

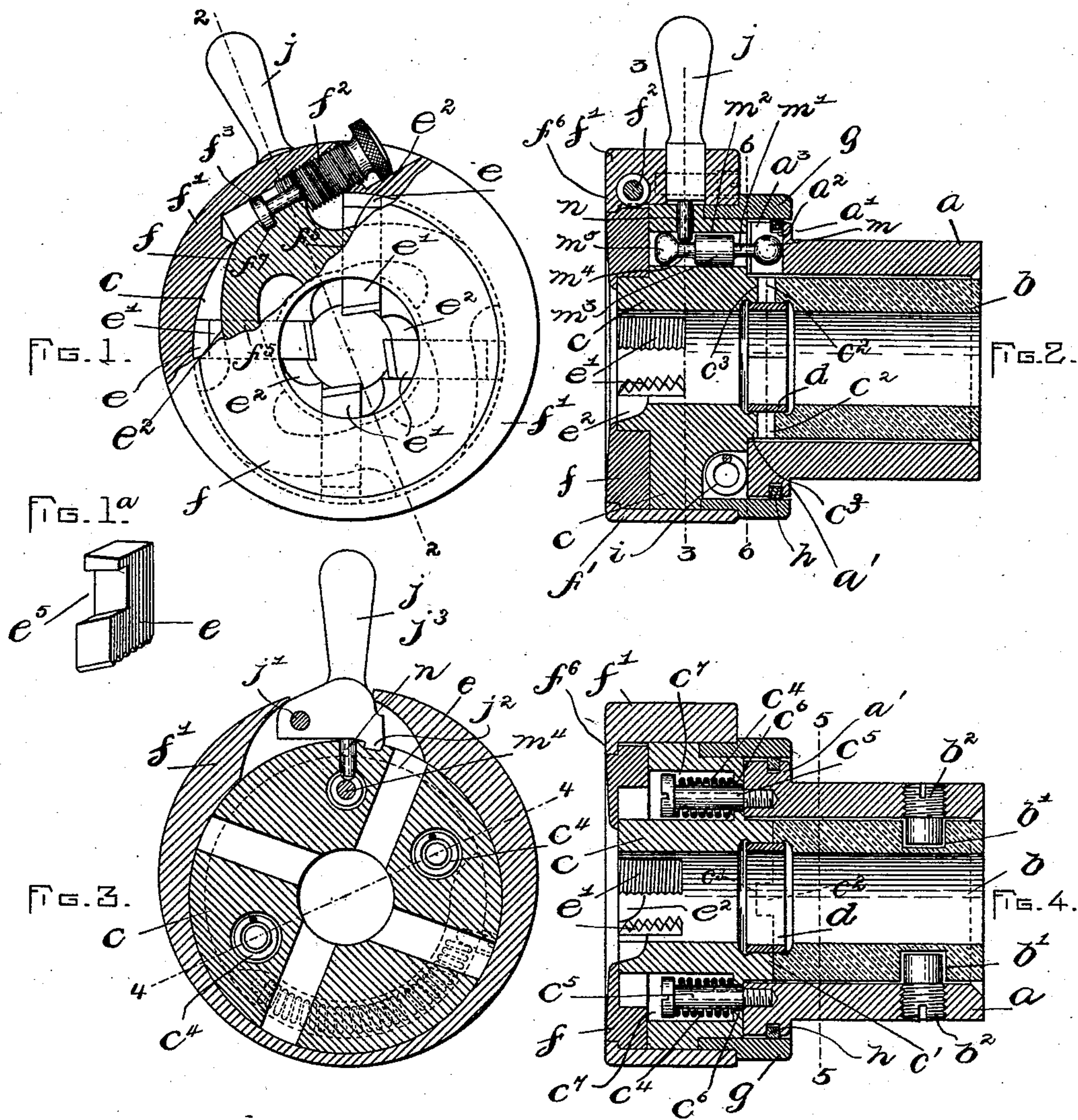
(No Model.)

2 Sheets—Sheet 1.

J. HARTNESS.
SCREW CUTTING DIE.

No. 529,169.

Patented Nov. 13, 1894.



WITNESSES:

A. D. Harrison
J. P. Davis.

INVENTOR:

James Hartness
by Knight Brown Crossley
Attys.

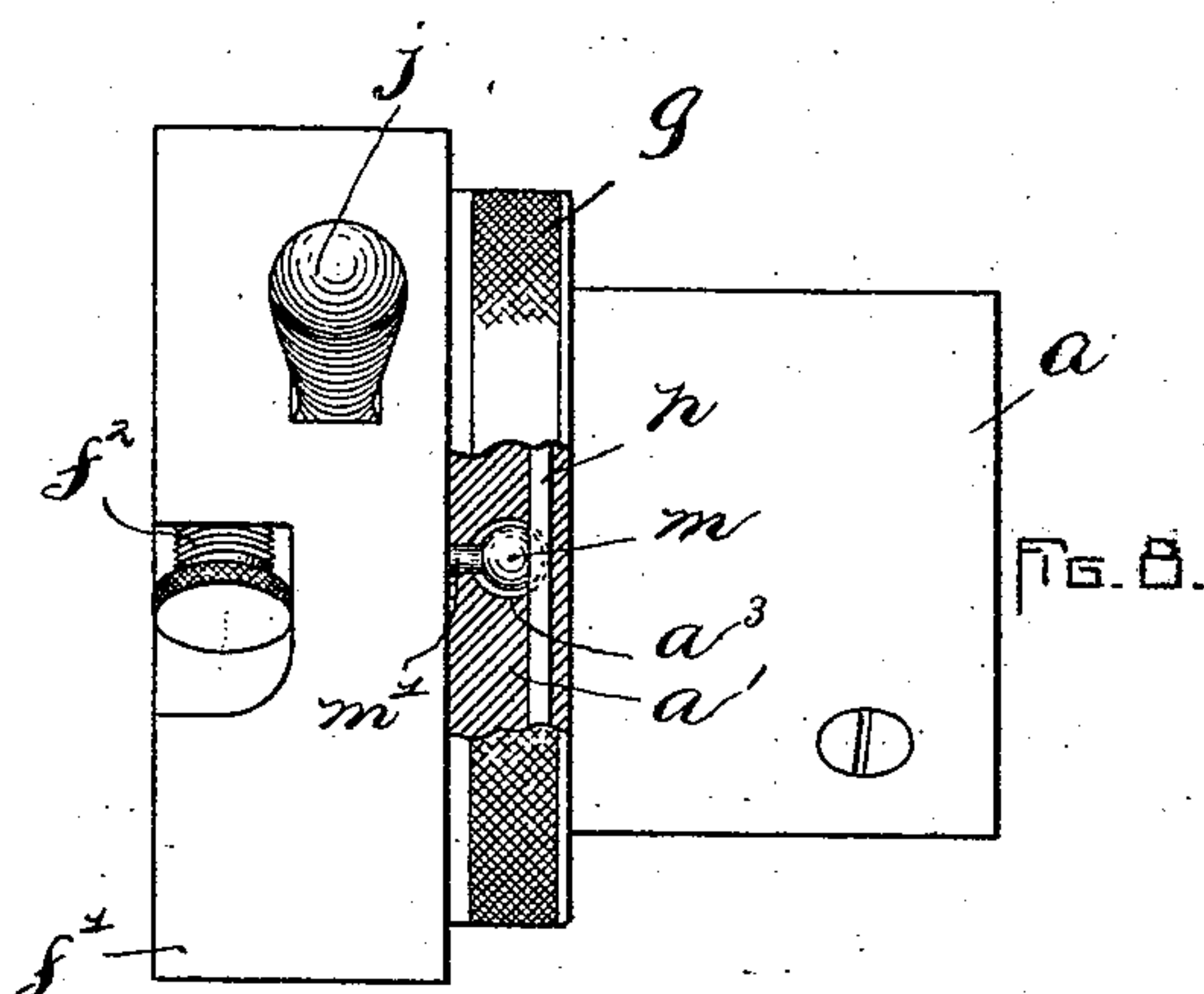
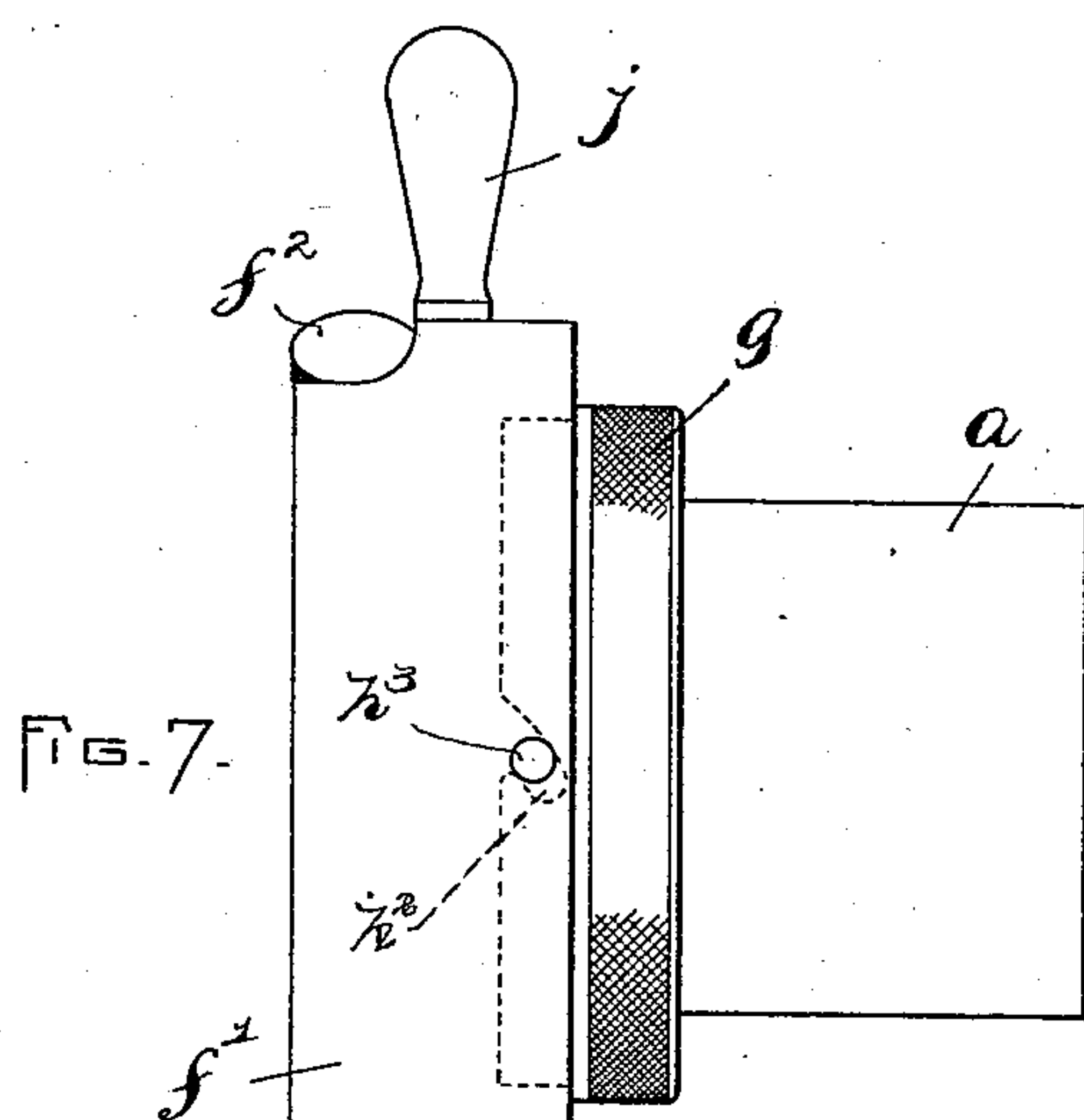
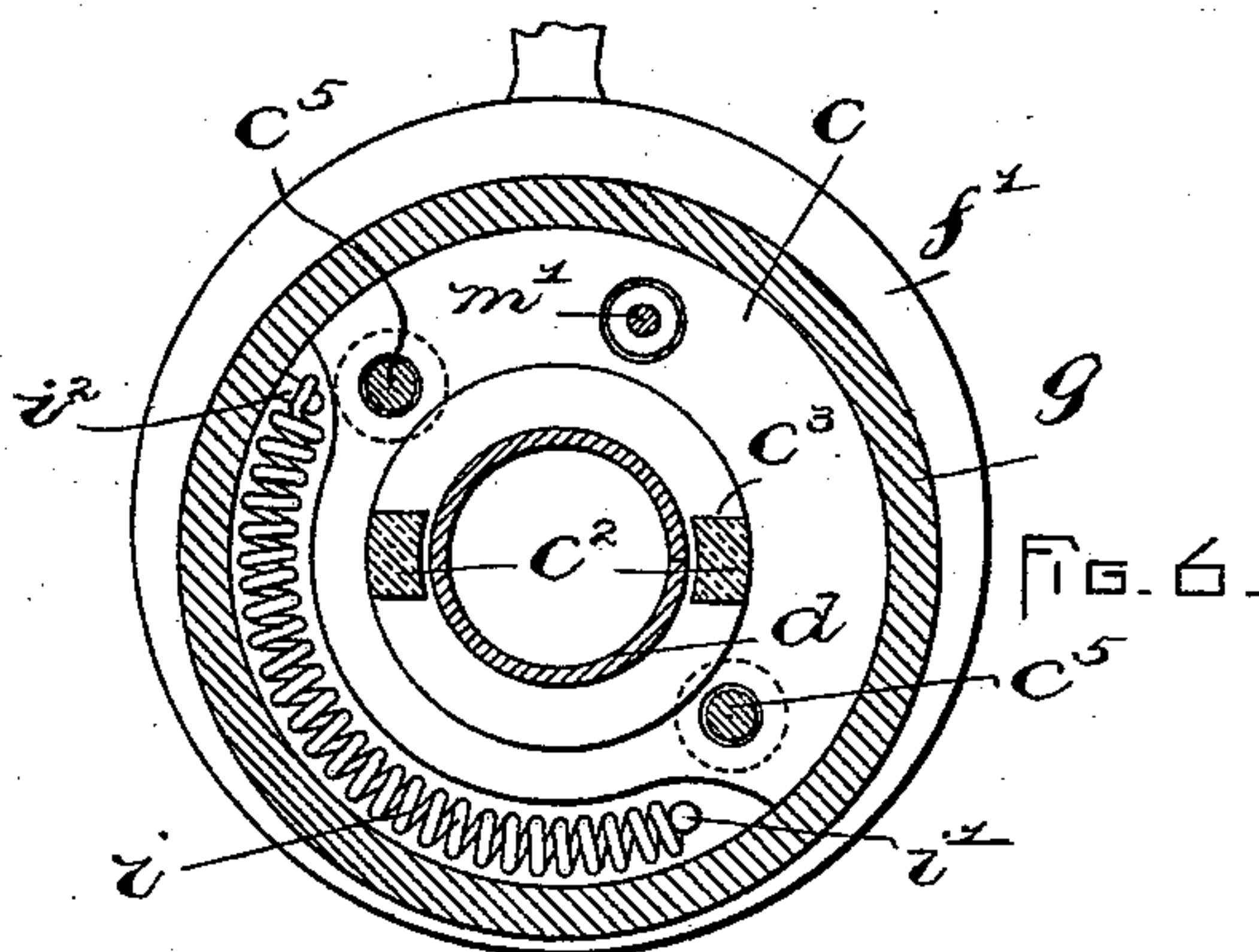
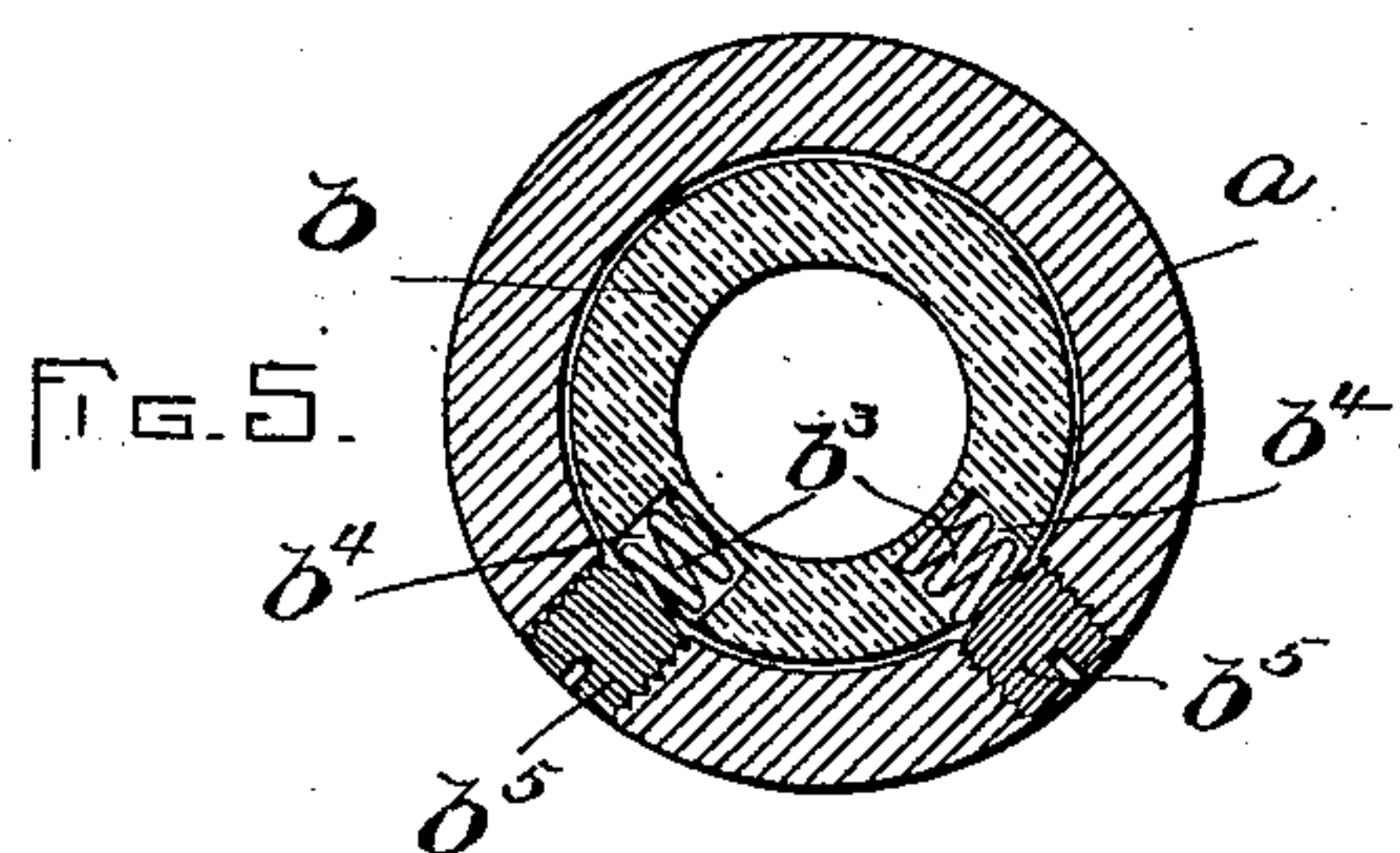
(No Model.)

2 Sheets—Sheet 2.

J. HARTNESS.
SCREW CUTTING DIE.

No. 529,169.

Patented Nov. 13, 1894.



WITNESSES:

A. D. Harrison.

J. P. Davis.

INVENTOR:

James Hartness
by Knight Brown & Crossley
Atty.

UNITED STATES PATENT OFFICE.

JAMES HARTNESS, OF SPRINGFIELD, VERMONT.

SCREW-CUTTING DIE.

SPECIFICATION forming part of Letters Patent No. 529,169, dated November 13, 1894.

Application filed January 9, 1894. Serial No. 496,260. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARTNESS, of Springfield, in the county of Windsor and State of Vermont, have invented certain new and useful Improvements in Screw-Cutting Dies, of which the following is a specification.

This invention relates to certain improvements in screw-cutting dies, and the main object in view is to obtain greater accuracy in screw-cutting than is possible with the dies heretofore devised.

The greatest essential to accuracy in screw-cutting is a perfect alignment of the axis of the die and the work, and hitherto it has been found practically impossible to maintain such an alignment. It is well known that, if a die is started on its work at or nearly at the correct angle, it will follow the work, if free to do so, and will assume a position with its axis in alignment with the axis thereof. I therefore contemplate the construction of a die without a fixed axis, but capable of assuming the position which the work demands, at the same time providing for rigidity of the die with regard to the direction of the cutting strain, and herein my invention may be said to chiefly reside.

The invention has also in view certain improvements relative to the construction of opening dies.

The accompanying drawings illustrate a construction which embodies the invention.

Figure 1 shows a front elevation of the die, represented as broken out at one place, with parts in section thereat. Fig. 1^a represents a perspective view of one of the die-cutters. Fig. 2 shows a longitudinal section on line 2—2 of Fig. 1. Fig. 3 shows a cross-section on line 3—3 of Fig. 2. Fig. 4 shows a section on line 4—4 of Fig. 3. Fig. 5 shows a cross-section on line 5—5 of Fig. 4. Fig. 6 shows a cross-section on line 6—6 of Fig. 2. Fig. 7 shows a side elevation of the die. Fig. 8 shows a top plan view of the die, represented as broken out at one place, with parts in section thereat.

The same letters of reference indicate the same parts in all the figures

In the drawings: the letter *a* designates a cylindrical support or holder, designed to be stationarily mounted on the turret or other carriage of a lathe, or applied to a suitable part of a bolt-cutter, drill-press or other ma-

chine. Said holder is preferably formed with an annular flange *a'* at its forward end, in which flange is a peripheral groove *a*², and a radially-extending slot or slide-way *a*³ (Figs. 2 and 8), the office whereof will appear hereinafter.

e' e', represent the thread-cutters or chasers, which are carried by a die-body, here shown as composed of two members *b c*, one of which, *b*, is in the form of a cylinder and occupies the bore of the holder *a*, and in accordance with this invention is capable of universal lateral play in said holder to a limited extent, said member *b* being loosely fitted to the holder with clearance all around, as shown in the drawings. The member *b* is engaged with the holder *a* by means of studs *b*², fastened in the holder and projecting into pockets *b'* formed in the member *b*, said pockets being of suitable size to permit the desired universal play of the member.

When the die is used in a horizontal position, the weight of the body is counterbalanced by means of cushions, in the form of helical springs *b*³ (Fig. 5), contained in pockets *b*⁴ formed in the member *b* and bearing against screws *b*⁵ fastened in the holder. When the die is disposed vertically, these springs will not be found necessary. The other member, *c*, of the die-body is of annular form, and bears against the front end of the holder *a*, and has a flange *c'* (Figs. 2 and 4), which enters the bore of the holder and bears against the front end of the member *b*, the same clearance being allowed around the said flange as around the member *b* and for the same purpose. The two members are rotatively connected by means of lugs *c*² (see Fig. 2 and dotted lines in Fig. 4) on the member *b*, and notches *c*³ in the flange *c'* engaged by said lugs, this construction permitting longitudinal movement of the member *c* with respect to the member *b*, but no rotative movement of the one without the other.

When the die is horizontally disposed, the member *c* is yieldingly held against the member *b* and holder *a* by springs *c*⁴ (Fig. 4), which surround screws *c*⁵ fastened in the holder, said screws extending through openings *c*⁶ in the member *c* and into pockets *c*⁷ in the latter, the springs bearing against the base of the pockets and the heads of the screws.

It is to be noted that the openings c^6 are of a size giving clearance all around the screws.

The springs c^4 , like the springs b^3 , will not be necessary when the die is disposed vertically. Said springs should be stiff enough to only overcome the gravity of the die-body and hold the same against the perpendicular face of the holder. The joint occurring where the two body-members b c abut is effectually closed to exclude dirt and chips, by a flat resilient band d (Figs. 2 and 4), sprung into a recess in the wall of the central opening of the body.

The member c is provided in its face with diverging slots e (Figs. 1 and 3), which receive the thread-cutters or chasers e' , and with segmental concavities e^2 (Fig. 1) adjacent to the slots to permit the escape of the chips from the die. The cutters e' are provided with transverse grooves e^5 (Figs. 1 and 1^a), which receive the acting portions f^5 of a cam f , the latter being fitted to turn on a seat formed for it on the die-body. Rotative movement of the cam in opposite directions moves the cutters e' from operative to inoperative adjustment and vice versa, or, in other words, opens and closes the die. The cam is embraced by a sleeve or cam-holder f' , which is fitted to rotate on the member c of the die-body, said cam-holder having a shoulder f^6 projecting over the front of the cam. Said cam-holder and cam are adjustably connected by means of a screw f^2 (Figs. 1 and 2), engaged with a screw-threaded bore in the cam-holder and having a head f^3 engaging a groove f^7 in the cam, so that upon turning said screw the cam may be adjusted in the cam-holder and the cutters correspondingly adjusted.

To automatically open the die, I provide a ring or collar g , which is fitted to turn in an annular recess between the cam-holder f' and the body-member c , a portion of said collar projecting outside of the cam-holder, and being knurled at this part to facilitate manipulation of the collar. The desired clearance is allowed between the collar and the holder a , and the joint between said collar and the holder a is closed by a packing-ring h , occupying a groove a^2 in the holder a , and pressing outward against the collar. The latter is formed in that portion which fits between the cam-holder and the die-body, with obliquely-extending slots h^3 , which embrace pins h^3 fastened in the sleeve f' and thereby hold the latter on the body.

A spiral spring i is contained in a curved cavity in the rear side of the body-member c , and bears at one end against a pin i' fastened in the latter, and at the opposite end against a pin i^2 fastened in the collar g , so that said spring exerts a constant pressure in a direction to advance the oblique slots of the collar upon the pins in the cam-holder, thereby locking the collar and the cam-holder tightly together and also rotating the cam to open the die.

The die is closed by rotating the cam-holder

against the tension of the spring i , and for this purpose the cam-holder f' is equipped with a handle j , by which it may be partly rotated. Said handle serves also to move a detent j^3 (Fig. 3), which is adapted to hold the die closed, said detent being pivoted at j' (Fig. 3) to the holder f' , and having a lug j^2 for engagement with a notch in the body, the handle being formed on the detent.

Means are provided through the medium of which longitudinal movement of the member c effects the disengagement of the detent, said means including a pin, comprising a spherical end m (Figs. 1 and 8) engaging the radial slot a^3 in the holder, a neck m' extending through the narrow front of the said seat and into a bore m^2 in the member c , an enlarged cylindrical central part m^3 loosely fitting said bore, a neck m^4 , and a conical head m^5 beyond the latter.

A short tappet-rod n (Figs. 2 and 3) has a sliding engagement with the body-member c , and one end normally bears against the neck m^4 when the die is closed, while the other end bears against the detent j^3 . It will be seen that an outward longitudinal movement of the body-member c will cause the rod n to ride on the conical head m^5 and be thrust outward thereby and caused to disengage the detent from the die-body.

It is to be noted that all parts making up the die proper are closely fitted together, while there is no part of the die proper which closely fits the holder. This gives the die proper a latitude of independent adjustment, permitting it to adjust itself to the work and assume an axial adjustment with regard thereto irrespective of the holder's axis. By this arrangement, I am enabled to obtain a more nearly perfect alignment of the axis of the work and the die than has hitherto been possible.

It will be observed that the die is at all times rigidly held against the cutting strain by the engagement of the die-body with the holder through the studs b^2 and pockets b' (Fig. 4).

In the operation of the die, it is crowded on to the work with the cutters closed, the work being rotated and the holder fed forward along the work as usual in machines of this class. When the forward movement of the holder ceases, the member c of the die-body and the cutters thereon continue to be moved forward by the continued rotation of the work until the detent j^3 is disengaged, in the manner previously described, whereupon the spring i forces the cutters outwardly through the described intermediate means, and the operation ceases.

The connection between the cam f and the cam-holder f' afforded by the screw f^2 enables the cam to be turned independently of the holder for a more or less fine or minute adjustment of the cutters, and also enables the holder and cam to be moved together for a quick adjustment.

It is evident that the invention may be embodied in other forms than here shown, and is not therefore limited in this respect.

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

1. A screw-cutting die comprising a support or holder, a cutter-carrying body held thereby, and connections between the support and body with provisions rendering the latter capable of lateral movement bodily in the support to adjust itself axially with respect to the work without necessarily changing the angular relation of its axis and that of the work.

2. A screw-cutting die comprising a support or holder, a cutter-carrying body held thereby, connections between the support and body with provisions rendering the latter capable of lateral movement bodily in the support to adjust itself axially with respect to the work without necessarily changing the angular relation of its axis and that of the work, and means for yieldingly supporting the said body.

3. A screw-cutting die comprising a support or holder, a cutter-carrying body held thereby, and connections between the support and body with provisions rendering the latter capable of lateral movement bodily in the support to adjust itself axially with respect to the work without necessarily changing the angular relation of its axis and that of the work, while rigidly holding the die against rotary cutting strains.

4. An automatically-opening die, comprising a holder, a body therein, connections between the holder and body with provisions whereby the latter is yieldingly held against lateral strains, rigidly held against rotary cutting strains, and rendered capable of a longitudinal movement; adjustable cutters normally held in their open adjustment in said body; means for holding said cutters in their closed adjustment; and means operated by a longitudinal movement of the body for releasing the cutters and allowing them to assume their normal adjustment.

5. An automatically-opening die, comprising a holder or support, a die-body therein, connections between the holder and die-body with provisions whereby the latter is yieldingly held against lateral strains and rigidly held against rotary strains, and rendered capable of longitudinal movement, radially-movable cutters, automatic means for moving said cutters to their open adjustment, and locking-mechanism that holds the cutters in their closed adjustment and is released by a relative longitudinal motion of the die-body to its holder.

6. An opening-die, comprising a holder, a die-body, connections between the holder and die-body with provisions for permitting a slight lateral motion of the latter, cam-operated cutters or chasers fitting in radial slots in the face of said body, and means for re-

sisting cutting strains on the cutters and die-body.

7. A threading-die, comprising a holder having a face approximately perpendicular to the axis of the work, a die-body yieldingly held against said face, and connections between the holder and die-body with provisions permitting an independent lateral movement of the latter while rigidly holding the die against rotary cutting strains.

8. An opening die comprising a holder, a spring-supported die-body, and means of connection between the holder and die-body with provision for rigidly resisting cutting strains and for bodily movement of the die-body to adjust itself to the work without changing the relative angularity of the axes of the die-body and work.

9. An adjustable screw-cutting die, with provisions to permit its taking the axial position of the work, without affecting the angular relation of its axis and that of the work, and provided with means for resisting the cutting strains.

10. An opening-die, provided with cam-operated cutters or chasers fitting in radial slots in the face of the die-body, a cam-holder engaged with said cam, and a spring-pressed locking-collar having means for engagement with said cam-holder.

11. An automatically-opening screw-cutting die, comprising in its construction a support or holder, a cutter-carrying body, connections between the holder and body with provisions rendering the latter capable of limited lateral play and also capable of independent longitudinal movement, while rigidity in the direction of the cutting strain is maintained, means for yieldingly resisting longitudinal movement of said body, and means controlled by the independent longitudinal adjustment of the body for simultaneously retracting or opening the cutters.

12. An automatically-opening die, comprising a holder, a die-body, cutters carried thereby, a rotative cam for opening and closing the cutters, a cam-holder engaged with the cam, a collar rotatable on the die-body and adapted to engage the cam-holder, a spring actuating the said collar and there-through tending to move the cam and its holder to open the die, and a detent for holding the cam in position to close the die.

13. An automatically-opening die, comprising in its construction a holder, a die-body supported therein, connections between the holder and body with provisions rendering the latter capable of independent longitudinal movement, radial cutters supported by said body, a rotative cam controlling said cutters, a spring tending to throw the cam to position to open the die, a detent for holding the cam against said spring, a pin engaged with the holder and held thereby from longitudinal movement and having a sliding engagement with the body, said pin having a tapered part, and a tappet-rod adapted to

ride on said tapered part under longitudinal movement of the body and disengage the detent.

14. A screw-cutting die, comprising a die-body having radial slots, cutters or chasers movable in said slots, a rotatable cam adapted to move the cutters to their open and closed adjustments, a cam-holder rotatable on the die-body, and an adjustable connection between said holder and cam whereby the latter may be minutely adjusted, the holder being adapted to be moved with the cam to effect a quick adjustment.

15. A screw-cutting die, comprising a die-body having radial slots, cutters or chasers movable in said slots, a rotatable cam adapted to move the cutters to their open and closed adjustments, a cam-holder rotatable on the die-body, an adjusting-screw engaged as described with the cam-holder and cam whereby the latter may be independently rotated, said screw constituting a connection between the holder and cam so that the two may be rotated together to effect a quick adjustment.

16. A screw-cutting die, comprising a die-body having radial slots, cutters or chasers movable in said slots, a rotatable cam adapted to move the cutters to their open and closed adjustments, a cam-holder rotatable on the die-body, an adjustable connection between said holder and cam whereby the latter may be minutely adjusted, the holder and cam being movable together to effect a quick adjustment of the cam, and a spring-pressed collar adapted to partially rotate said cam-holder.

17. A screw-cutting die, comprising a die-body having radial slots, cutters or chasers movable in said slots, a rotatable cam adapted to move the cutters to their open and closed adjustments, a cam-holder rotatable on the die-body, an adjustable connection between said holder and cam whereby the latter may

be minutely adjusted, the holder and cam being movable together to effect a quick adjustment of the cam, a spring-pressed collar adapted to partially rotate said cam-holder, a detent adapted to hold the cam-holder against the action of said collar, and means operated by a longitudinal movement of the die-body for displacing said detent.

18. A screw-cutting die comprising a holder, a two-part die-body, connections between one member thereof and the holder, connections between the two members of said body with provisions for independent longitudinal movement of one without disconnection of the two members, radially-movable cutters or chasers in the longitudinally-movable member, means for automatically moving said cutters outwardly to their open adjustment, a detent adapted to hold the cutters in their closed adjustment, and detent-displacing devices operated by a longitudinal movement of the cutter-carrying member.

19. A screw-cutting die comprising a holder, a two-part die-body, connections between one member thereof and the holder, connections between the two members of said body with provisions for independent longitudinal movement of one without disconnection of the two members, radially-movable cutters or chasers in the longitudinally-movable member, and a spring-pressed collar engaged with the cam-holder and adapted to turn the same in one direction.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 22d day of December, A. D. 1893.

JAMES HARTNESS.

Witnesses:

G. O. GRIDLEY,
W. D. WOODSON.