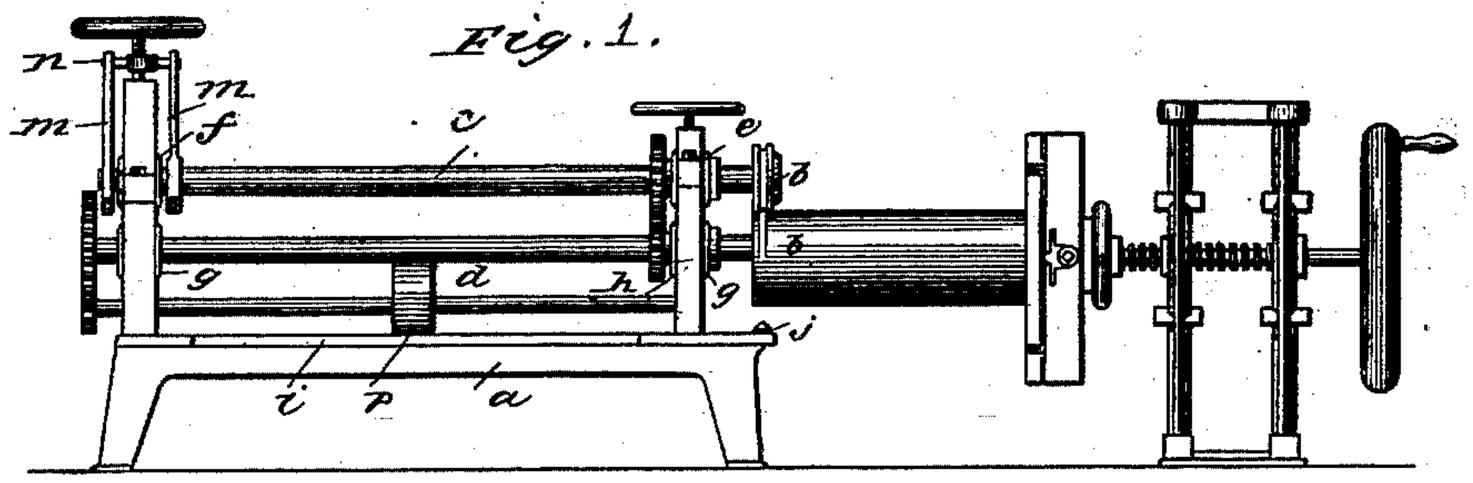

Fig. 2.

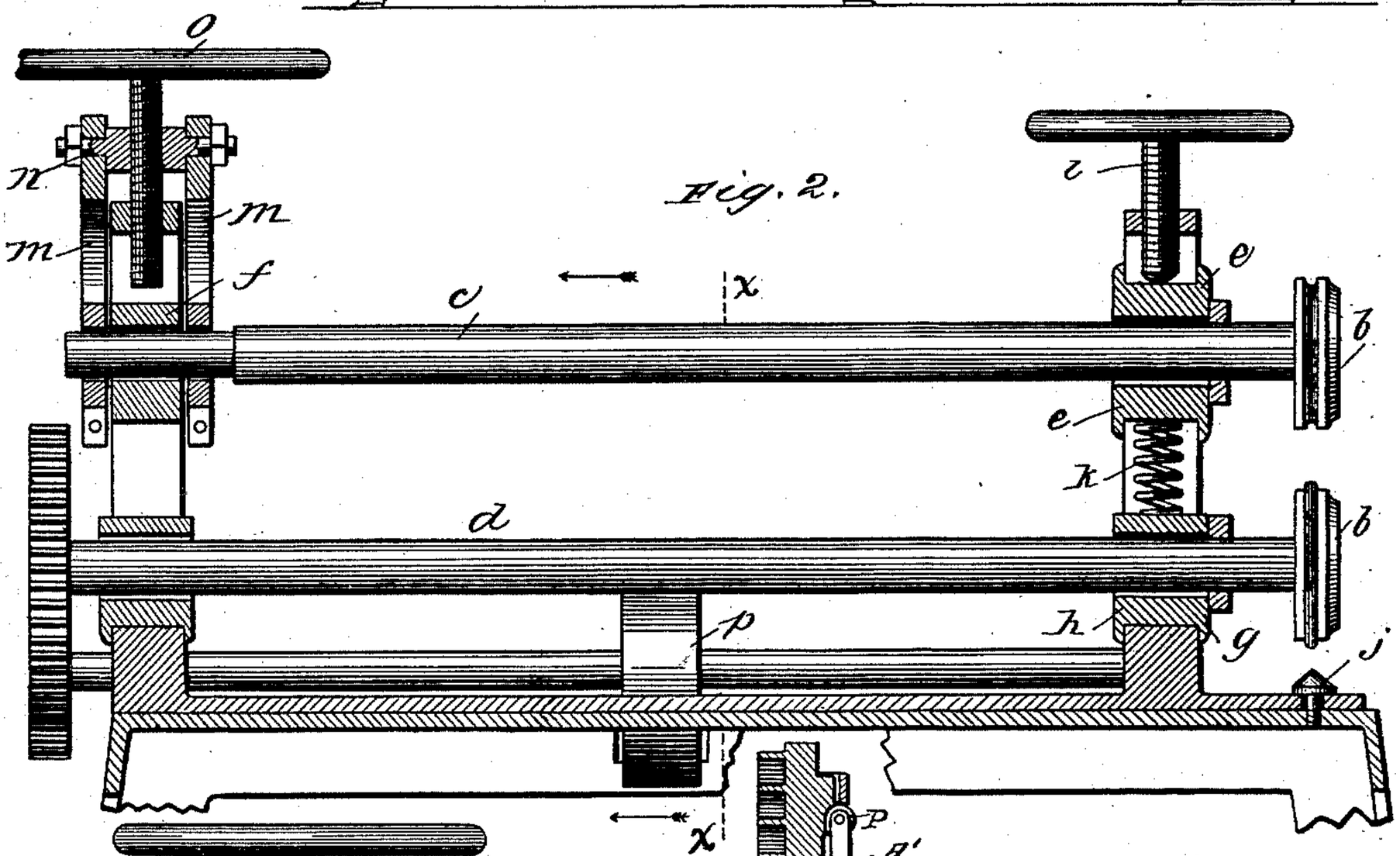

Fig. 3.

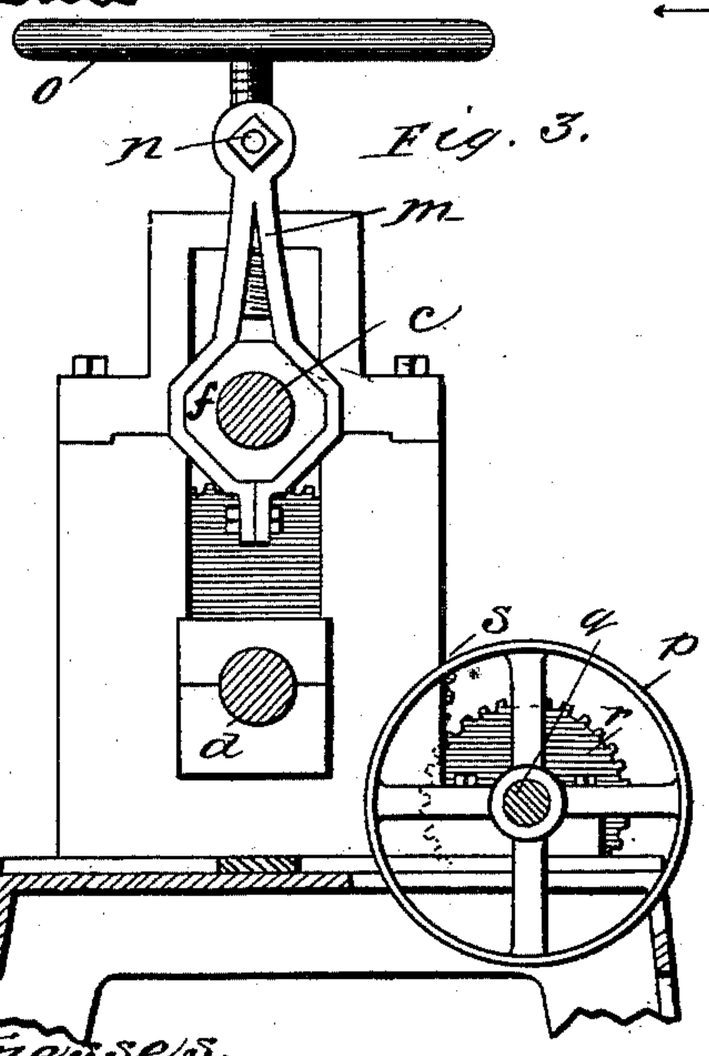

Fig. 11.

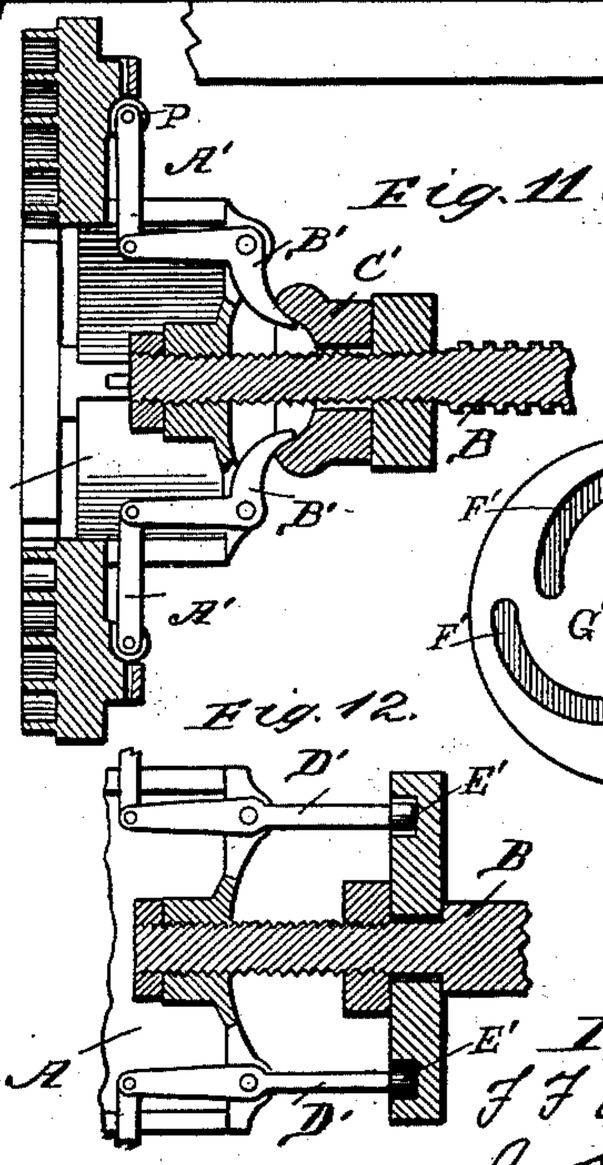

Fig. 13.

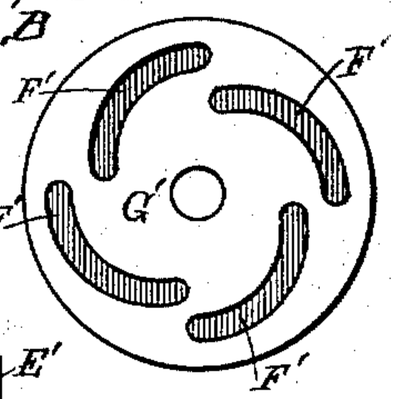

Fig. 12.

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SCREW THREADING MACHINE.

No. 485,245. Patented Nov. 1, 1892.

Fig. 4.

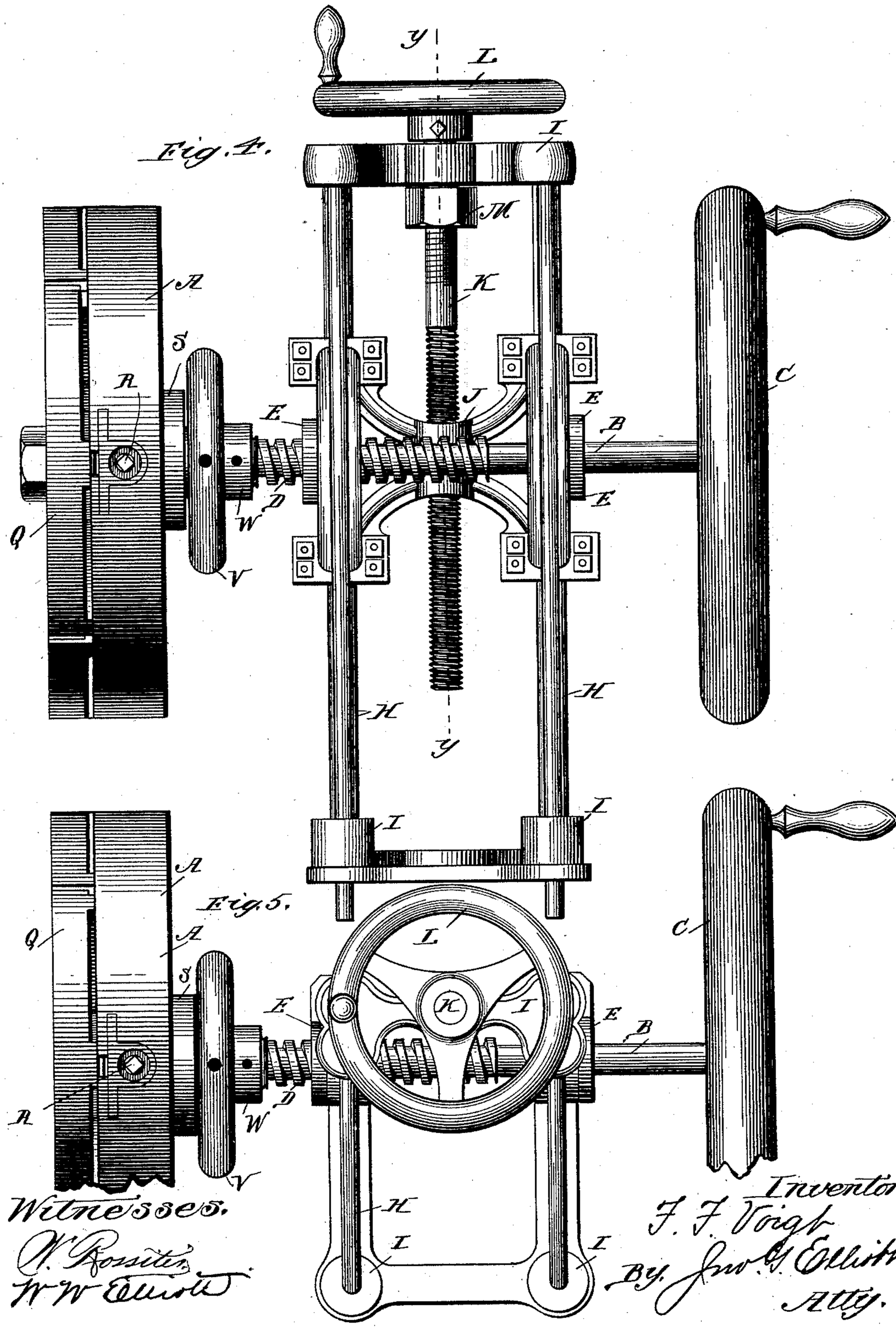

Fig. 5.

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SCREW THREADING MACHINE.

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Fig. 6.

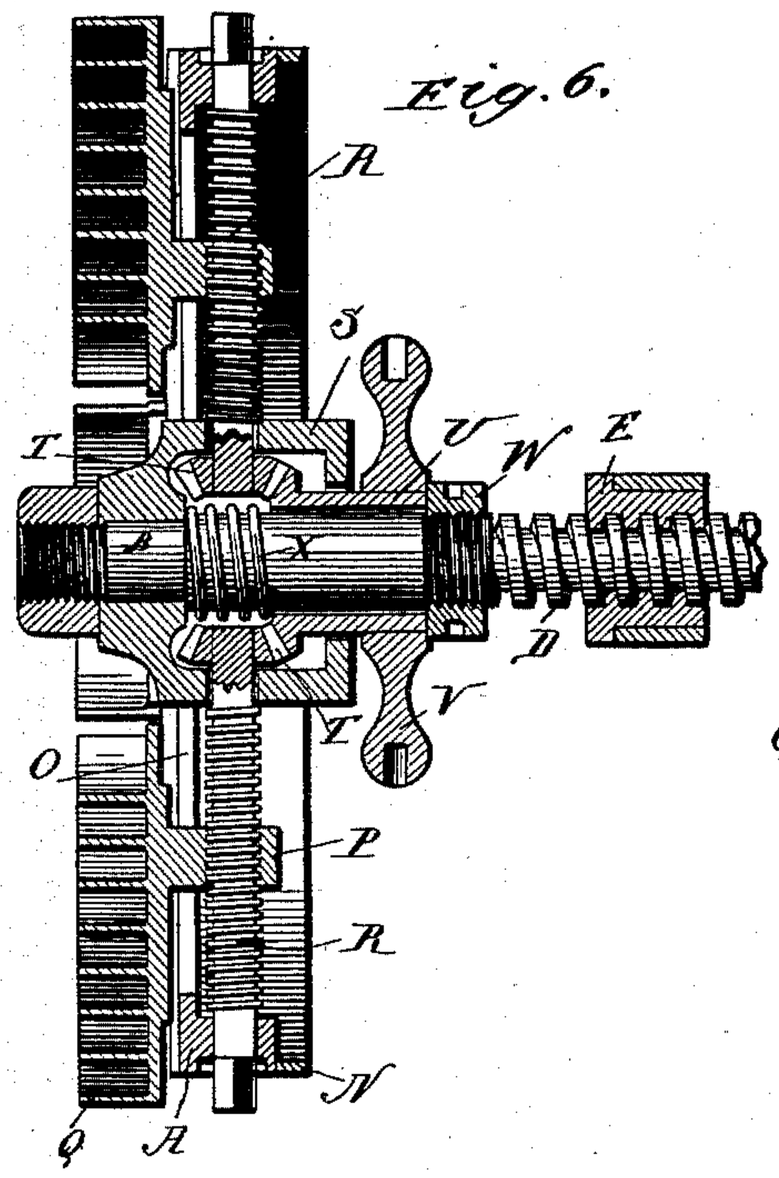


Fig. 7.

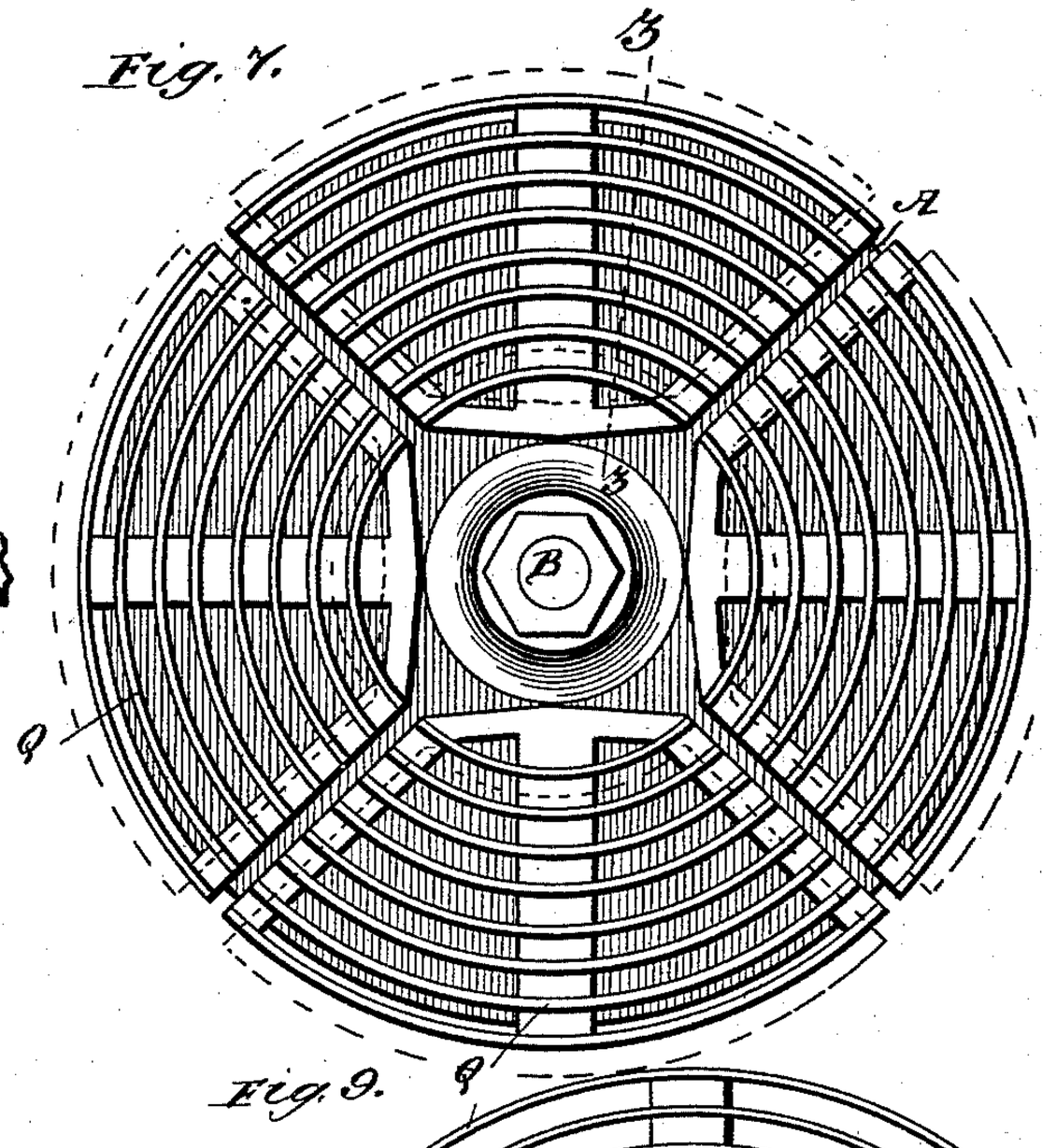


Fig. 9.

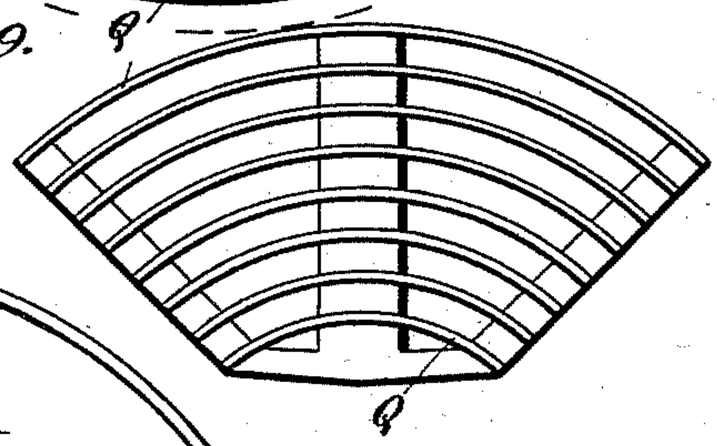


Fig. 10.

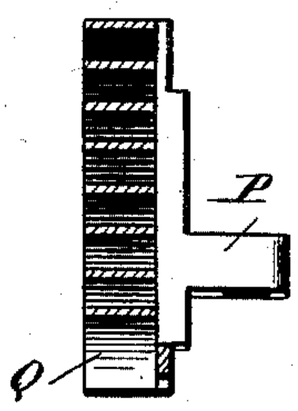
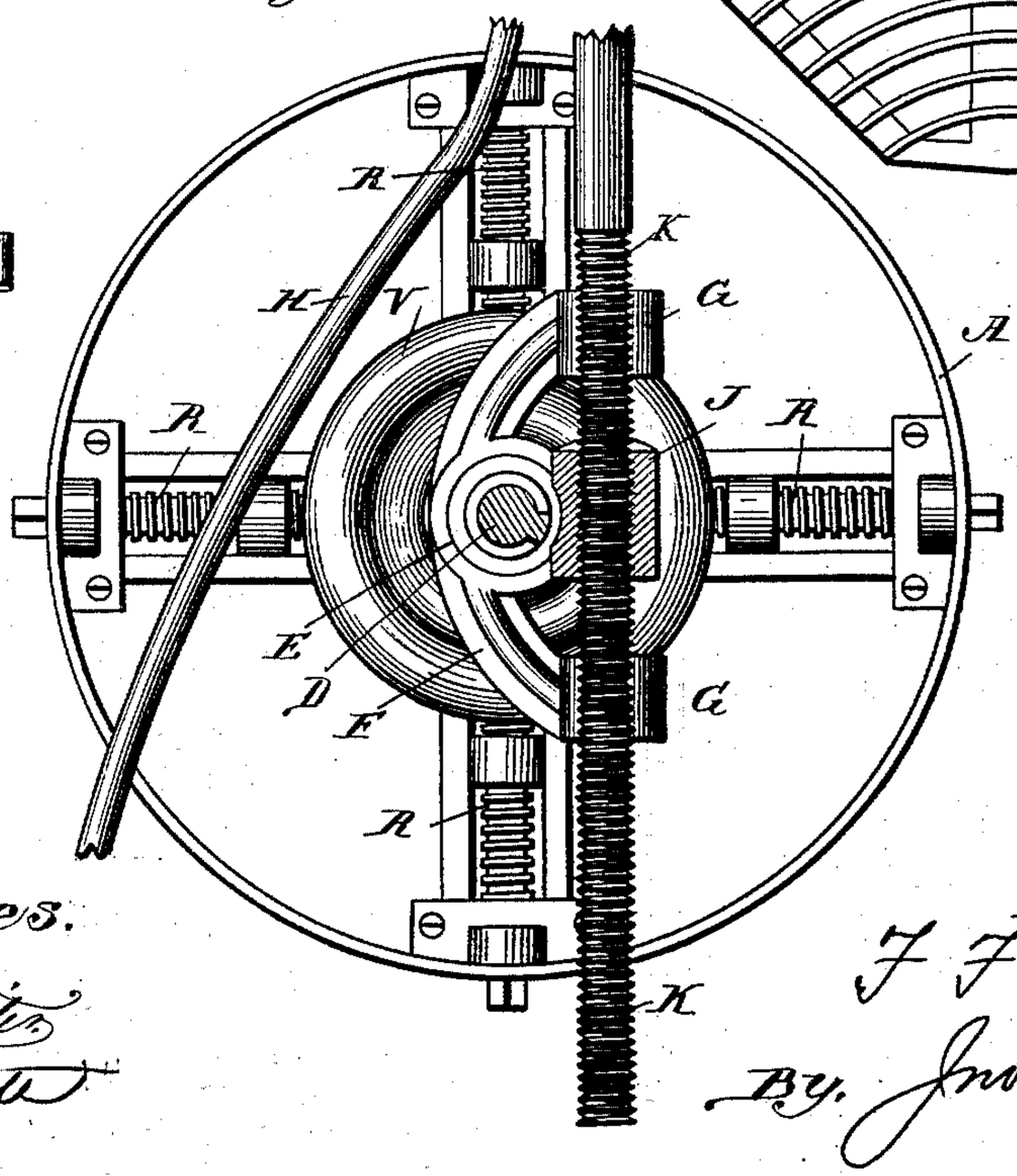


Fig. 8.



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UNITED STATES PATENT OFFICE.

FERDINAND F. VOIGT, OF CHICAGO, ILLINOIS.

SCREW-THREADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 485,245, dated November 1, 1892.

Application filed March 22, 1887. Serial No. 231,902. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND F. VOIGT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Screw-Threading Machines, of which the following is a specification.

This invention relates to improvements in screw-threading machines, and more particularly to that class designed for forming screw-threads upon sheet-metal pipe in which the pipe is held in an adjustable support and fed to the beading-rollers at an oblique angle to their axes and direction of rotation, in order that the angle of pitch of the thread formed on the pipe may be varied.

Prior to this invention the means for securing the pipe to the supporting devices in machines of this class consisted either of a series of notched radial plates or else a series of annular flanges rigidly secured to the face of a rotatable disk or similar structure; but both of these constructions are objectionable, for the reason that the pipe cannot be properly held in position while the thread is being turned thereon or prevented from a rotation independent of the holder because the holding jaws or flanges are rigid, and hence must be of such a size that the pipe may be readily slipped off and on, and therefore can exert no gripping or binding force on said pipe.

Another objection to screw-threading machines as heretofore constructed is due to lack of pressure upon the beading-rollers or, rather, the inability to increase the normal pressure upon said rollers during the forming of a screw-thread, and thereby resulting in a corresponding lack of finish and uniformity of thread formed upon the pipe.

The prime object of this invention is to provide a series of expansible gripping devices for holding the pipe to be operated upon and so constructed that pipes having materially-different diameters may be quickly and readily secured rigidly in position upon the pipe-holder and without an unnecessary degree of adjustment of the said gripping devices.

Another object is to have the beading-rollers so supported that the pressure of said rollers upon the pipe being operated upon may be increased or diminished at will and at the same time adjustably supported in such manner that they may readily operate upon pipes of varying thicknesses and be capable of exerting the same pressure upon any and all sizes of pipe.

I attain these objects by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of a screw-threading machine complete embodying my invention; Fig. 2, a central longitudinal section through the beading portion of the machine; Fig. 3, a transverse section on line *x x*, Fig. 2, looking in the direction indicated by the arrows; Fig. 4, an enlarged side elevation of the pipe-holding device; Fig. 5, a plan view thereof; Fig. 6, a central detail vertical section through the adjustable gripper-jaws, the supporting-disk, and their operating connections; Fig. 7, a face view thereof; Fig. 8, a detail transverse vertical section on line *y y*, Fig. 4; Fig. 9, a detail face view of the adjustable gripping-jaws; Fig. 10, a transverse sectional view thereof on line *z z*, Fig. 7; Fig. 11, a detail central section through a pipe-holding device, showing a modified construction of the same; Fig. 12, a similar view of a second modification of the same. Fig. 13 is a face view of the collar employed in the modification shown in Fig. 12.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates a disk or circular plate secured upon one end of a shaft B and carrying or supporting the pipe-holding devices, the detailed construction of which will be more fully described further on. On the opposite end of shaft B is rigidly secured an ordinary hand-wheel C for imparting a rotary motion to said shaft, which latter, between the disk and hand-wheel, is screw-threaded, as shown at D, and works through corresponding screw-threaded bearings E, formed in an adjustable frame F, having eyes or bearings G cast therewith, preferably above and below the bearing E, and sliding loosely upon vertical guide-rods H, held at a uniform distance apart by castings I I, all of which form a part of the supporting-frame of this portion of the machine, which is designed to rest

upon a tinsmith's table or any other suitable structure, and may have such other braces and connections as may be deemed desirable.

As will be seen from Fig. 8, the bearings E of the shaft B are set to one side of the vertical axes of the bearings G, so that the said shaft and the guide-rods may cross each other at right angles, and also to permit the location of still another bearing J, also cast with and secured by suitable arms to the adjustable frame F, through which works a screw-threaded rod K, which also works loosely through the upper casting I and has secured to the upper end thereof a hand-wheel L for imparting a rotary motion to said rod, which rod, while free to rotate, is prevented from a longitudinal or axial movement by means of the said hand-wheel and the nut M, located, respectively, above and below the casting I.

It is obvious that any rotation of the rod K will cause the adjustable frame F to ride up and down the vertical guide-rods H, carrying with it the shaft B and all its connections.

The disk or circular plate A, mounted on the forward end of the shaft B, has cast therewith an annular flange N, projecting rearwardly therefrom, and also has provided therein a series of radial slots O, through which project screw-threaded eyes P, formed on the rear faces of the adjustable quadrant-plates Q, which latter have a radial sliding movement upon the face of said disk. It is immaterial what the exact construction of these adjustable quadrant-plates may be, whether a series of notched plates, such as are common in the art, or a series of quadrant-plates provided each with forwardly-projecting flanges, which when properly brought together in the position shown in Fig. 7 constitute circular or annular gripping-flanges of different sizes, over which the end of the pipe fits, for whether notches or flanges said notches or flanges are arranged in circles varying in diameter—that is to say, each quadrant plate has a series of gripping-faces in differing arcs of a circle, so that, taken together, the gripping-flanges of said quadrant-plates differ in size, and are therefore adapted to grip pipe-sections corresponding and substantially varying in diameter. In other words, the quadrant-plates form adjustable gripping-jaws and jaws which differ in size, and thereby grip and hold pipe-sections substantially varying in diameter. For the purpose of adjusting these flanged quadrant-plates toward or away from the center I have provided a series of radial screw-threaded shafts R, working on the rear face of the disk A and having a bearing at the outer ends thereof in the flange N and at the inner ends in a boxing or cover S, secured to the disk A, which shafts work through the screw-threaded eyes on the rear of the said plates Q and have mounted on the inner ends thereof spur-gears T, meshing with a corresponding driving gear-wheel U, sleeved upon the shaft B, which gear has secured thereto a small hand-wheel V for imparting a rotary motion to said gear when desired. A lock-nut W is provided mounted on the shaft B for securing the driving cog-wheel U in position and in gear with the gears T. Sufficient space is left between the cog-wheel U and the inside of the boxing S to permit of a longitudinal movement of said gear upon the shaft B, in which movement it is assisted by a spiral spring X, coiled upon said shaft between the disk A and said cog-wheel, the tension of said spring being exerted in such manner as to throw the said cog out of gear with the spur-gears T whenever the lock-nut is withdrawn or moved backward upon the shaft B, so as to permit a movement to any one of the shafts R independent of the others.

When all the parts are in the position shown in Fig. 6, it is obvious that any movement whatever of the hand-wheel B will produce a corresponding rotation of the screw-threaded shafts R, thereby causing the quadrant-plates to move toward or away from the center, being guided in such movements by the projecting eyes P, working through the slots O, formed in the disk. It will also be observed that any bodily movement of the disk as a whole will produce a corresponding rotation of the shaft B, thereby causing the said shaft, by reason of its screw-threaded connection with the adjustable frame F, to have an endwise or longitudinal movement through said bearings, carrying with it the disk, quadrant-plates with their gripping flanges, and all their connecting parts. This latter movement or rotation of the pipe-holder as a whole in practice is produced by the turning of the pipe in the operation of forming a screw-thread upon the pipe, which latter, as before explained, is held rigidly in position by the gripper-flanges, and hence as the thread is turned upon the pipe the latter will have a gradual backward or forward travel toward or away from the beading-rollers by reason of the screw-thread connection between the shaft B and its bearings, as a result of which the pitch of the thread will be uniform and regulated, and the angle of pitch of the thread will be determined by a lateral shifting from a straight line either of the pipe-holding devices or the beading-rollers; but as this latter feature is already well known in the art I do not desire to herein more fully describe or claim any devices for producing such movements.

Facing the pipe-holding portion of the machine and mounted upon a suitable table *a*, secured to the same bench upon which the pipe-holding device is mounted, is the beading or screw-threading portion of the machine, consisting of beading-rollers *b*, mounted upon the ends of shafts *c d*, the former one of which works in suitable sliding bearings *e f* and the latter in fixed bearings *g*, guided and supported in standards *h*, cast with or otherwise rigidly secured to a base *i*, which latter has a single pivot connection with the table *a* at a point *j*, exactly underlying the beading-rollers *b b*. The sliding bearing or box *e* near-

est the beading-rollers is supported upon a strong spiral spring *k*, the tension of which tends to lift the bearing, and consequently the shaft and beading-roller, away from the lower shaft and roller, so that pipes of varying thicknesses may be introduced between the rollers, and the tension of this spring is overcome and the rollers brought together by means of a hand-screw *l*, working through the upper end of the standard *h* and bearing upon the box *e* on the top side thereof. The opposite end of the shaft *c* works loosely in the bearing *f*, so that this end of the shaft may have a vertical movement, while the forward end of the shaft is held in a fixed position without binding the shaft so that it cannot rotate, this end of the shaft being supported in suitable stirrups *m*, depending from a cross-bar *n* above the standard *h*, through which works a hand-screw *o*, by means of which said stirrups are elevated and lowered, and, if desirable, that portion of the hand-screw working through the cross-bar *n* may be a right-hand screw, while that portion working through the standard *h* may be a left-hand screw, in order to quicken the movement of the stirrup in elevating and lowering the end of the shaft.

In practice when the end of the pipe, supported by its opposite end upon the pipe-holder, is placed between the beading-rollers and the said rollers brought together by means of the hand-screw *l*, so as to tightly grip the pipe, the hand-screw *o* is then operated so as to lift the opposite end of the shaft *c*, which causes a corresponding depression of the forward end of said shaft, carrying with it the beading-rollers and causing them to grip the pipe as tightly as may be desired during the operation of forming a screw-thread.

The machine herein shown is constructed as a power-machine, to which power is communicated through the belt-pulleys *p*, mounted upon a supplemental shaft *q*, upon the end of which is also mounted a cog-wheel *r*, meshing with a corresponding cog-wheel *s*, secured to the lower shaft *d*, outside of the standard *h*, by means of which power is transmitted to said shaft.

In Figs. 11 and 12 are illustrated two modified forms of my pipe-holding device, in the former of which the several radial screw-shafts are dispensed with and links A′ substituted therefor, said links being pivoted at their outer ends to the eyes P and having their inner ends pivoted to right-angle or bell-crank levers B′, pivoted upon a portion of the plate A. The free ends of the bell-crank lever B′ all project toward the center and are engaged by a collar C′, sleeved and working upon the shaft B, so that when said collar is advanced or slid toward the disk A, carrying with it the ends of said levers, they will cause a corresponding outward movement of the other ends of said levers and of the links A′, each in turn, and impart the same movement to the sliding gripper-flanges working on the face of the disk A, as in the preferred construction.

The modification shown in Fig. 12 operates in substantially the same manner as that shown in Fig. 11, except that the bell-crank lever is substituted by a lever of the first class D′, carrying upon its free end an anti-friction-roller E′, which latter engages eccentric or cam grooves F′, formed on the face of a collar G′, which is a substitute for the screw-threaded collar C′ of the modification shown in Fig. 11. It will be seen that a rotation of said collar in either direction will cause the ends of the levers D′ to travel toward or away from a common center, according to the direction of the movement thereto, causing a corresponding movement of the gripping-flanges. A construction of this character has the advantage of gripping the pipe either inwardly or outwardly—that is to say, either on the inside of the pipe or on the outside—and in addition to that is the most economical in its construction and quicker in its action of any of the other forms.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a screw-threading machine, a pipe-holder having a series of slidable quadrant-plates provided with gripping-flanges of differing size, in combination with devices for adjusting said flanges, whereby the holder may be adjustable to and rigidly gripped by sections substantially varying in diameter.

2. In a screw-threading machine, screw-thread-forming devices, in combination with a holder having quadrant-plates provided with gripping-flanges radially adjustable independently of each other, substantially as described.

3. In a screw-threading machine, screw-thread-forming devices, in combination with a holder having quadrant-shaped plates provided with gripping-flanges and radially adjustable from a common center, substantially as described.

4. Screw-thread-forming devices, in combination with a holder having radially-adjustable quadrant-plates provided with gripping-flanges and means for simultaneously adjusting said plates, substantially as described.

5. In a machine for screw-threading sheet-metal pipe, the table *a*, the adjustable base *i*, the pivot connection *j* between said base and table, the standards *h*, the rotatable shafts *c d*, the beading-rollers *b*, mounted thereon, and the fixed bearings *g* thereof, in combination with the sliding bearings *e f*, the supporting-spring *k*, the hand-screw *l*, the stirrups *m*, and the hand-wheel, substantially as described.

6. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a threaded carrying-shaft and a pipe-holder mounted upon the end of said shaft, substantially as described.

7. In a machine for threading sheet-metal

pipe, the combination, with screw-thread-forming devices, of a vertically-adjustable threaded carrying-shaft and a pipe-holder mounted upon the end of said shaft, substantially as described.

8. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a rotatable shaft, a bearing therefor, a screw-thread connection between said shaft and bearing, a hand-screw working through for vertically adjusting said bearing, and a pipe-holder mounted upon the end of said shaft, substantially as described.

9. In a machine for threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a rotatable threaded carrying-shaft and a pipe-holder mounted upon the end of said shaft and provided with adjustable quadrant-plates having gripping-flanges of different size, substantially as described.

10. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a vertically-adjustable threaded carrying-shaft and a pipe-holder mounted upon the end of said shaft and provided with adjustable quadrant-plates having gripping-flanges of different size, substantially as described.

11. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a vertically-adjustable threaded carrying-shaft, a pipe-holder mounted upon the end of said shaft, the adjustable quadrant-plates thereof, having gripping-flanges of different size, a sliding connection between said plates and the holder, and means for actuating said plates, substantially as described.

12. In a machine for threading sheet-metal pipe, the combination, with screw-thread-forming devices and the vertically-adjustable threaded carrying-shaft, of a pipe-holder mounted upon the ends of said shaft, comprising a disk provided with radial slots, adjustable quadrant-plates having gripping-flanges of different size, a sliding connection between said plates and the disk, eyes on said plates projecting through the slots in said disk, screw-threaded shafts working through said eyes, and means for rotating said shafts, substantially as described.

13. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices and a vertically-adjustable threaded carrying-shaft, of a pipe-holder mounted upon the end of said shaft, comprising a disk provided with radial slots, adjustable quadrant-plates provided with gripping-flanges of different size, screw-threaded eyes on said plates projecting through said slots, radial screw-threaded shafts working through said eyes and bearing in the disk, a hand-wheel sleeved upon the carrying-shaft, and a gear connection between said wheel and the radial screw-threaded shafts, substantially as described.

14. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a pipe-holder comprising a rotatable disk provided with radial slots, adjustable quadrant-plates having flanges of different size, a sliding connection between said plates and disk, screw-threaded eyes on said plates projecting and working through the slots in said disk, radial screw-threaded shafts working through said eyes, and means for rotating said shaft, substantially as described.

15. In a machine for screw-threading sheet-metal pipe, the combination, with screw-thread-forming devices, of a pipe-holder comprising a rotatable disk provided with radial slots, adjustable quadrant-plates provided with gripping-flanges of different size, screw-threaded eyes on the said plates projecting and working through these slots in said disk, radial screw-threaded shafts working through said eyes and bearing in the disk, a hand-wheel sleeved on the support of the disk, and a gear connection between said wheel and the radial screw-threaded shafts, substantially as described.

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