

No. 774,883.

PATENTED NOV. 15, 1904.

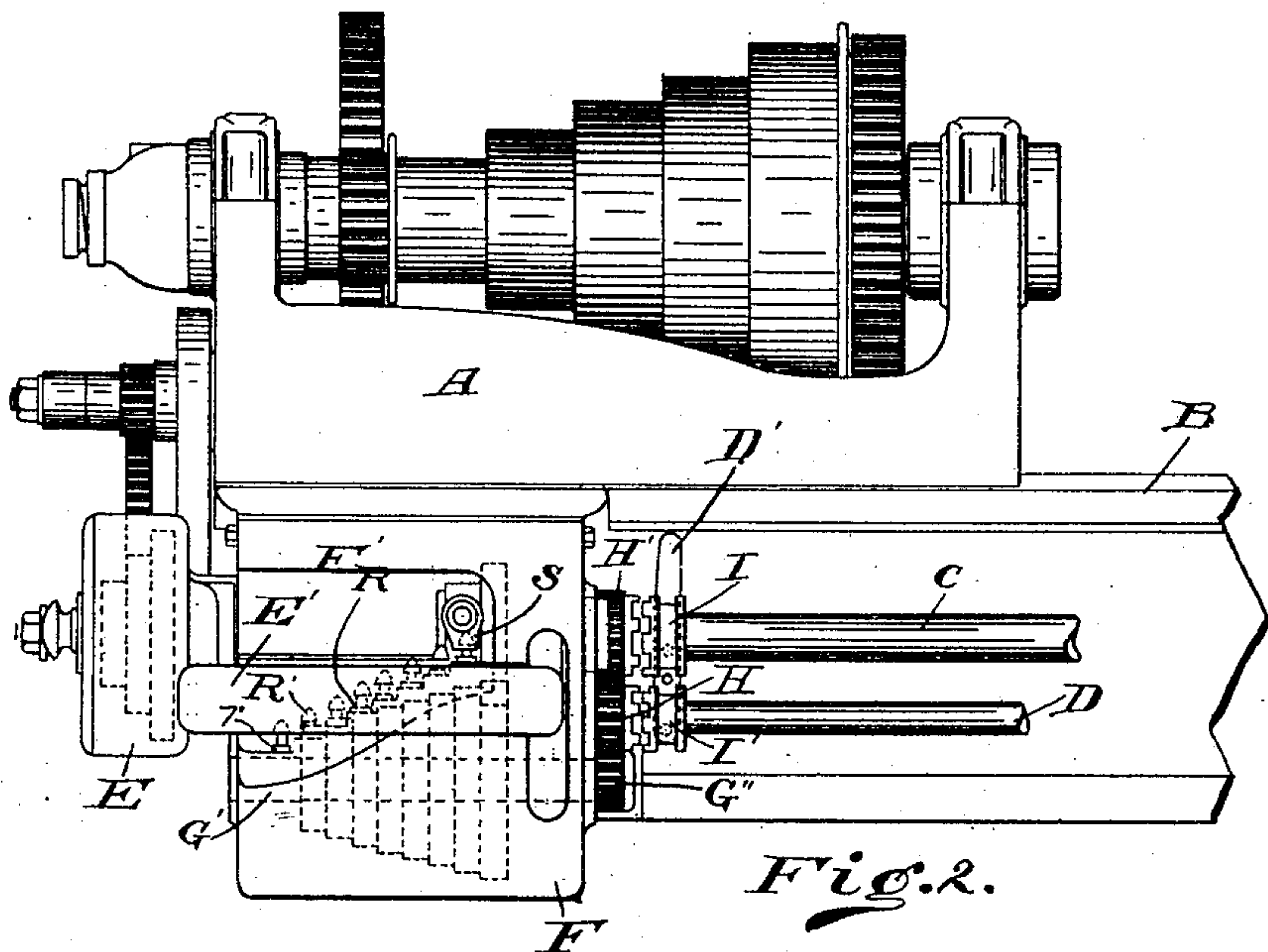
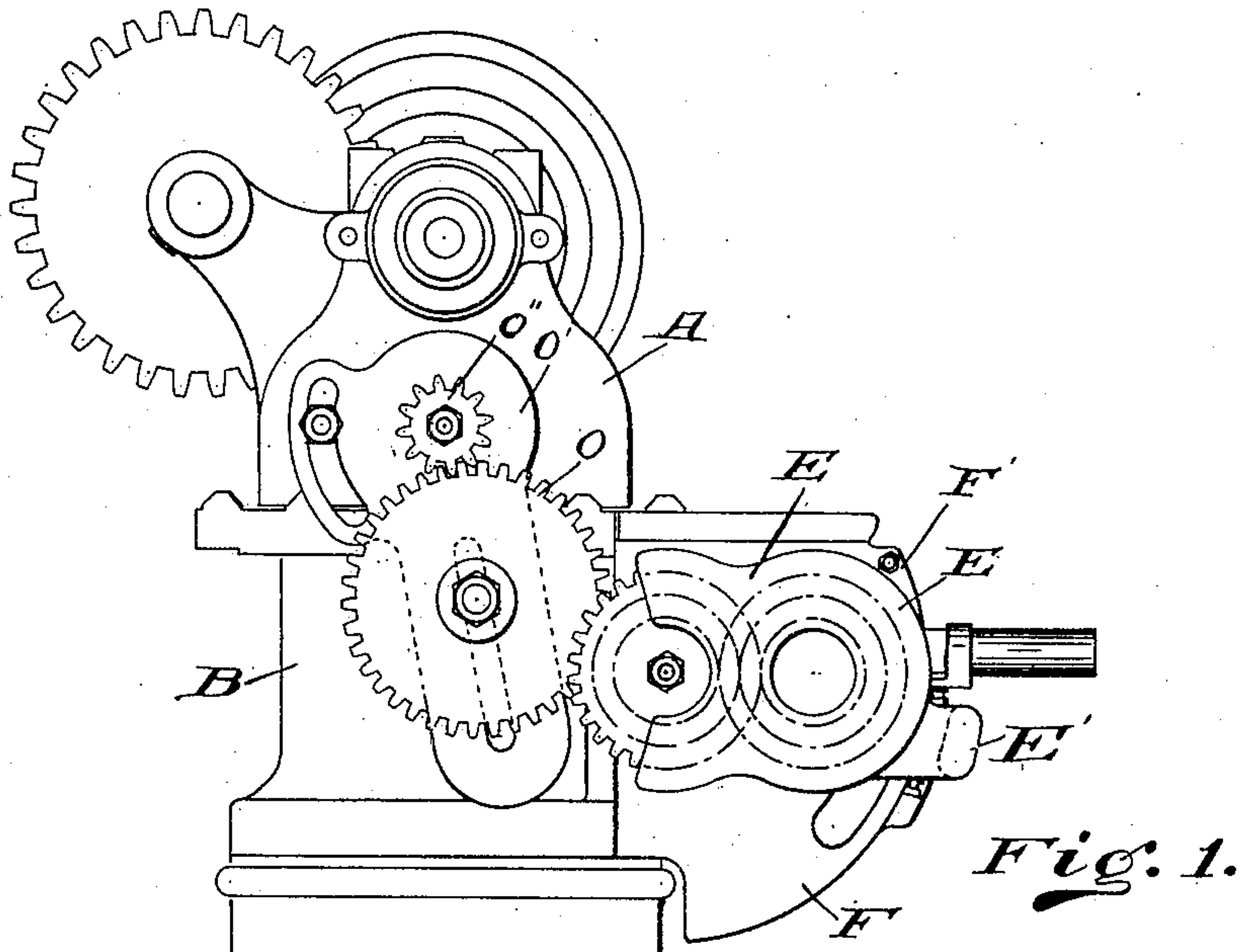
W. T. S. JOHNSON.

CHANGE GEAR MECHANISM FOR MACHINE TOOLS.

APPLICATION FILED JUNE 24, 1904.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
Fred Kinsey
Joseph R. Rohrer

Inventor
William T. S. Johnson
by *Stewart & McKim*
his Attorneys.

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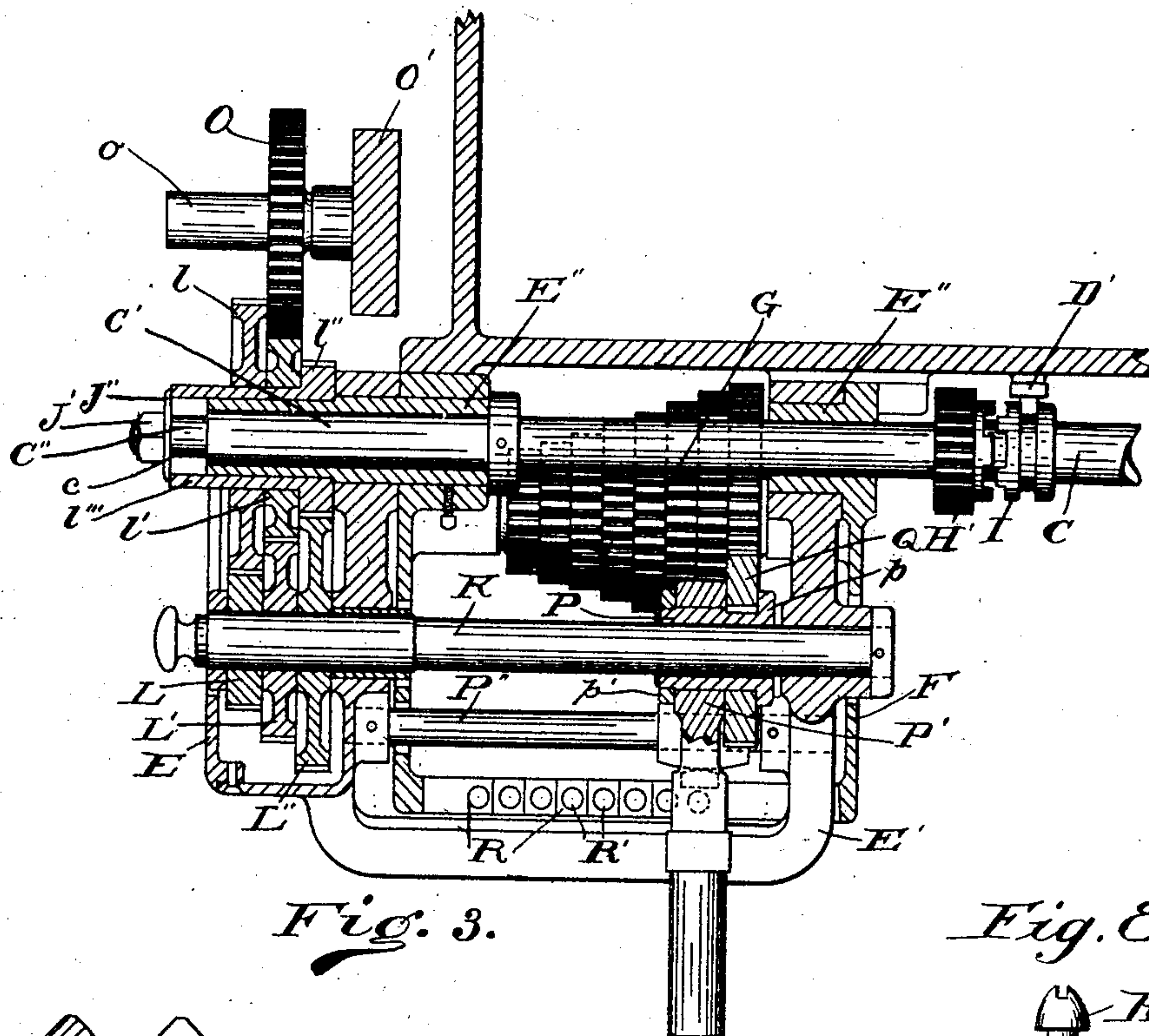


Fig. 3.

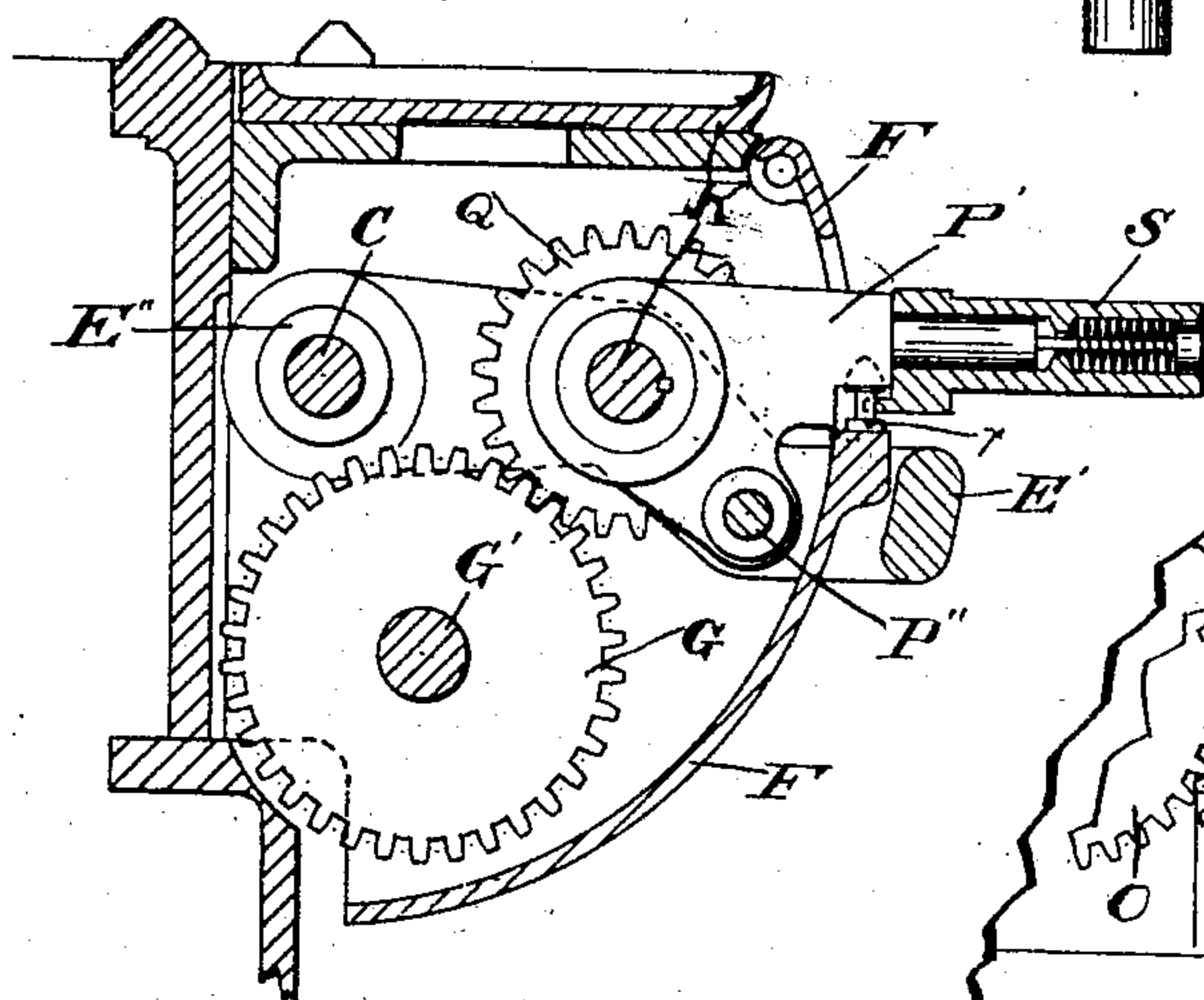


Fig. 5.

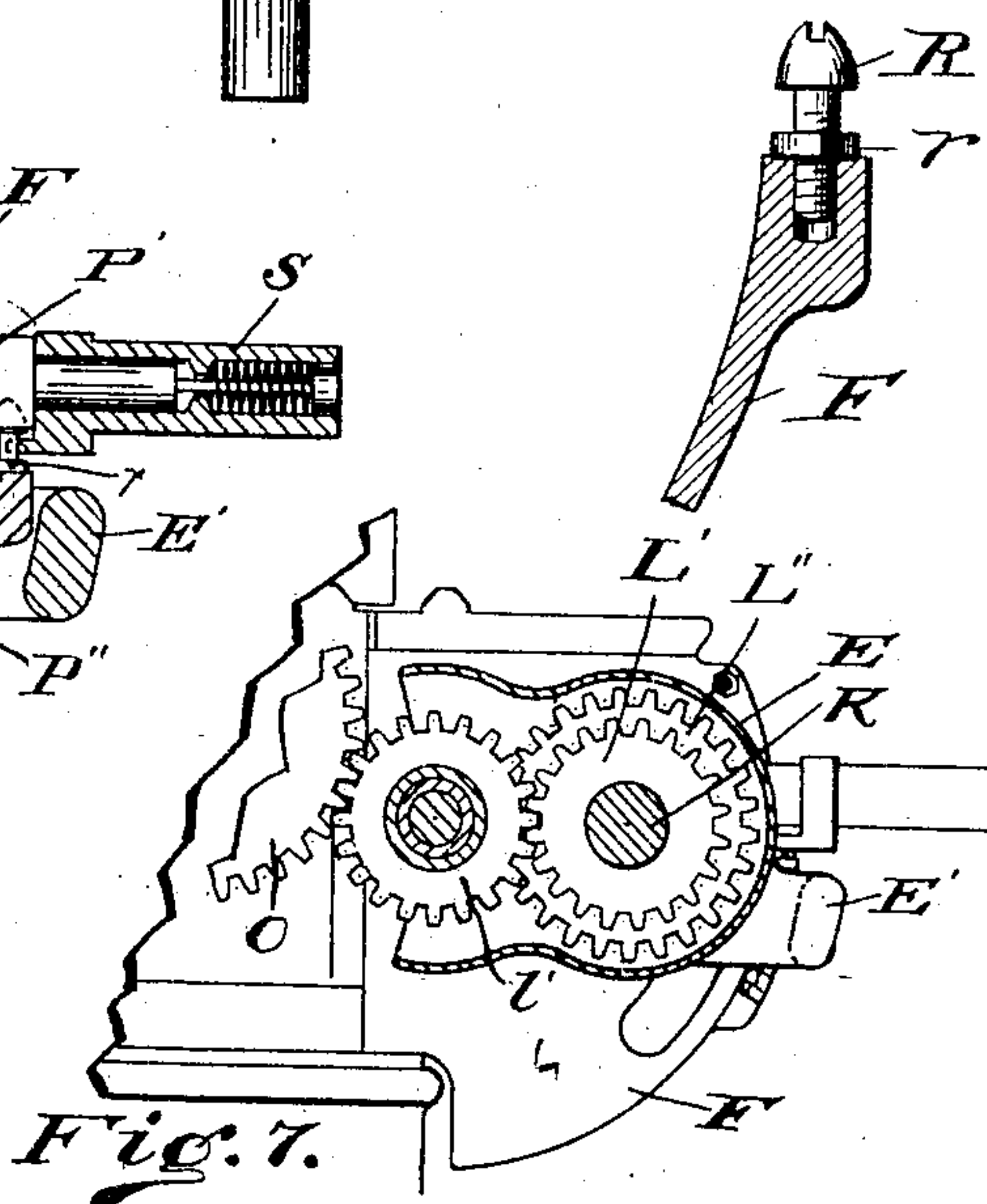


Fig. 7.

Witnesses

Fred J. Kinsey
Joseph R. Rohrer

Inventor
William T. S. Johnson
by Henry Newman & Muhlberg
his Attorneys.

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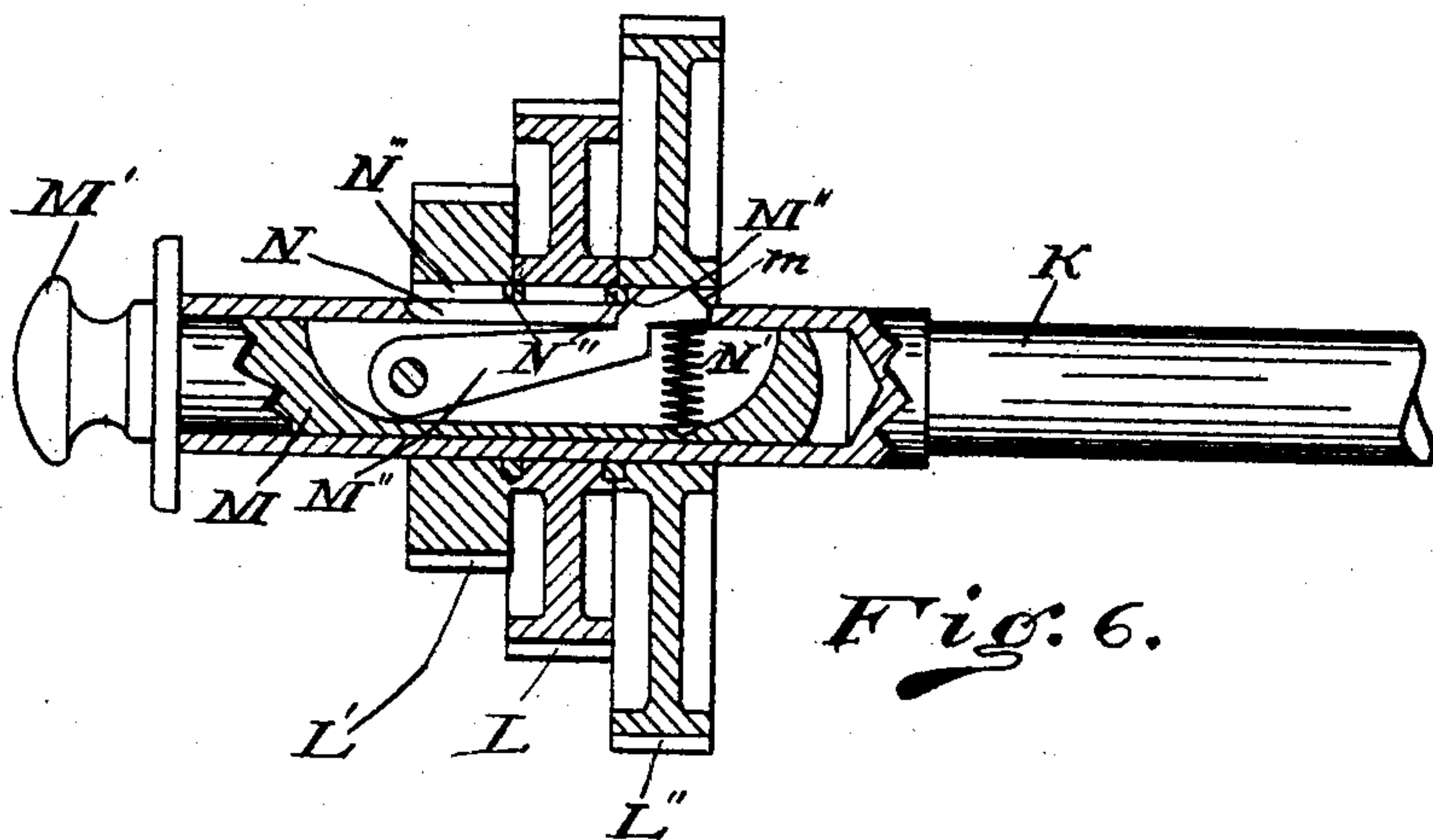
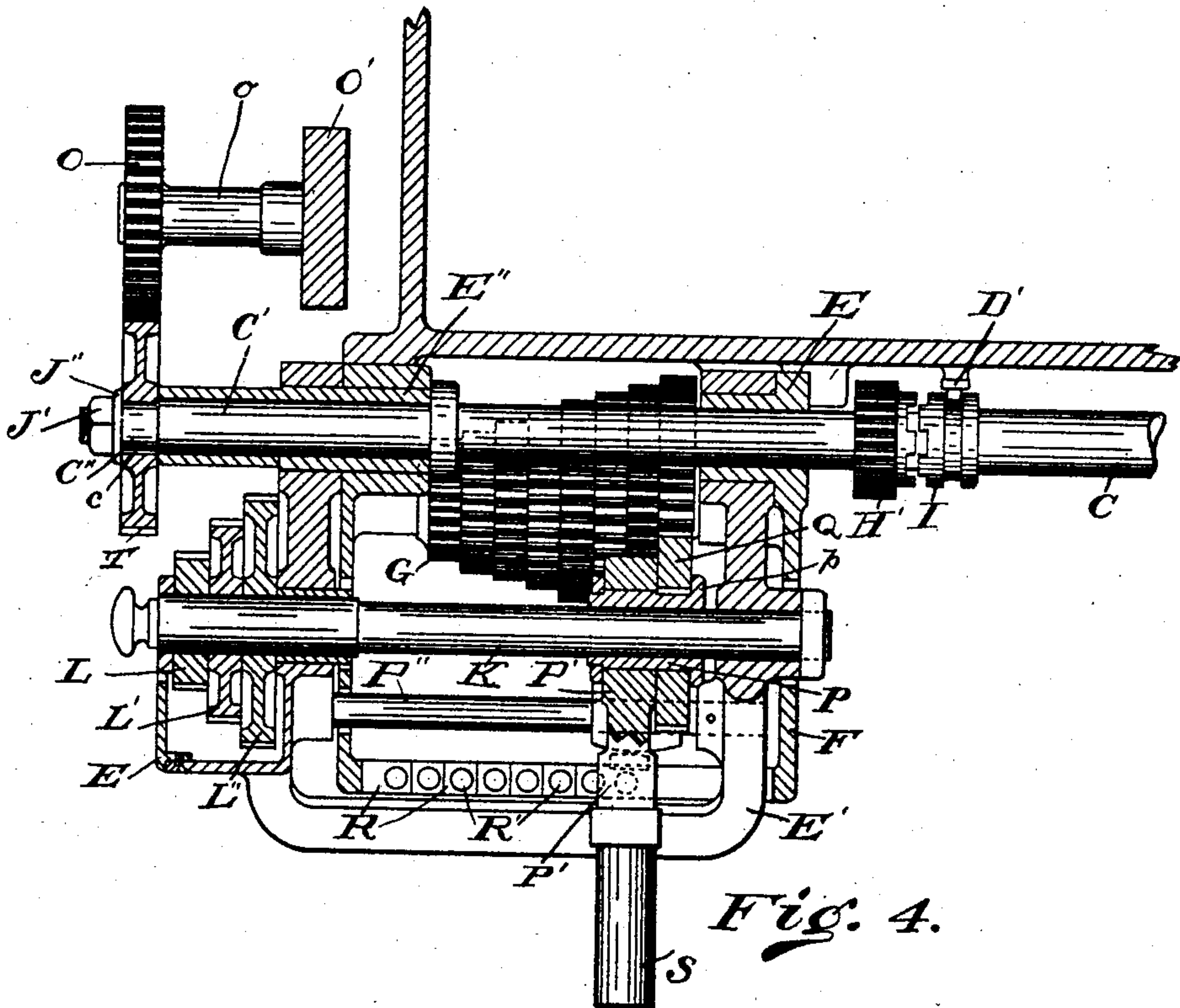
W. T. S. JOHNSON.

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APPLICATION FILED JUNE 24, 1904.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses
Fred J. Kinsey
Joseph R. Rohrer

Inventor
William T. S. Johnson
by *Sturges & McKelvey*
his Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM T. S. JOHNSON, OF CINCINNATI, OHIO.

CHANGE-GEAR MECHANISM FOR MACHINE-TOOLS.

SPECIFICATION forming part of Letters Patent No. 774,883, dated November 15, 1904.

Application filed June 24, 1904. Serial No. 214,043. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. S. JOHNSON, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Change-Gear Mechanism for Machine-Tools, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of my specification.

My invention relates to machine-tools or lathes, and more particularly to the mechanism by which changes in the rate of feed of the tool or when applied to the lead-screw in screw-cutting lathes changes in the number of threads to be cut may be produced.

The object of my invention is to produce a simple efficient change-gear mechanism arranged to readily produce any one of a number of designed speeds, which will at the same time be readily adjustable to produce any desired feed. The several advantages of my invention will appear as I proceed with my description.

In the drawings, Figure 1 is an end elevation of a lathe with my improved change-gear mechanism attached. Fig. 2 is a front elevation of same. Fig. 3 is a section of Fig. 1 on the line 3 3 thereof. Fig. 4 is a similar section illustrating the arrangement when a different thread is to be cut or a different rate of feed to be produced than any of the number of threads or speeds that the machine is especially designed to produce. Fig. 5 is a section of Fig. 3 on the line 5 5 thereof. Fig. 6 is a longitudinal section, on an enlarged scale, of shaft K. Fig. 7 is a partial end elevation of the lathe, the outside wall of the change-gear box being removed; and Fig. 8 is a detail view, on an enlarged scale, of the pins R', to be referred to later.

A is the head-stock, mounted on the bed B in the usual manner, C the lead-screw, and D the feed-rod journaled in suitable bearings.

E is a swinging box, hereinafter to be called the "swinging gear-box," which contains a series of multiple gears, which by means of a sliding gear swinging with the change-gear box may be caused to produce several speeds

in a set of cone-gears G, which are carried in a cone-gear box F.

The cone-gear box F is of any ordinary type secured to the frame B and is open in front and provided near its top with a hinged lid F' in any convenient manner. The cone-gear shaft G' projects beyond the box and there has keyed to it the spur-gear G'', meshing with a gear H, loosely mounted on the rod D, which in turn meshes with the spur-gear H', loosely mounted on the screw C. By means of clutch members I I', respectively feathered to the screw C and the rod D and operated in any convenient manner—as, for example, by the lever D'—the gear G'' may be caused to operate either the screw or the rod. The screw-shaft C projects through the cone-box, as at C', and is there provided with gears in the manner presently to be described. (See Fig. 3.)

A substantially U-shaped frame E' is journaled on bushings E'' E'', secured in the side walls of the cone-gear box, one side of the frame being just inside one end of the cone-gear box and the other side of the frame being just outside of the opposite end of the cone-gear box, with its axis of oscillation coincident with the axis of the screw C. The swinging change-gear box E is secured to or made a part of the latter side of the frame E' and carries the multiple change-gears, which will now be described.

A shaft K is journaled in the frame E', and upon it are loosely mounted within the swinging gear-box the three gears L L' L''. Said shaft is drilled out at the end to receive a slotted pin M, (see Fig. 6,) which may be pulled in or out by means of the handle M'. In the slot of this pin is pivoted a key M'', which is normally caused to project through a keyway N in the shaft K by means of a spring N'. Said keyway is of the length of the total depth of the three gears L, L', and L'', which are mounted side by side in the said swinging gear-box. Said gears are provided with keyways N'', which are separated from each other by means of rings N'', mounted on the shaft K. The pivoted key M'' is beveled at m, so as to readily slide over these rings when the pin M is pulled in or

out. It is apparent that by means of this pin and the pivoted key M'' any one of the three gears L , L' , or L'' may be keyed to the shaft K , the other two turning loosely thereon.

5 One of the bushings E'' —namely, the one nearest the end of the screw—is prolonged, and loosely journaled upon this bushing is a gear l'' , having a long hub l''' , the face of the gear bearing against the frame E' and the
10 hub extending to the end of the screw-shaft C' , where it is held in place by means of a washer J'' and a nut J' . Two other gears l' and l are keyed to the hub l''' of the gear l'' , the three gears l l' l'' being arranged to
15 mesh with the three gears L L' L'' in the order mentioned. (See Fig. 3.)

The set of gears l l' l'' are driven by the gear O , adjustably trunnioned on the usual adjustable arm O' , and the gear O is driven
20 by the stud-gear O'' in the usual manner. The gear O is provided with a long hub o for a reason which will appear later.

The rotation of the shaft K is communicated to any one of the set of cone-gears G in the
25 following manner, (see Figs. 3 and 5:) A sleeve P is feathered to the shaft K , and its movement along the shaft K is controlled by means of a bracket P' , which is held in a fixed position vertically with reference to the frame
30 E' by means of a rod P'' , which passes through an opening in said bracket P' . The sleeve P turns loosely in the bracket P' and has keyed to it a spur-gear Q , which is adapted to engage any one of the set of cone-gears G . The
35 gear Q and the bracket P' are held in position by means of a collar p on the sleeve P and a washer p' . It is apparent that the bracket P' may slide from side to side, so as to bring the gear Q opposite to any one of the set of
40 cone-gears G . It is also apparent that the gear Q after being brought opposite any one of the cone-gears G may be brought into mesh with it by properly swinging the frame E' by means of the bracket P' .

45 The cone-gear box F has suitable slots in its side and front walls to permit of the swinging up and down of the shaft K , the rod P'' , and the frame E' .

In order to lock the arm P' in position when
50 the gear Q is engaging the desired one of the set of cone-gears, the upper edge of the front of the cone-gear box is stepped, as at R , (see Fig. 2,) there being a step for each one of the set of cone-gears. On each step is a pin R' , adapted to be engaged by a notch in the flange
55 of an adjustable collar S , which is mounted on the bracket P' . This collar is spring-controlled, so as to normally engage one of the pins, the arrangement being apparent from
60 Fig. 5. The pins R' are preferably provided with screw-threaded shanks and screwed into the steps, each one being provided with a lock-nut r . This arrangement permits of adjustment in case of wear of the gears.

65 It is obvious from the description that the

cone-shaft may be given for each one of the set of cone-gears either of three speeds, depending upon which of the gears L , L' , or L'' is caused to be keyed to the shaft K . It is
70 thus apparent that in order to obtain the desired speed for the feed-rod or the screw, supposing, of course, that the desired speed is any one of the speeds at which the machine is designed to run, it is simply necessary to
75 pull out the pin M by means of the handle M' , so that the key M'' engages the proper one of the gears L L' L'' , and then move the bracket P' along the shaft K until it is opposite the proper one of the set of cone-gears and then swing the frame E' until the gear Q
80 engages that cone-gear. The spring-controlled collar S will then be in such a position that the notch in its flange will engage one of the pins R' . Of course a suitable card may be provided to indicate the proper position
85 of the bracket P' for each of the desired speeds. It often happens, however, that a speed or a pitch is desired for which the machine is not specially designed, and my improved machine is especially adapted to such
90 a contingency.

The end of the screw-shaft C is turned down, as at C'' , and is there provided with a keyway
95 c . To cut any unusual thread for which the set of cone-gears and multiple gears do not provide, the nut and washer J' J'' are taken off and the set of gears l l' l'' removed. A change-gear T is then keyed onto the end of the screw C'' and the nut and washer J' J''
100 put back, said change-gear T being held between the end of the bushing E'' and the washer J'' . The gear O is then removed and reversed, (see Fig. 4,) the hub o being of such length that in the reversed position the gear
105 O will be brought opposite the change-gear T . The adjustable arm O' is then adjusted so as to bring the gear O into mesh with the change-gear T , and the screw is then operated directly, the cone-gear box being entirely eliminated from the machine. It is apparent that
110 any speed may be in this way produced.

I do not wish to limit myself to any particular number of multiple gears L L' L'' and l l' l'' , as it is apparent that this number may be increased or diminished without departing
115 from the spirit of my invention, nor do I wish to limit myself to any of the details of construction described and shown in the drawings, as these may be changed in various ways.

What I claim, and desire to cover by Letters
120 Patent, is—

1. A change-gear device comprising a set of multiple gears turning together and means for driving the same, a swinging shaft with its axis of oscillation coincident with the axis
125 of said set of multiple gears, a second set of multiple gears journaled on said shaft and engaging said first set of multiple gears, means adapted to key any one of said second set of multiple gears to said shaft, a sliding gear on
130

said shaft turning with the same and a set of cone-gears adapted to be engaged by said sliding gear, substantially as described.

2. A change-gear device comprising a set of multiple gears turning together with means for driving the same, a frame swinging about the axis of said set of multiple gears, a shaft journaled in said frame, a second set of multiple gears journaled on said shaft and engaging said first set of multiple gears, means adapted to key any one of said second set of multiple gears to said shaft, an intermediate gear sliding on said shaft and turning with the same, a set of cone-gears adapted to be engaged by said sliding gear, and means for locking said frame and said sliding gear in position, substantially as described.

3. A change-gear device comprising in combination with the driven shaft, a set of multiple gears turning together journaled on said driven shaft, with means for driving them, a swinging frame journaled on said driven shaft, a shaft journaled in said frame, a second set of multiple gears loosely mounted on said shaft in engagement with the first set of multiple gears, mechanism adapted to key any one of said second set to said shaft, a set of cone-gears, a sliding gear on said shaft, turning with the same and adapted to engage any one of said set of cone-gears, a bracket controlling the movement of said frame and said sliding gear, with means adapted to lock the same in the desired position, together with gearing intermediate said set of cone-gears and said driven shaft, substantially as described.

4. A change-gear device comprising in combination with the driven shaft, a set of multiple gears secured together, and removably journaled on the driven shaft, means for driving said set of multiple gears, a frame journaled on said driven shaft, a shaft carried by said frame, gearing intermediate said set of multiple gears and said shaft adapted to induce any one of several speeds therein, a sliding gear on said shaft turning therewith, a set of cone-gears adapted to be engaged by said sliding gear, a train of gears between said set of cone-gears and the driven shaft, together with means for swinging said frame and moving said sliding gear along said shaft, substantially as described.

5. A change-gear device comprising in combination with the driving-shaft and driven member, a frame journaled thereon, a shaft journaled in said frame, a set of cone-gears, a sliding gear on said shaft turning therewith adapted to engage any one of said set of cone-gears, gearing intermediate said shaft and the driving-shaft adapted to induce any one of several speeds in said shaft, together with gearing intermediate the set of cone-gears and the driven member, substantially as described.

6. In combination with the cone-gear box

and a set of cone-gears, the driven shaft journaled in said box and prolonged beyond the same, a removable set of multiple gears keyed together turning loosely on said driven shaft, said driven shaft being prolonged beyond said set of multiple gears where it is provided with a keyway adapted to receive a change-gear of any size, an adjustable intermediate gear adapted to drive either the said set of multiple gears or said change-gear when said set of multiple gears is removed, a frame journaled on said driven shaft, a shaft journaled therein, a second set of multiple gears turning loosely on said shaft in engagement with said first set of multiple gears, means for keying any one of said second set of multiple gears to said shaft, an intermediate gear sliding on said shaft and turning with the same adapted to engage any one of said set of cone-gears, a gear loosely mounted on said driven shaft with gearing intermediate the same and the cone-gear shaft and a clutch mechanism adapted to key said loose gear to said driven shaft, substantially as and for the purpose described.

7. In combination, the cone-gear box, a set of cone-gears journaled therein, the driven shaft, a frame journaled on said driven shaft, the latter projecting beyond said frame, a removable set of multiple gears turning loosely on said driven shaft, a short projection of the driven shaft beyond said set of multiple gears provided with a keyway adapted to receive any-sized change-gear, an adjustable intermediate gear adapted to drive either said set of multiple gears or said change-gear when said set of multiple gears is removed, a shaft carried by said swinging frame, a second set of multiple gears turning loosely on said shaft in engagement with said first set of multiple gears, with means for keying any one of said second set to said shaft, an intermediate gear turning with the said shaft and sliding thereon adapted to engage any one of the set of cone-gears together with gearing adapted to gear the cone-shaft to the driven shaft, substantially as described.

8. In combination with the driven member, a set of cone-gears, the gearing intermediate the same and the driven member, a swinging frame journaled on said driven member, a shaft journaled in said frame, an intermediate gear sliding on and turning with said shaft adapted to engage any one of the set of cone-gears, removable gearing journaled on the driven member, mechanism between said removable gearing and said shaft adapted to induce in the same any one of several speeds, the driven member projecting beyond said mechanism where it is adapted to have keyed to it any-sized change-gear in the absence of said removable gearing, and an adjustable gear adapted to drive either said removable gearing or said change-gear, substantially as described.

9. In combination with a driven member, a

set of cone-gears, together with gearing intermediate the same and the driven member, a swinging frame journaled on said driven member, a shaft journaled in said frame, a
5 sliding gear on said shaft turning with the same and adapted to engage any one of the set of cone-gears, removable gearing on the driven member, with means for driving said removable gearing, and gearing intermediate
10 said removable gearing and the shaft carrying the sliding gear, substantially as described.

10. In combination, a driving and a driven shaft, a set of cone-gears operating the driven
15 shaft, a sliding gear adapted to engage any one of said set of cone-gears, an oscillating frame carrying said sliding gear, gearing intermediate the driving-shaft and said sliding gear, adjustable pins supported opposite the
20 set of cone-gears, and a spring-controlled col-

lar on said oscillating frame adapted to engage one of said pins when said sliding gear is in mesh with the corresponding cone-gear.

11. In combination with the driving and driven shaft, the cone-gear box and the set of
25 cone-gears operating the driven shaft, the sliding pinion adapted to engage any one of said set of cone-gears, the oscillating frame carrying the said sliding pinion, and gearing intermediate the driving-shaft and said sliding
30 pinion, the screw-threaded pins R' screwed into the upper edge of the cone-gear box opposite the cone-gears, the set-nut *r*, the bracket P' and the spring-controlled collar S having a notched flange normally engaging the pins
35 R', substantially as described.

WILLIAM T. S. JOHNSON.

Witnesses:

GEORGE HEIDMAN,

CLARENCE E. MEHLHOPE.