No. 887,741 PATENTED MAY 12, 1908.

A. L. ROBBINS.

PIPE THREADING MACHINE.

APPLICATION FILED NOV. 20, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

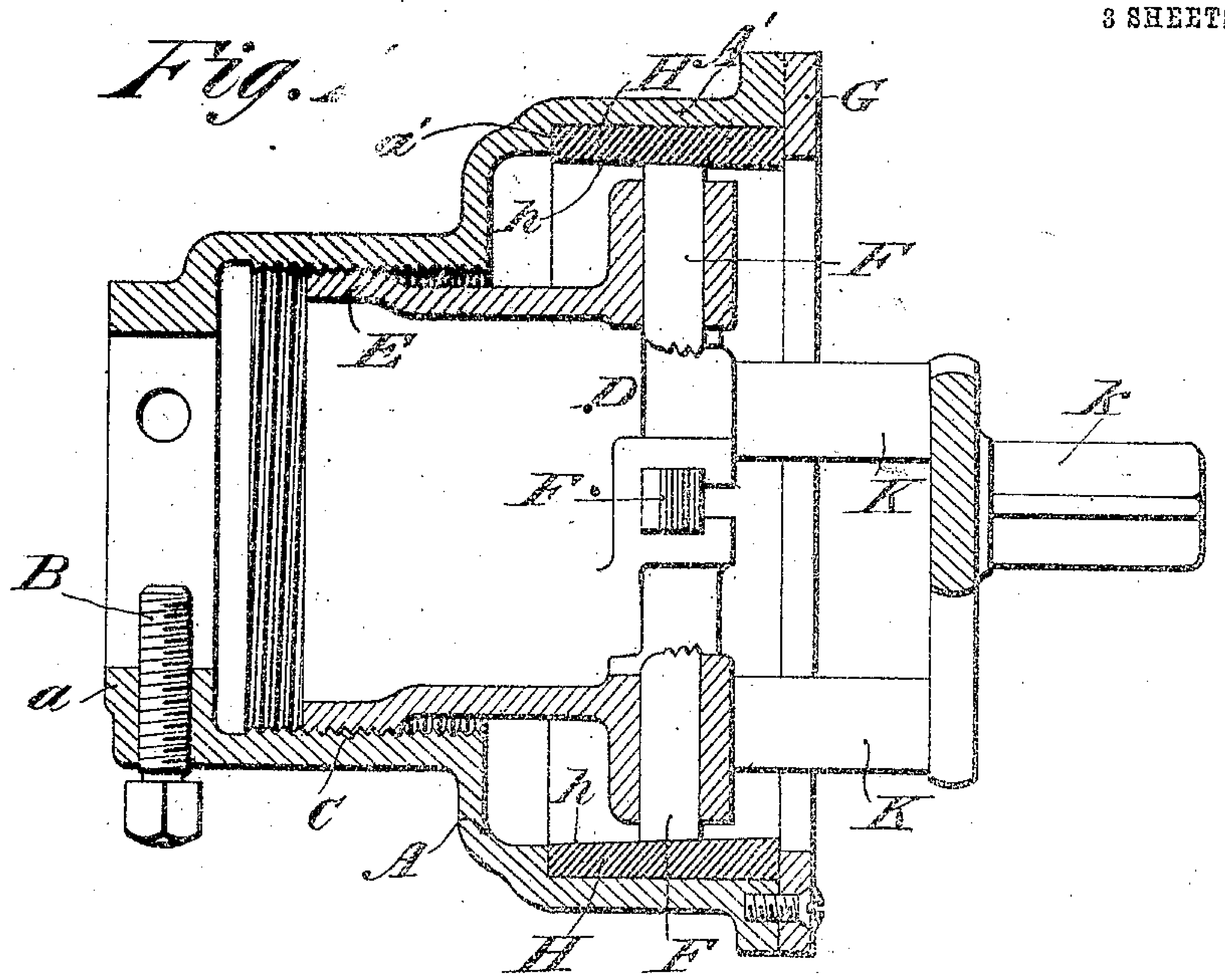


Fig. 2.

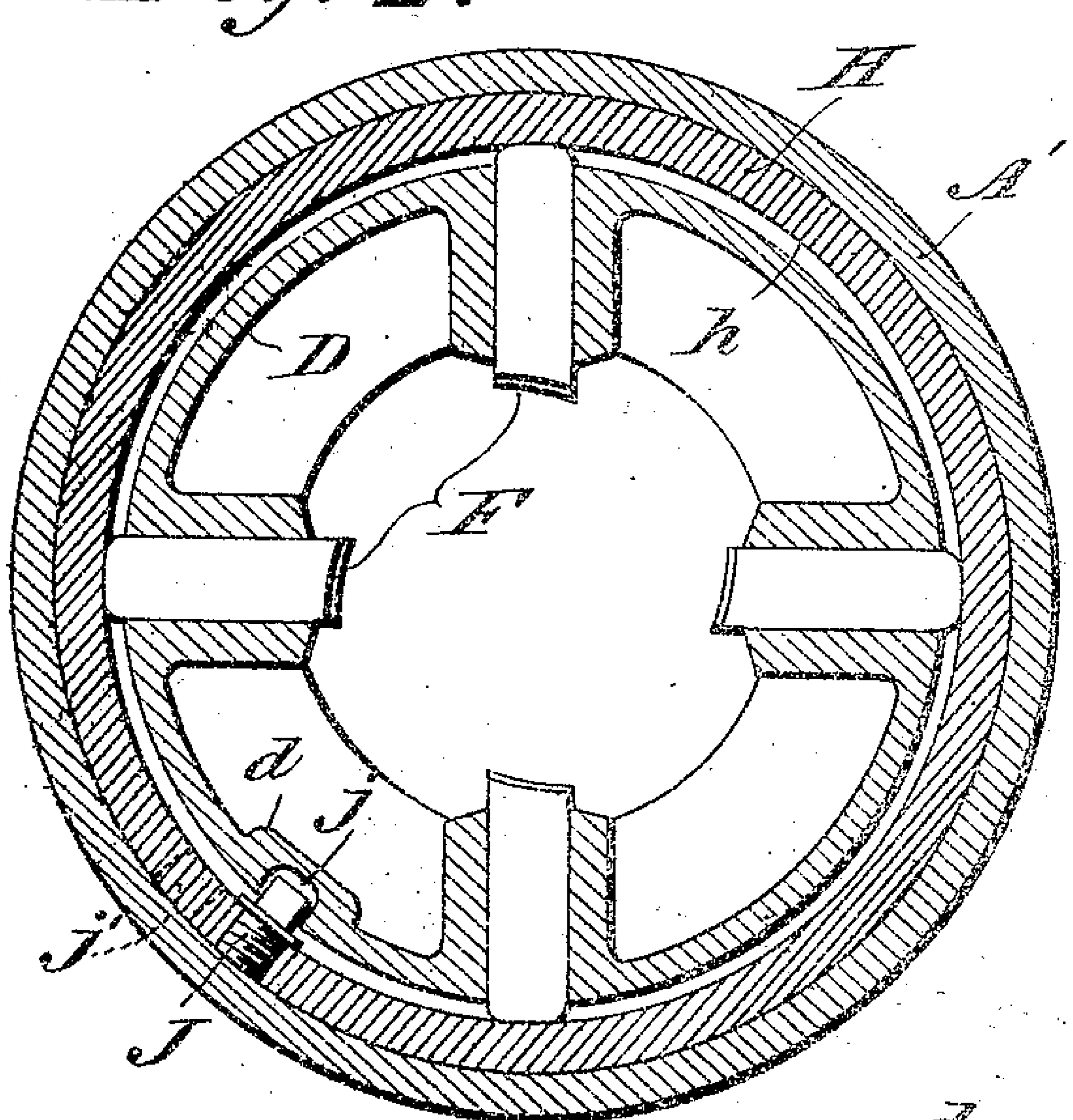


Fig. 3.

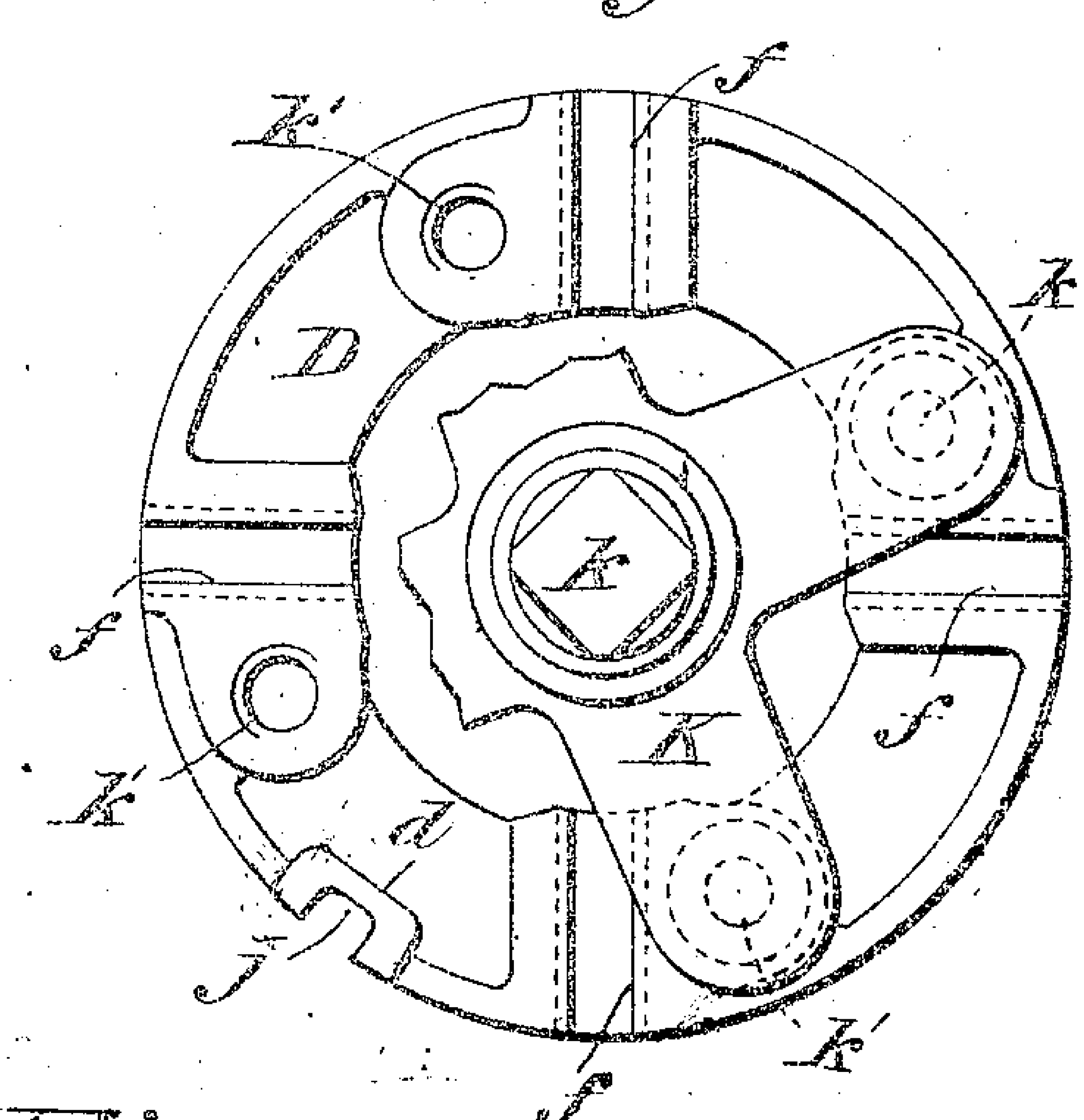
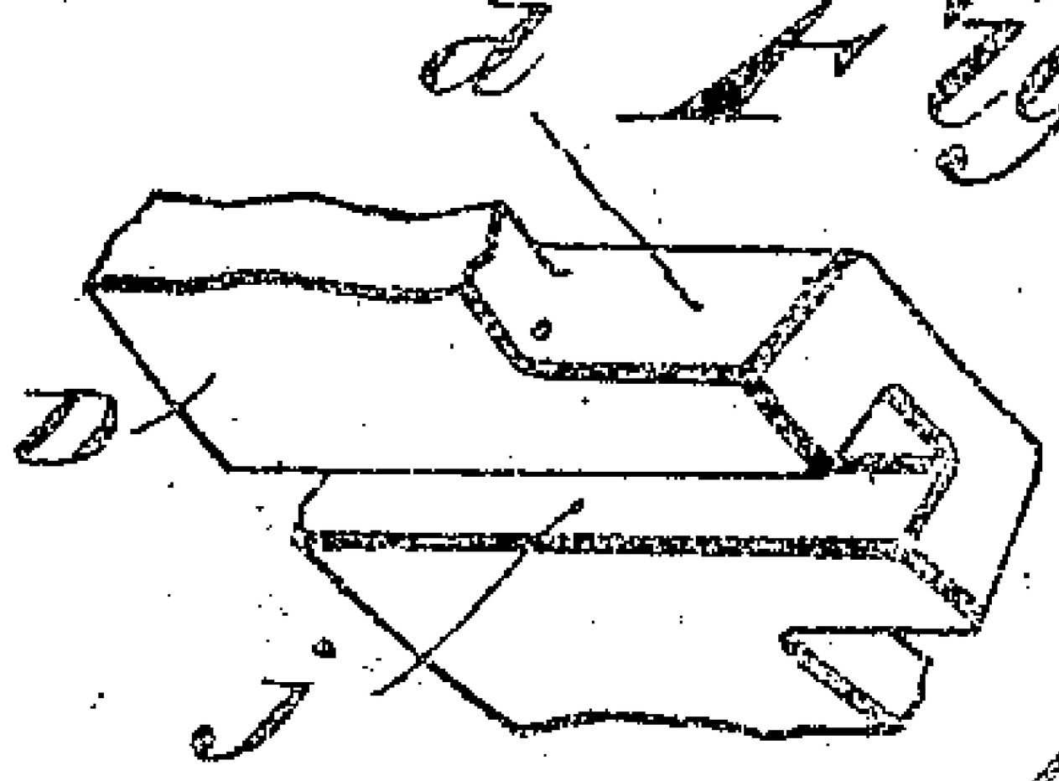


Fig. 4



WITNESSES

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3 SHEETS—SHEET 2.

Fig. 7.

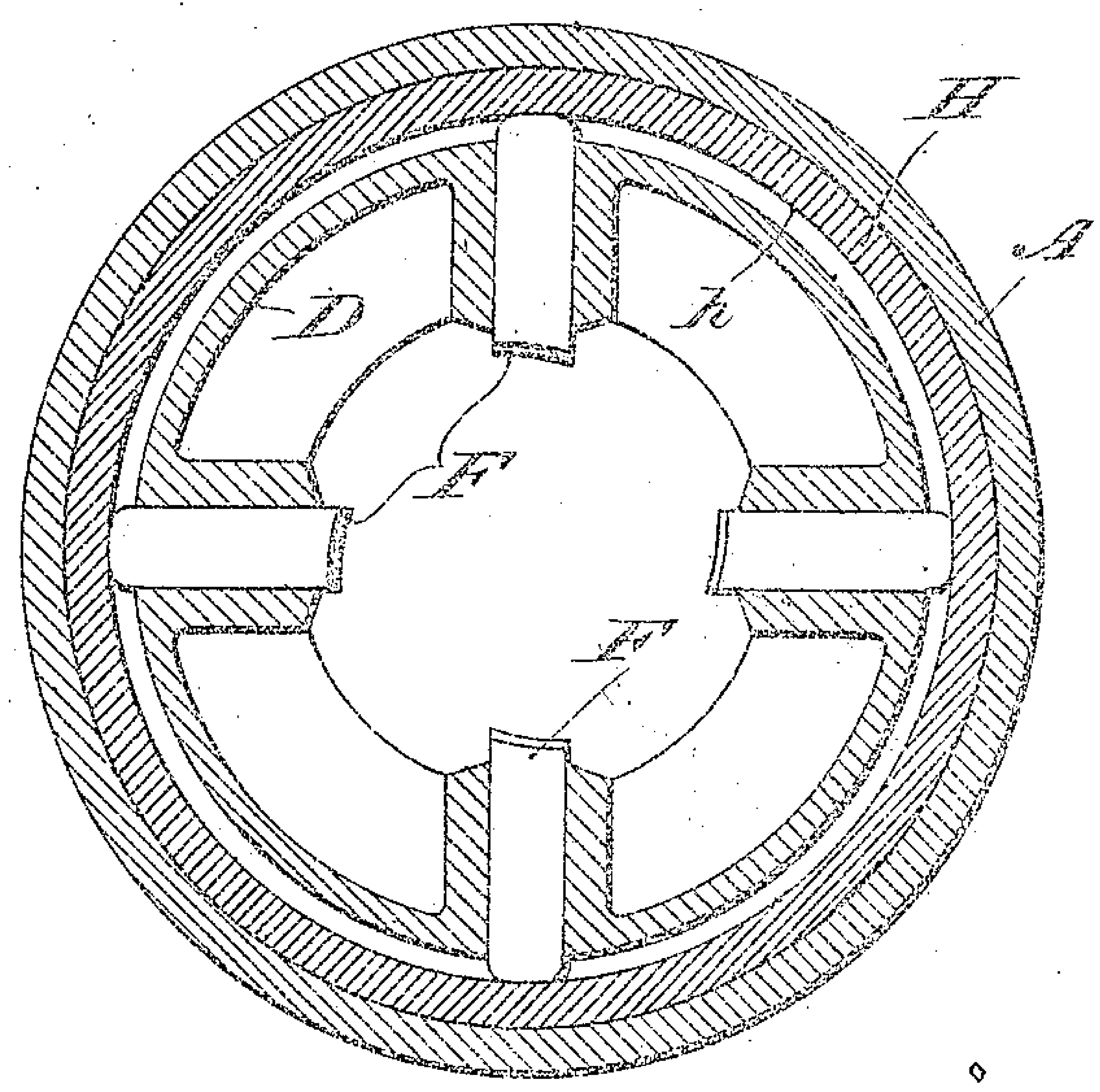


Fig. 8.

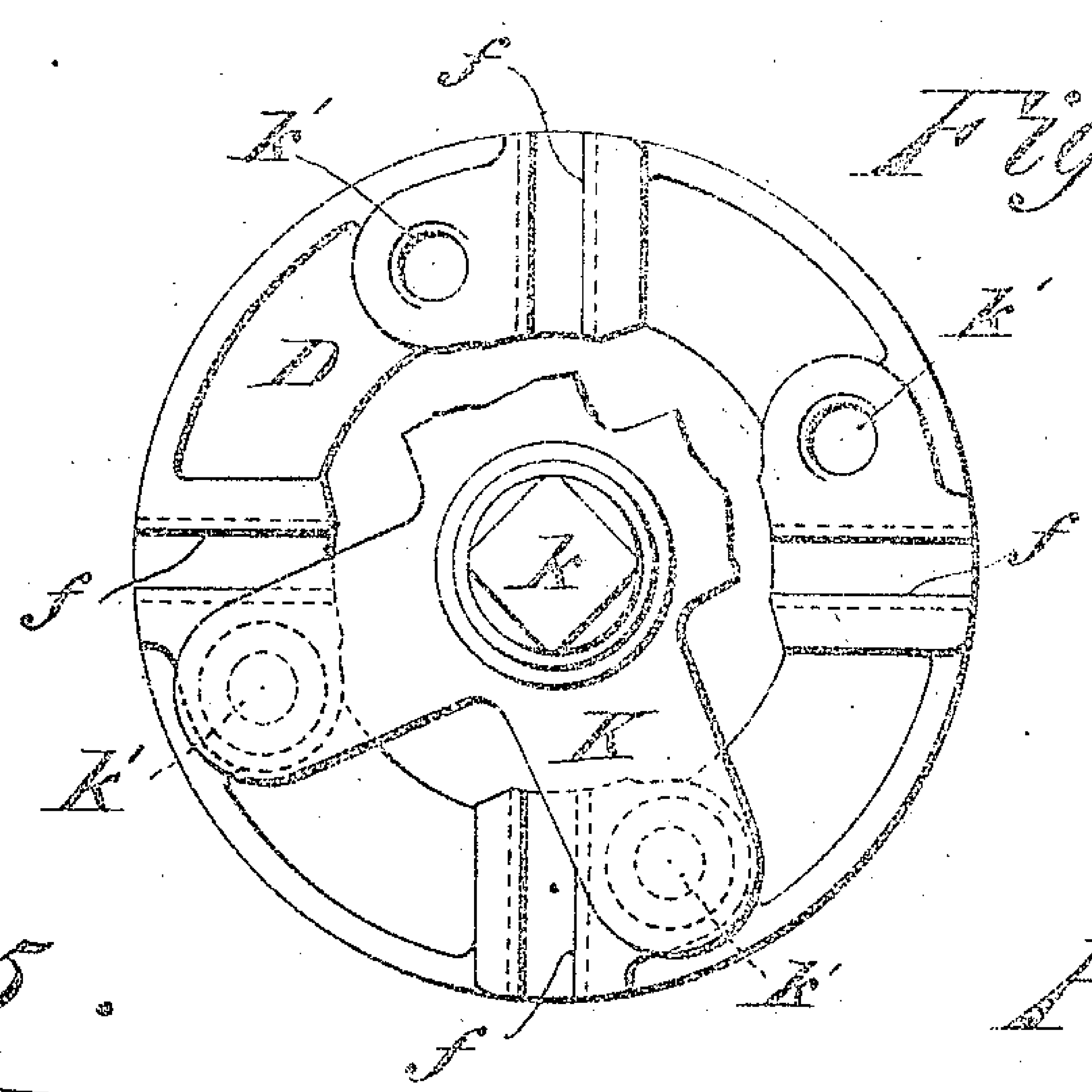


Fig. 5.

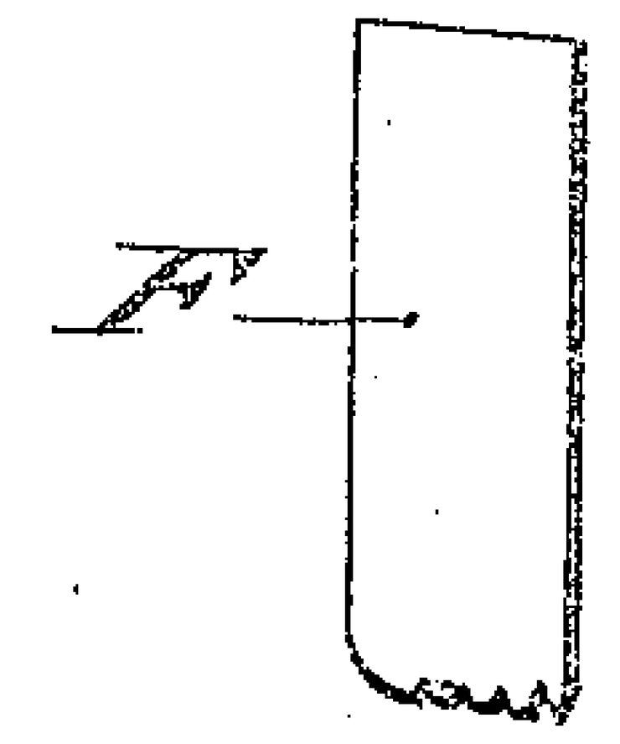
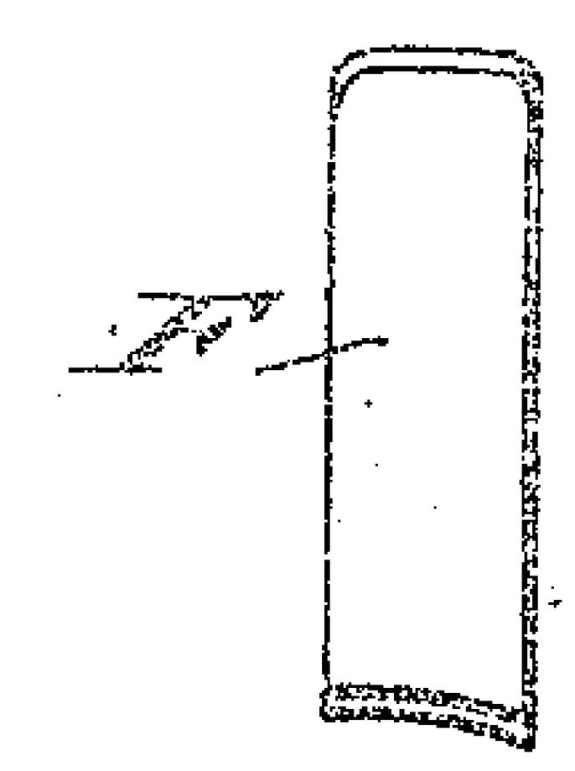


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 9.

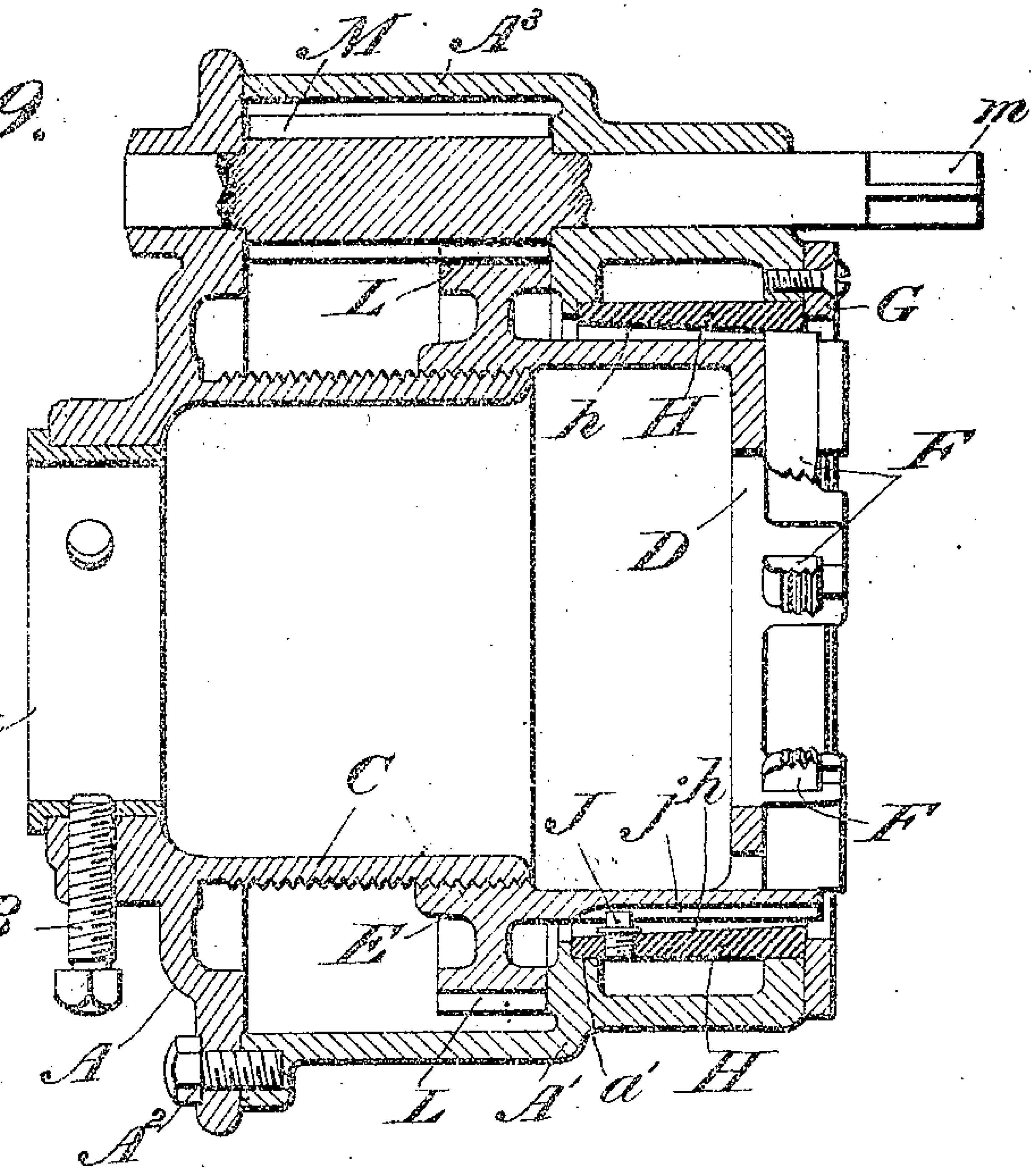
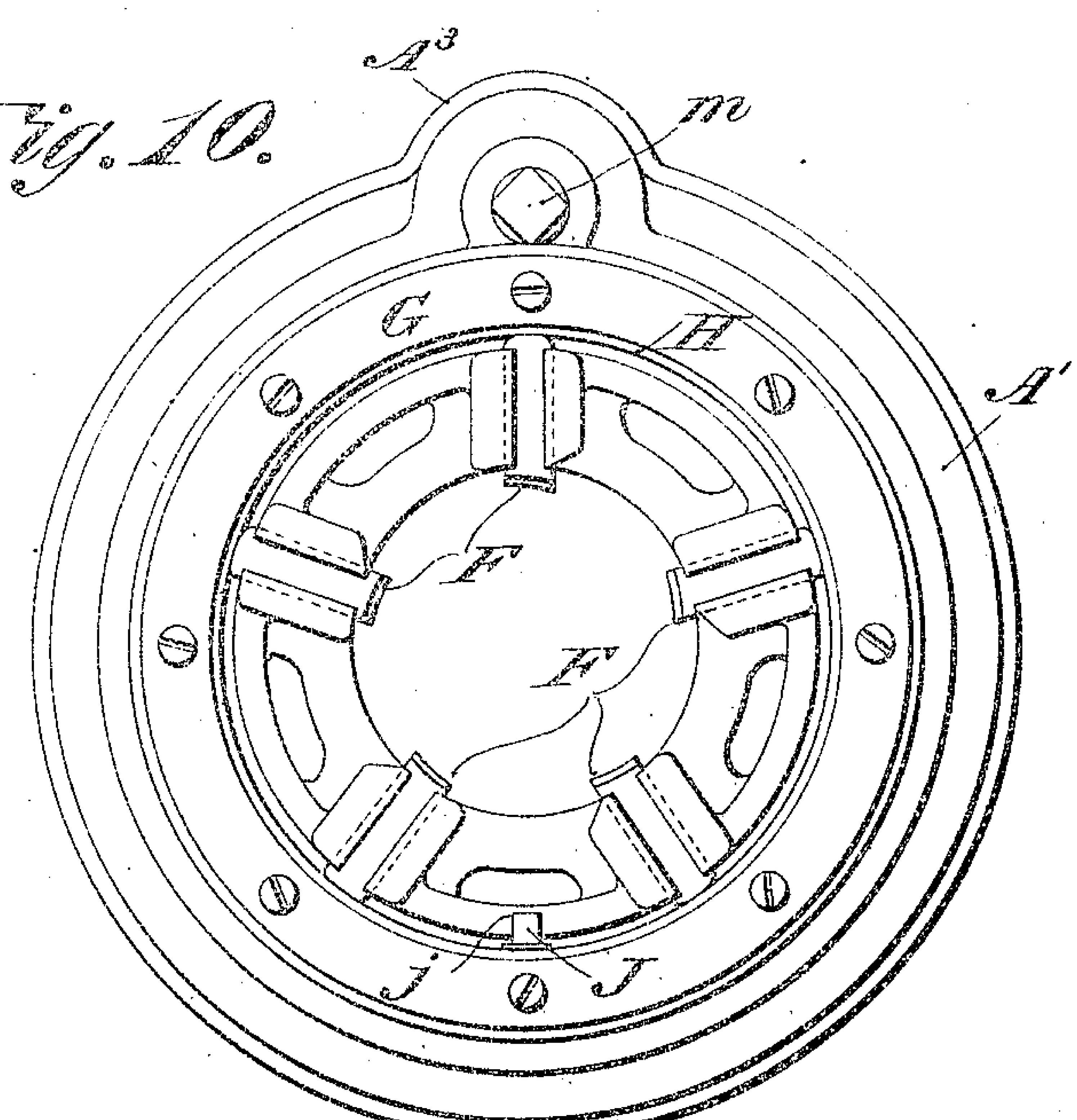


Fig. 10.



WITNESSES

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his Attorneys.

UNITED STATES PATENT OFFICE.

ALBERT L. ROBBINS, OF SANDUSKY, OHIO, ASSIGNOR TO THE SANDUSKY FOUNDRY & MACHINE COMPANY, OF SANDUSKY, OHIO, A CORPORATION OF OHIO.

PIPE-THREADING MACHINE.

No. 887,741. Specification of Letters Patent. Patented May 12, 1908.

Continuation of application Serial No. 357,195, filed February 13, 1907. This application filed November 20, 1907. Serial No. 403,031.

To all whom it may concern:

Be it known that I, ALBERT L. ROBBINS, a citizen of the United States, residing at Sandusky, in the county of Erie and State of Ohio, have invented certain new and useful Improvements in Pipe-Threading Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to pipe-threading machines and particularly those adapted for cutting taper threads.

The object is to simplify and perfect the mechanical construction, and increase the accuracy and efficiency of operation, of machines of the character stated.

An especial object of my invention is to provide improved means for accomplishing the gradual recession of the screw-cutting dies, as the work progresses, in order to produce the desired taper-cut. Various means have heretofore been devised for this purpose, including levers or other instrumentalities operatively-connected with the dies for retracting them, or inclined or tapered pins, guides or abutments at the backs of the dies allowing them to recede as the die-stock advances on the pipe or other object which is being threaded. These devices, besides entailing a multiplicity of elements where a plurality of dies are used, have moreover been very difficult to construct with the degree of accuracy required in order to obtain the exact centering of the dies which is essential to proper operation; and they have necessitated extreme precision in machining and assembling the parts. As well understood, the several dies carried by the stock must maintain equal distances from the center of the work, in order to bear evenly or uniformly upon the pipe and prevent the work from falling chiefly upon only one or two dies of the set; and, even with careful workmanship, it has been hard to attain this precision or accuracy in the setting or adjustment of the dies, in the case of a receding die machine, owing to the difficulty of setting each die and its associated tapered abutment or retracting instrumentality in an exactly proper relation to every other die, and effecting the uniform recession of the several dies. My present improvement obviates these difficulties; it materially simplifies the construction, reduces the number of parts, enables them to be easily milled or turned in a lathe, and insures absolute accuracy in the centering of the dies and precision in the work performed; while also providing a more durable and practicable device than heretofore.

Without restricting myself to any specific embodiment, the invention will hereinafter be fully described by reference to the accompanying drawings (which are to be taken as a part of this specification), and will then be more particularly pointed out and defined in the claims following the description.

In said drawings, Figure 1 is a central longitudinal section of one form or type of machine embodying my invention, this form being more especially suitable for the smaller sizes of machines. Fig. 2 is a cross-section of the same, taken through the die-stock. Fig. 3 is a front view of the die-stock, with a portion of its operating device broken away. Fig. 4 is a perspective of a fragment of the die-stock, in which is formed a longitudinal groove for engagement with or by a stud carried by a revoluble conical sleeve which surrounds the die-stock, said groove being partly formed in an extension on the periphery of the die-stock. Fig. 5 is a side view of one of the dies, and Fig. 6 is a plan view of the same. Figs. 7 and 8 are views similar to Figs. 2 and 3 respectively, but omitting the key-and-groove connection shown in said former figures for positively revolving the conical sleeve with the die-stock. Fig. 9 is a central longitudinal section, on a reduced scale, of another form or type of machine embodying my invention, this form being more especially adapted for the larger sizes of machines, intended for threading large pipes or rods, where it is desired to perform the operation with a relatively small expenditure of power. Fig. 10 is a front view of the machine shown in Fig. 9.

The type of machine herein selected for illustrating my invention comprises a revolving die-carrying head having a tubular feed-screw in engagement with a lead-screw in or on a stationary work-holder, the latter being shown as constructed with an annular casing surrounding the die-head. The invention is however applicable to various types of machines, and it may be mentioned is not de-

pendent upon any specific construction and arrangement of the die-head and work-holder, nor upon any particular means for advancing the die-head as the work progresses, the screw-connection being shown however as the preferred means in this class of machines.

In this specification and in the claims appended thereto the term "revoluble" as applied to the die-stock or die-carrying head will be understood as used in a relative sense, indicating that the die-head is revoluble relatively to the work-holder; and such term is also intended to apply equally to a construction wherein the die-head is stationary while the work is revolved, one being regarded as the equivalent of the other.

The two machines illustrated respectively on Sheets 1 and 3 of the drawings are substantially similar in principle, so that a general description will apply to both. The main difference between them resides in the operating or driving means; the smaller machine shown on Sheet 1 being operated by a wrench, crank or lever applied to an axial stem on the die-head; while the larger machine shown on Sheet 3 is operated by a similar instrumentality applied to the shaft of a pinion meshing with a gear on the die-stock, whereby a relatively slow motion is imparted.

As represented in the drawings, the work-holder A is an annular body or casing, in the contracted neck *a* of which the pipe, rod or other object to be threaded may be clamped and centered in the customary manner, as by means of set-screws B. The said work-holder or casing A contains the revoluble die-stock or head D, and is interiorly constructed or provided with a tubular lead-screw C which is engaged by the tubular feed-screw E of the die-stock, to effect the progression or advance of the dies on the pipe or other object as the die-stock is turned. In Fig. 1, the casing is shown as an integral body, having an enlarged annular front portion A′ inclosing the die-stock, and the lead-screw C is shown as a female thread formed in the intermediate portion of the casing; while in Fig. 9 the casing is shown constructed in two parts, A and A′, bolted together as at A^2, while the lead-screw C is a male thread on a tubular projection from the part A or work-holder proper, encircled by the part A′.

The die-stock D, within the casing, is an annular head or plate carrying a series of radially movable screw-cutting dies or chasers F, projecting inwardly and adapted to be brought into engagement with the pipe or other object and cut a screw-thread thereon, as the die-stock in turning is advanced by engagement of its feed-screw E with the lead-screw C. Said dies or chasers F are or may be slidably fitted in radial slots or guideways *f* therefor in the said head or die-stock D, and the backs or outer ends of the dies project beyond the outer periphery of the head. It may be noted that the slots *f* can easily be cut by running a milling tool radially through the annular head from its inner to its outer periphery. The term "radial" is not intended to be construed absolutely, as confined to a construction wherein the dies are arranged in strictly radial lines, but such term is employed to denote the general disposition of the dies. The plural term "dies" is also intended to include the singular. The die-stock is encircled by an annulus or sleeve H, having an interior conical surface *h* against which the backs of the dies abut. In the particular machine represented herein, said sleeve or "cone" H is revolubly fitted to or seated in the casing A, or the part A′ of the casing, being shown seated in an annular rabbet *a′* and held in place by a retaining-ring G fastened on the front of the casing; whereby said sleeve H is held from axial or longitudinal movement relative to the work-holder. Said conical sleeve is revoluble with the dies, and for this purpose a suitable means may be provided, as for example a key-and-groove connection between the conical sleeve and the die-head. As shown, the head of an internal screw or stud J, carried by the sleeve or cone H, engages in a longitudinal groove, *j* in the outer periphery of the die-stock. In the smaller machine shown in Figs. 1 and 2, the groove *j* may be formed partly in an extension *d* on the periphery of the die-stock, in order to provide an adequate length of groove, as illustrated in the detail Fig. 4; while in the larger machine shown in Fig. 9, the die-stock itself is of sufficient length to provide the groove. However, such key-and-groove connection is not essential, since in operation the pressure or thrust of the dies against the conical member H will of course revolve the latter with the dies, while allowing the dies to traverse the conical surface in longitudinal paths, that is longitudinally of the conical member. I have therefore, by way of example, reproduced in Figs. 7 and 8 the construction shown in Figs. 1 and 2, omitting the key-and-groove-connection in said Figs. 7 and 8. The construction shown in these latter figures is preferred, because in addition to saving the expense of providing said key-and-groove connection, the further advantage is gained that the dies will at each thread-cutting operation track down the conical sleeve over different surfaces, as will be referred to later.

In operation, the dies F being in engagement with the pipe or other object clamped in the work-holder, as the work progresses by advance of the revolving die-head, the backs or outer ends of the dies move longitudinally along the interior conical surface *h* of the sleeve H, which as aforesaid revolves with the dies; and thus a gradual adjustment of

the dies ensues as required to cut a tapered thread. In the illustrated machine, where the dies recede as the work progresses, the inclination of the conical surface *h* is outward toward the back of the machine, or in a direction to allow such receding of the dies, the latter being forced outward by the resistance of the screw-cutting operation.

By this simple device, a highly efficient means is afforded for insuring the cutting of an accurate tapered thread, the several dies being exactly centered, while at the same time gradually receding as they pass along the enlarging conical surface of the encircling sleeve. As will be seen, the machine is practically as simple in construction as one for cutting threads of uniform diameter, since it involves the single additional element H. The sleeve H, as well as its annular seat *a'* in the casing, can readily be milled or turned in a lathe, which insures accuracy, and when the dies are inserted in the stock they are of course correctly centered; and the difficulty of machining a number of parts, and setting and adjusting each die with respect to a separate abutment or retracting instrumentality, is obviated, as well as the extreme precision and consequent expense demanded in manufacturing such device.

A further advantage is that the sleeve H may be angularly adjusted relative to the dies or turned at a different position relatively to the die-stock, so as to present fresh and unworn surfaces to the backs of the dies. For this purpose, in the case of a machine constructed as in Figs. 2 and 3 or Figs. 9 and 10, it is merely necessary to change the location of the stud or screw J, one or more screw-holes *j'* being provided therefor at different points in the cone or sleeve H. But where the key-and-groove connection is omitted, as in Figs. 7 and 8, the angular adjustment of the sleeve is automatic, for at the completion of each thread-cutting operation, and when the die-stock is turned back or reversed to begin a new operation, the dies will start on new paths or surfaces down the conical sleeve.

It will be noted that the backs of the dies are inclined to conform with the conical surface of the sleeve H, as shown more clearly in Fig. 5, which is a side view of one of the dies, and they are also rounded transversely or in plan view, as shown in Fig. 6, so that the dies present rounded surfaces in contact with the sleeve, thereby reducing friction and making a better mechanical construction.

For turning the die-stock, in the case of the smaller machine shown in Figs. 1 and 2, a stool-like device or spider K is attached on the front of the die-stock or head D, and is provided with an axial stem *k* which may be squared or polygonal to receive the angular socket of any suitable type of wrench, handle, lever or crank. This device, affording an axial connection for the operating instrumentality, is adapted to enter the casing and to receive the end of the pipe or other object as the die-stock advances in the screw-cutting operation. As shown, the legs of the spider are secured by bolts or lag-screws to suitable screw-holes *k'* in reinforced portions of the die-carrying head.

In the case of the larger machine shown in Figs. 9 and 10, the die-stock is constructed or provided with an external gear L, which meshes with an elongated pinion M mounted in a housing A^3 therefor formed as a part of the casing A. The shaft of such pinion is formed with a squared or angular stub *m* for engagement by a wrench, crank-lever or other operating instrumentality. When the pinion M is turned, a relatively slow motion is imparted to the die-stock through the medium of the gear L, and as the die-stock advances its gear L moves longitudinally along the pinion M, as well understood. This construction is preferably employed for larger sizes of machines, where it is desired to perform the operation with a relatively small expenditure of power.

I do not intend to restrict the use of my invention to pipe-threading, since the same may be applied to threading other objects, as rods, etc.

I claim:

1. The combination of a revoluble die-carrying head adapted to advance as it is revolved, and a conical member revoluble therewith but not axially-displaceable, said conical member affording an abutment for the rear ends of radially-movable dies carried by said head to permit recession of the dies as the head advances, and said conical member being angularly-adjustable with relation to said head, for the purpose described.

2. In a thread-cutting machine, a work-holder and a die-carrying head, means whereby they are caused to approach each other when one of them is revolved, combined with an interiorly tapered sleeve or annulus surrounding and adapted to contact with the rear ends of radially-movable dies carried by said head, said sleeve being mounted loosely or revolubly but not axially-displaceable relative to said work-holder, whereby the dies traverse longitudinal paths on said tapered sleeve and thereby recede gradually as required to cut a tapered thread.

3. A work-support and a die-carrying head having a screw-threaded connection whereby they may be caused to approach each other by revolving one upon or within the other, combined with a sleeve or annulus revolubly seated in a recess in said work-holder and having a conical inner surface adapted to contact with the rear ends of radially movable dies fitted in said head and thereby gradually adjust the dies as required to form a tapered screw, the dies traversing said con-

ical surface only in an axial or longitudinal direction.

4. In a pipe-threading machine, the combination of a revoluble die-stock carrying a radially recessive screw-cutting die or dies, means for advancing said die-stock as it is turned, and an annular member revoluble with the die-stock but not longitudinally movable, said member having a conical inner surface against which the backs of the die or dies directly abut, thereby allowing a gradual recession of the dies.

5. The combination of a revoluble die-stock adapted for holding radially recessive thread-cutting dies or chasers, means for advancing said die-stock as it is turned, an interiorly conical annulus or sleeve surrounding said die-stock and revoluble therewith but not axially displaceable, said annulus or sleeve affording an abutment for the backs or outer ends of the dies and thereby permitting recession of the dies as the die-stock advances, and said annulus or sleeve being angularly adjustable with relation to said die-stock, for the purpose described.

6. The combination of a work-holder having a tubular lead-screw, an annular die-stock having a tubular feed-screw engaging with said lead-screw and having radially-disposed ways for a recessive die or dies, an interiorly conical annulus or sleeve surrounding said die-stock and affording an abutment for the backs or outer ends of the die or dies, said sleeve being revoluble but not axially displaceable, and a pin and longitudinal groove-connection between said sleeve and die-stock, whereby said sleeve is caused to revolve with the die-stock while allowing the latter to advance axially within said sleeve, thereby effecting a gradual recession of the die or dies by virtue of their axial advance in contact with the conical surface of said sleeve.

7. The combination of a tubular casing constituting a work-holder and having a lead-screw therein, a revoluble die-stock arranged within said casing and having a tubular feed-screw engaging with said lead-screw, a sleeve having an interior conical surface encircling the die-stock and revolubly seated in said casing but held against axial movement, said die-stock having radial slots or guideways for a screw-cutting die or dies, the backs or outer ends of which die or dies abut against said conical surface, and a pin and longitudinal slot-connection between said sleeve and die-stock, substantially as and for the purposes described.

8. In a pipe-threading machine, the combination of a tubular work-holder having a leed-screw therein, an annular die-stock inclosed within said work-holder and having a feed-screw engaging said lead-screw, and a stool-like device or spider attached on the front of said die-stock having an axially-disposed stem to receive a turning instrumentality, said spider adapted to enter said work-holder and to inclose or pass over the end of the pipe being threaded as the die-stock advances axially in the work-holder:

In testimony whereof I affix my signature, in presence of two witnesses.

ALBERT L. ROBBINS.

Witnesses:
W. H. MILLSPAUGH,
SIDNEY FROHMAN.