

No. 871,227.

PATENTED NOV. 19, 1907.

B. LJUNGSTRÖM.
GEARING.

APPLICATION FILED JULY 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

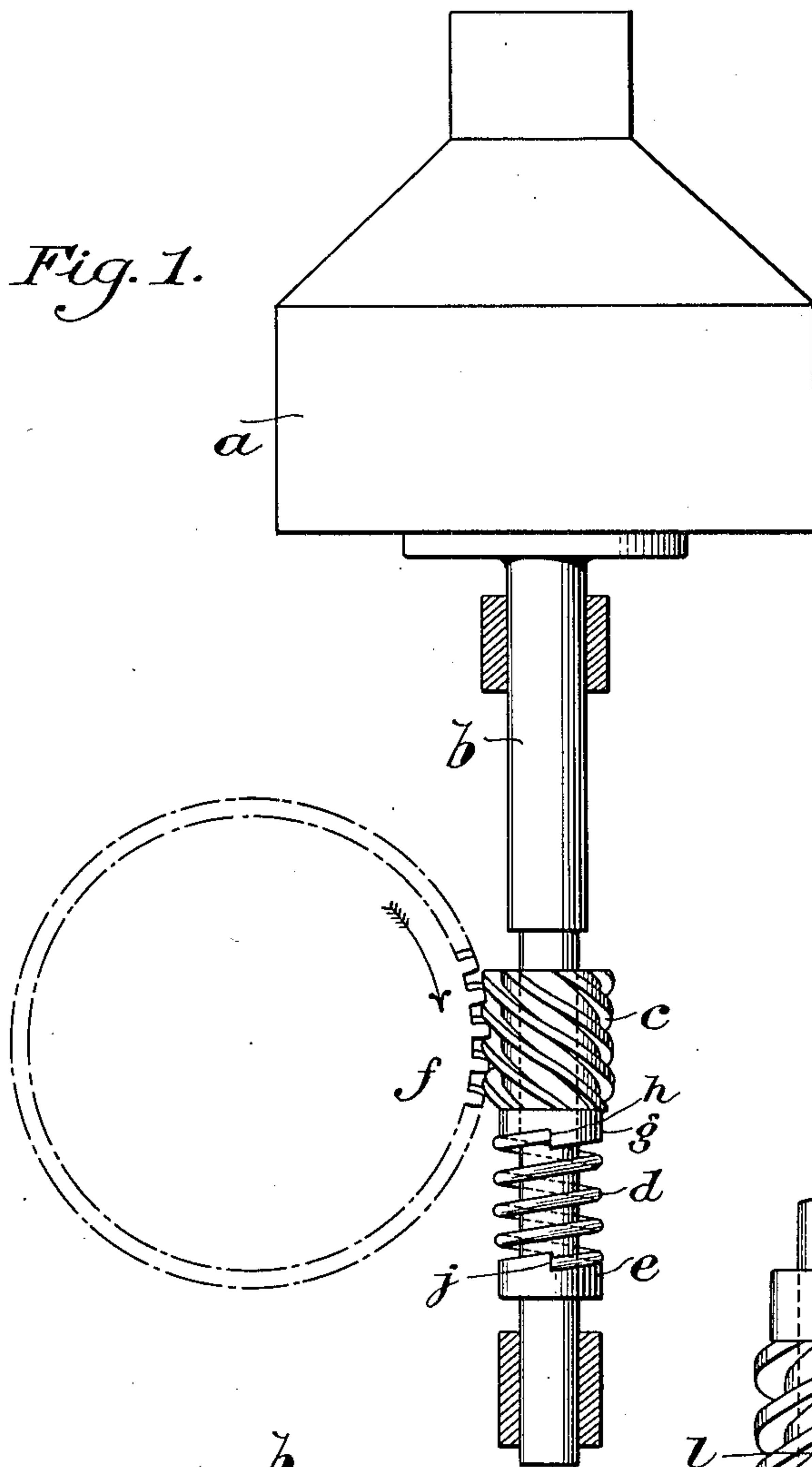
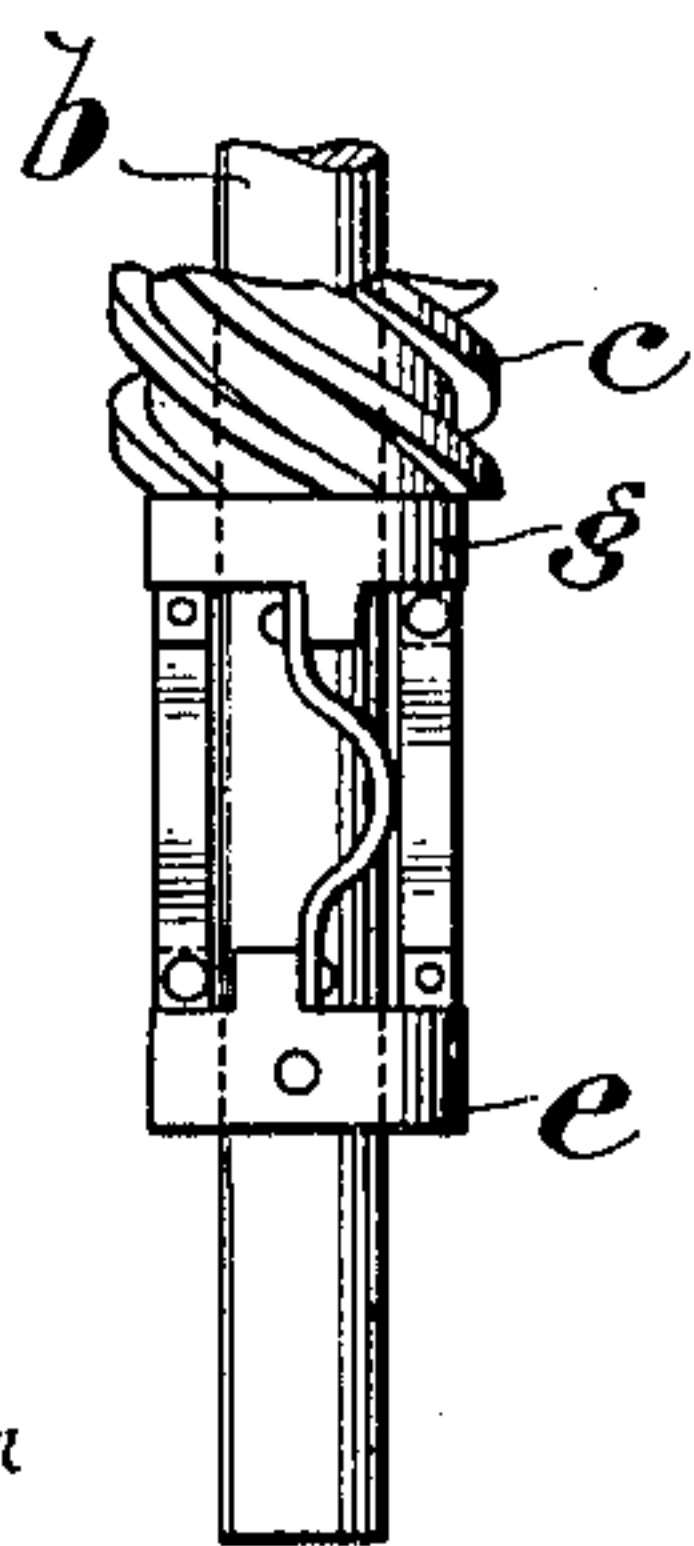


Fig. 2.



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Fig. 4.

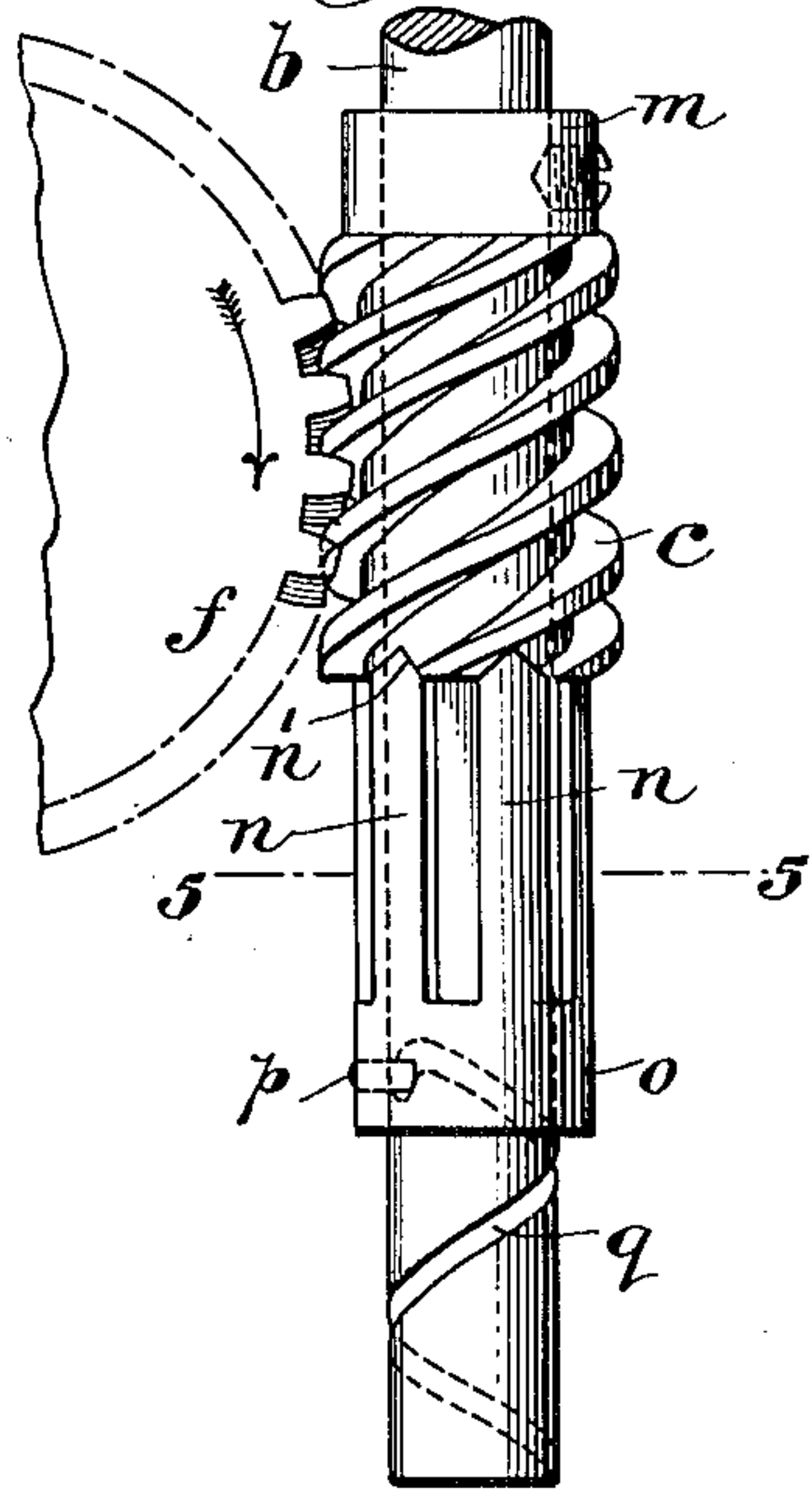


Fig. 5.

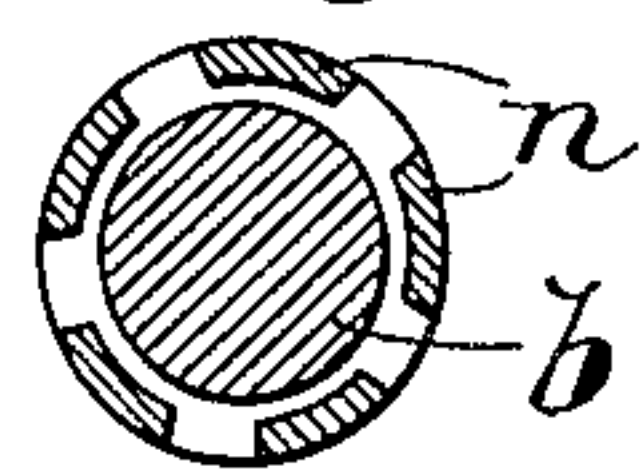
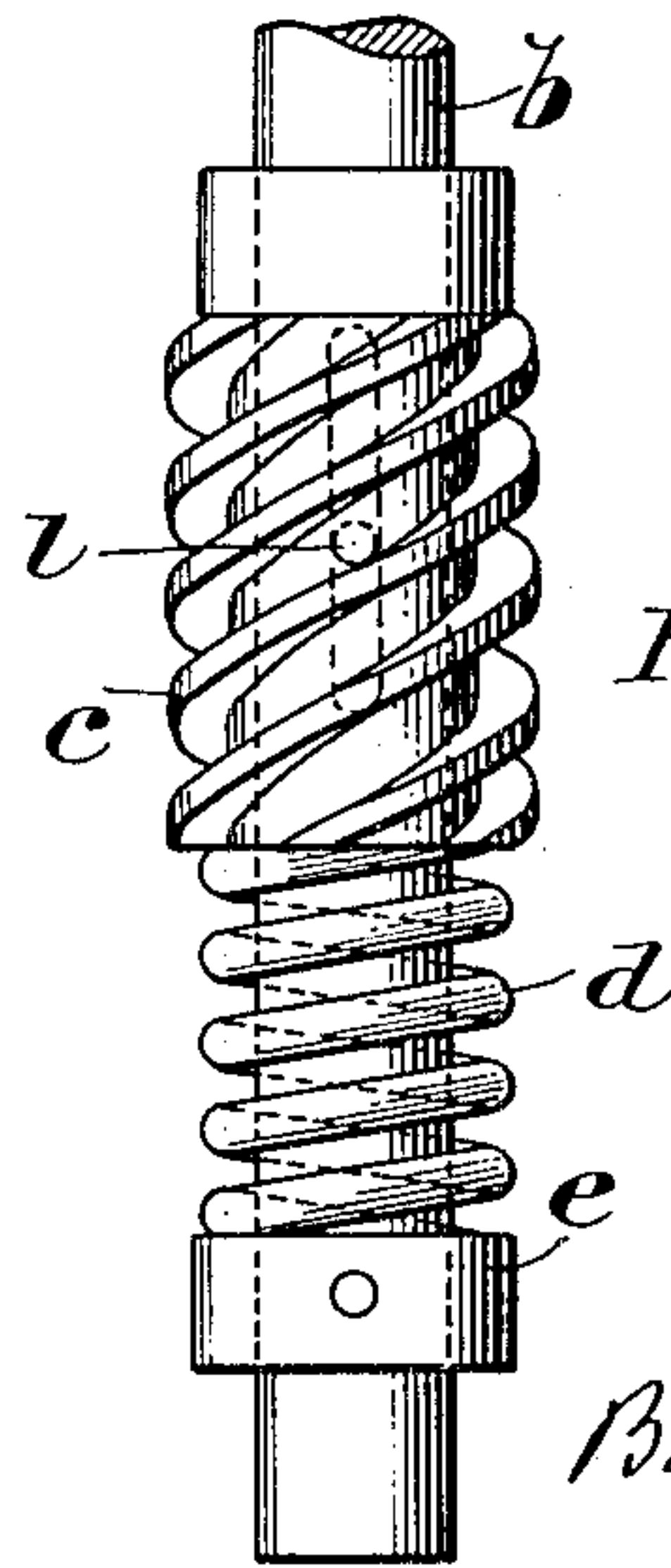


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 8.

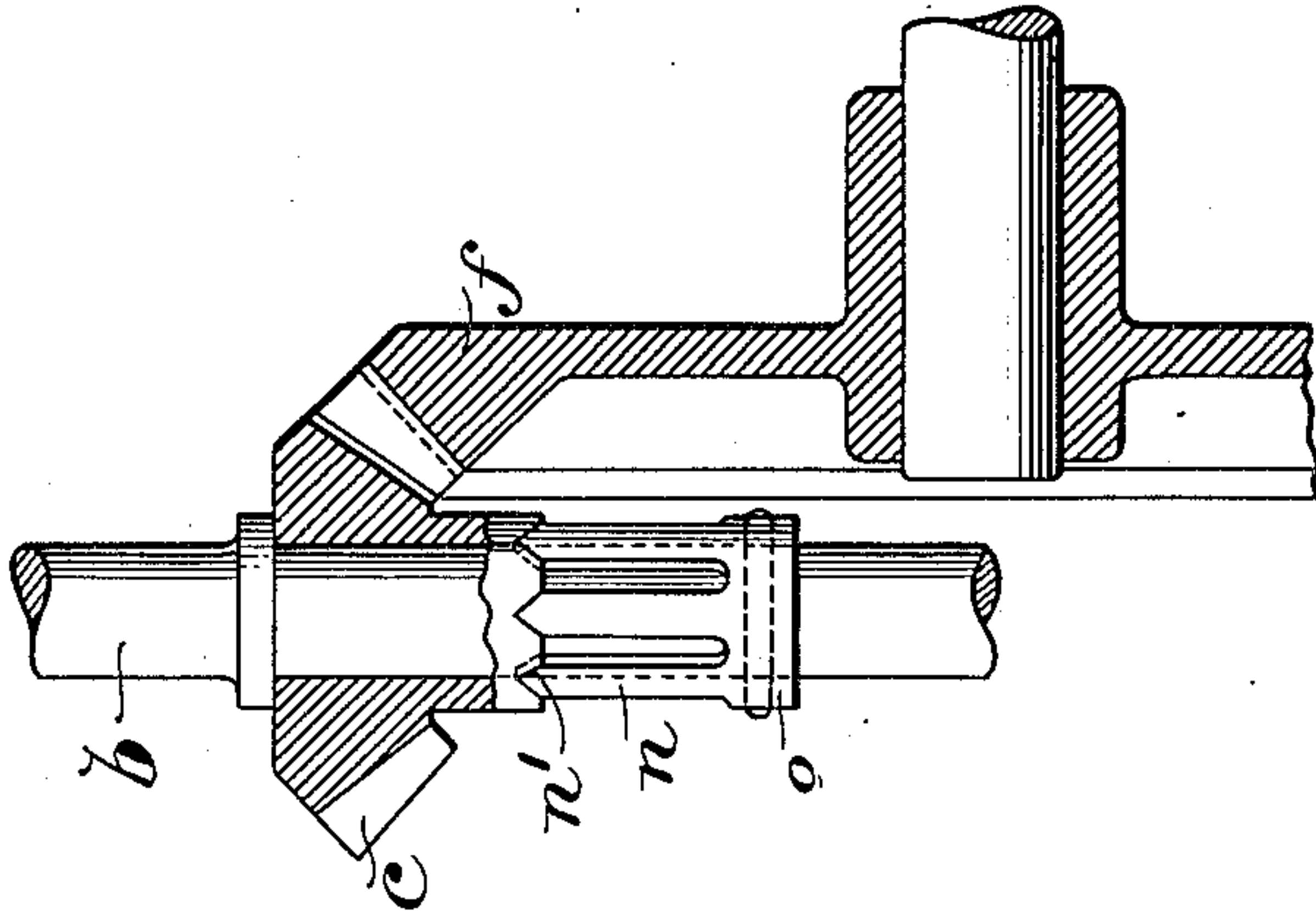


Fig. 7.

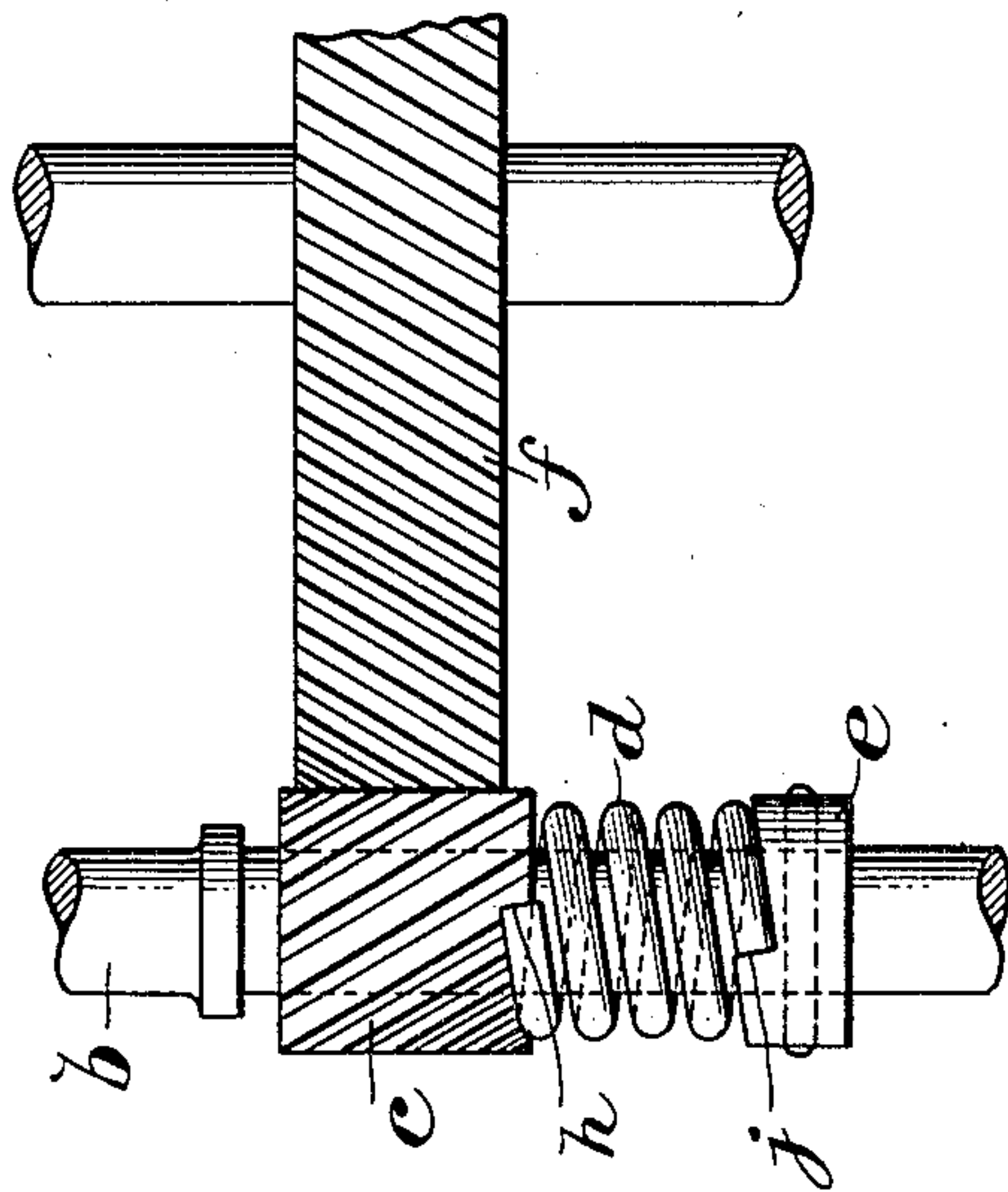
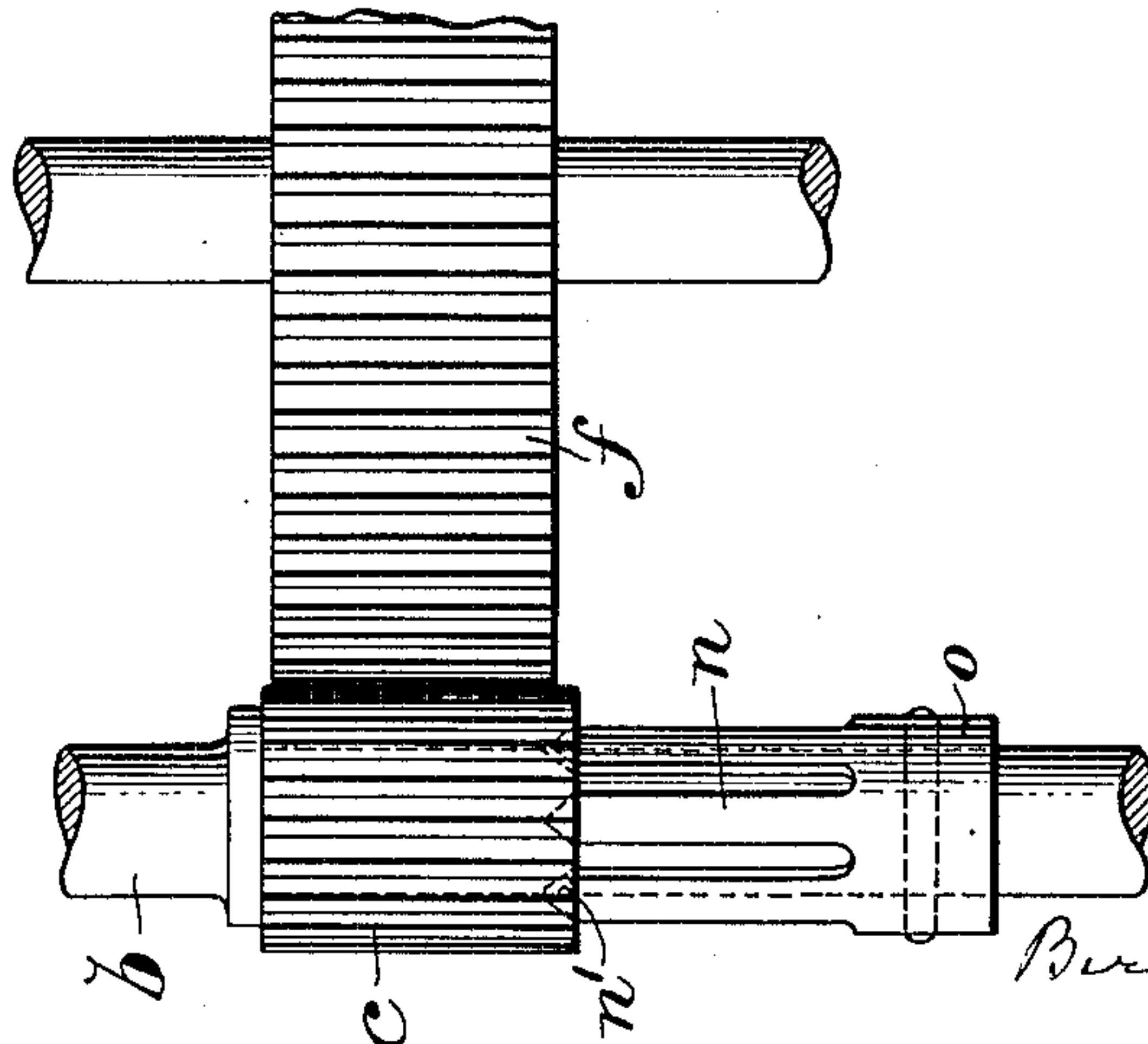


Fig. 6.



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UNITED STATES PATENT OFFICE.

BIRGER LJUNGSTRÖM, OF STOCKHOLM, SWEDEN, ASSIGNOR TO AKTIEBOLAGET SEPARATOR, OF STOCKHOLM, SWEDEN, A COMPANY.

GEARING.

No. 871,227.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed July 26, 1905. Serial No. 271,293.

To all whom it may concern:

Be it known that I, BIRGER LJUNGSTRÖM, a subject of the King of Sweden, residing at Stockholm, Sweden, have invented a new and useful Improvement in Gearings for Centrifugal and other Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

With centrifugal and other machines which are rotated at a high rate of speed, vibration will arise especially at high speed. This causes a disturbing noise and also the vibrations denote a loss of energy. For instance, if the separating bowl be the object rotated, the vibrations of the bowl are imparted to the spindle and the coöperating gearing causing or tending to cause increasing vibrations with resultant inconvenience and loss of energy.

Generally speaking, my invention consists in interposing a spring or resilient cushion between the spindle of the bowl or revolved device and the driving gears to cushion or take up the vibrations.

In the accompanying drawings, I have shown several embodiments of my invention and in all cases I have shown the rotating device as a separator bowl.

In the drawings: Figure 1 is an elevation of a portion of a centrifugal machine, showing my arrangement. Figs. 2, 3 and 4 are elevations showing modified forms of cushioning apparatus. Fig. 5 is a cross sectional view on the line 5—5, Fig. 4. Figs. 6 and 7 are elevations showing applications of spur and twisted gearing. Fig. 8 is an elevation partly in section, showing the application of bevel gears.

Speaking first of Fig. 1: *a* is the bowl and *b* the spindle. Upon the spindle *b*, the worm *c* is loosely mounted so that it can turn upon and move along the spindle *b*.

f is the worm wheel driven in any appropriate manner, not shown. This worm wheel meshes with the worm and rotates in the direction indicated by the arrow. The worm *c* has a collar or cylindrical extension *g* provided with an inset or notch *h*. Fixed upon the spindle *b* is the collar or ring *e*, having a notch *j*. A spiral spring *d* connects the collar *g* and collar *e*, one end of the spring entering the notch *h* and the other end the notch *j*. The arrangement of the notches

and spring is such that in the revolution of the worm wheel, the worm is pressed down, compressing the spring and at the same time the spring connects the worm and spindle so that the spindle is rotated by the rotation of the worm. With this construction the vibrations arising when the bowl is running are absorbed or equalized by the spring, so that the bowl will run more noiselessly and with less loss of power. Further, the spring acts as a coupling between the worm and spindle.

Instead of using a spiral spring, I can use one or more flat springs, as shown in Fig. 2. I can also embody my invention in the form shown in Fig. 3. In this form the worm rotates the spindle positively, but in sliding along it the spring acts, the spring no longer acting as a coupler between the worm and the spindle. This is accomplished as follows: The spindle is provided with a groove in which a projection *l* from the worm enters. As is self-evident, this arrangement may be reversed by placing the groove in the worm and the projection upon the spindle. In Figs. 4 and 5, I have illustrated another embodiment of my invention. In this embodiment, there is a collar or ring *m* integral with or fixedly secured to the spindle.

The lower end of the worm *c* abuts against the spring fingers *n* projecting from the ring *o*. There are notches *n'* in the worm in which the ends of the fingers *n* rest. The direction of travel of the worm wheel, as indicated by the arrow, is such as to cause the spring fingers to act and if the wheel is never turned in the opposite direction the collar or ring *m* may be omitted. The ring *o* has on its interior the projecting pin *p*, which enters a spiral groove *q* on the spindle.

Up to this point I have described my invention with respect to gears of the type of worm and worm wheel. It is, however, applicable to the case of other gearing, as appears in the construction shown in Figs. 6, 7, and 8.

In Fig. 6, I have shown the invention applied to cylindrical gearings with straight teeth; in Fig. 7 to cylindrical gearings with inclined teeth; in Fig. 8 to bevel gears. In these figures I have given the same letters to corresponding parts as are used with respect to the previous figures.

Having now fully described my invention what I claim and desire to protect by Letters Patent is:—

1. In combination, a rotatable device, a driven gear, and a driving gear for the same, one of said gears being mounted to move along its support and a resilient connection
5 between said gear and its support.
2. In combination with a rotatable device, a driven gear and a driving gear, one of said gears being mounted upon its support so as to move around and along said support and a
10 resilient connection between said gear and its support.
3. In combination, a shaft or spindle, a gear mounted to move along said spindle, a resilient connection between said gear and
15 the spindle, and a driving gear meshing with the last mentioned gear.
4. In combination, a rotating spindle, a collar, fixed on the spindle there being a notch on the gear and a notch on the collar and a spiral spring, one end in the gear notch 20 the other in the spindle collar notch.
5. In combination a rotating spindle, a collar fixed on the spindle there being a notch on the gear and a notch on the collar and a spring one end in the gear notch, the 25 other in the spindle collar notch.

In testimony of which invention, I have hereunto set my hand, at Stockholm, on this 8th day of July, 1905.

BIRGER LJUNGSTRÖM.

Witnesses:

AUGUSTUS E. INGRAM,
HARRY MOIHN.