

No. 709,900.

Patented Sept. 30, 1902.

W. H. GURNEY & S. L. TAYLOR.
FREE WHEEL OR LIKE CLUTCH.

(Application filed Mar. 6, 1901.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.

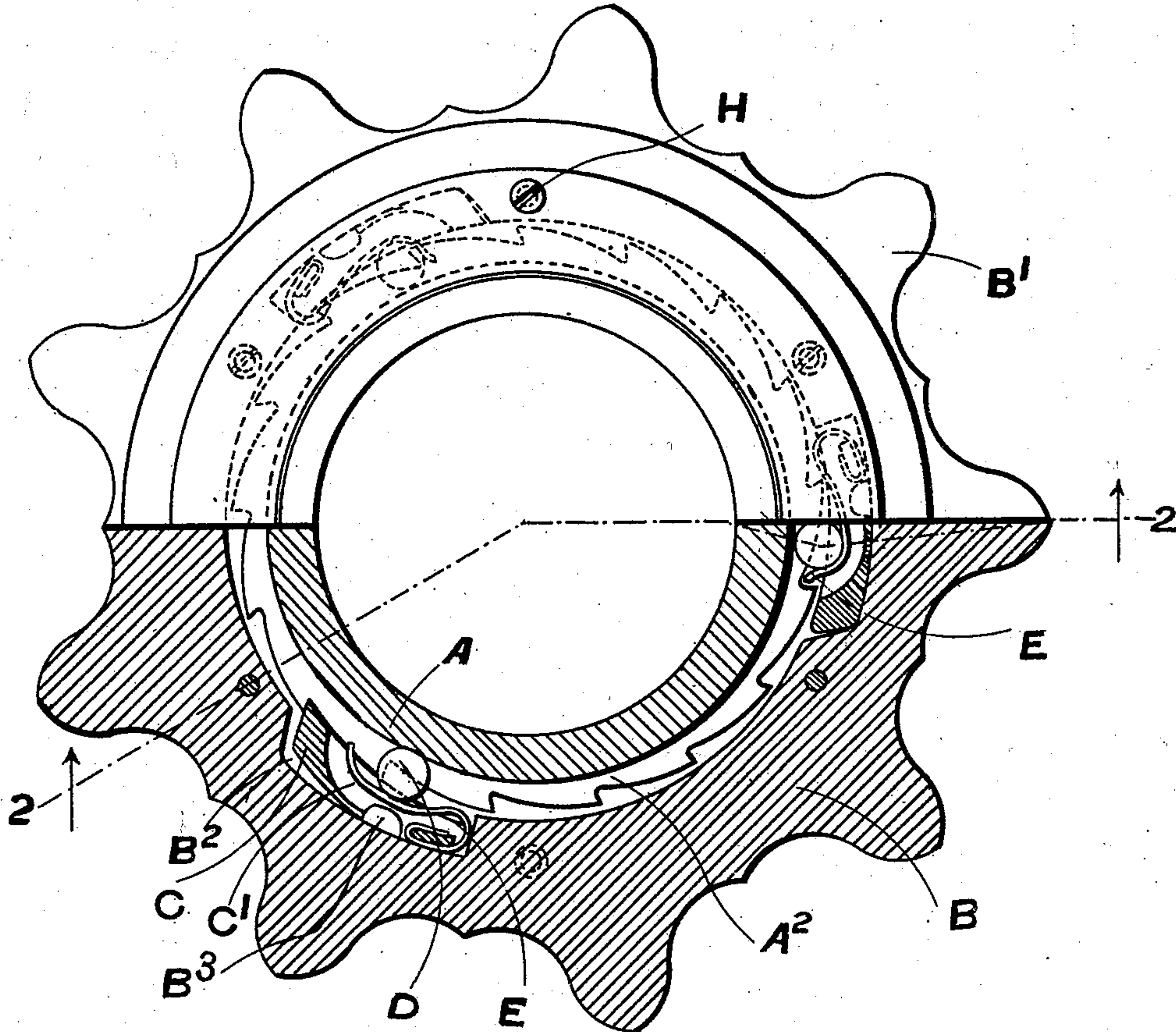


FIG. 2.

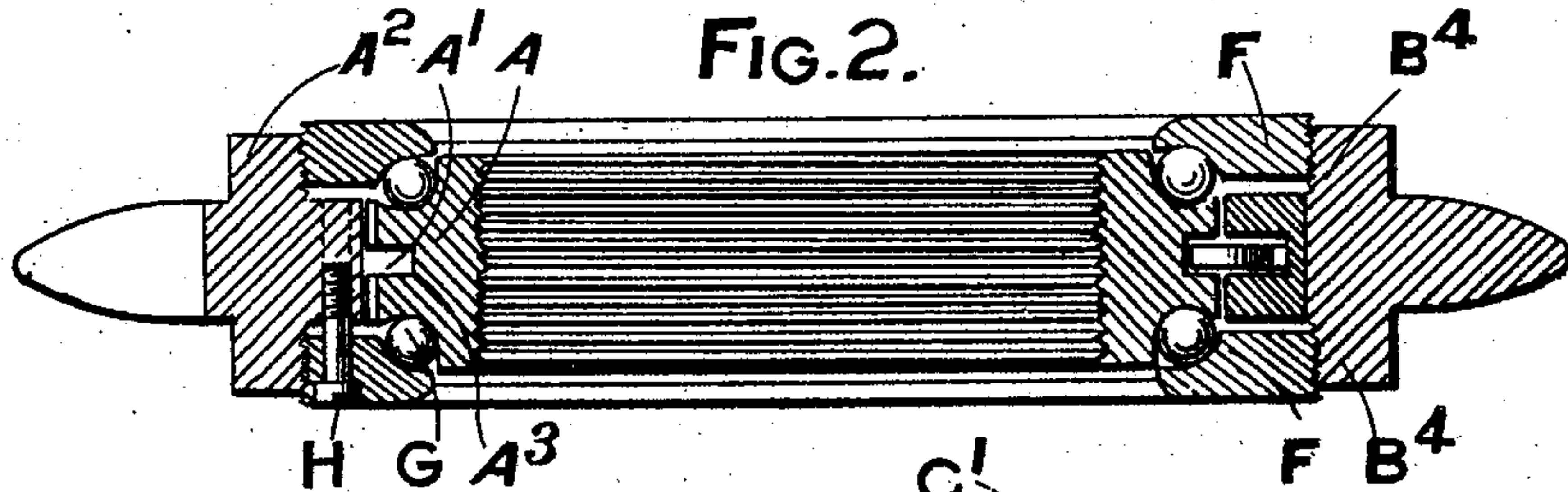
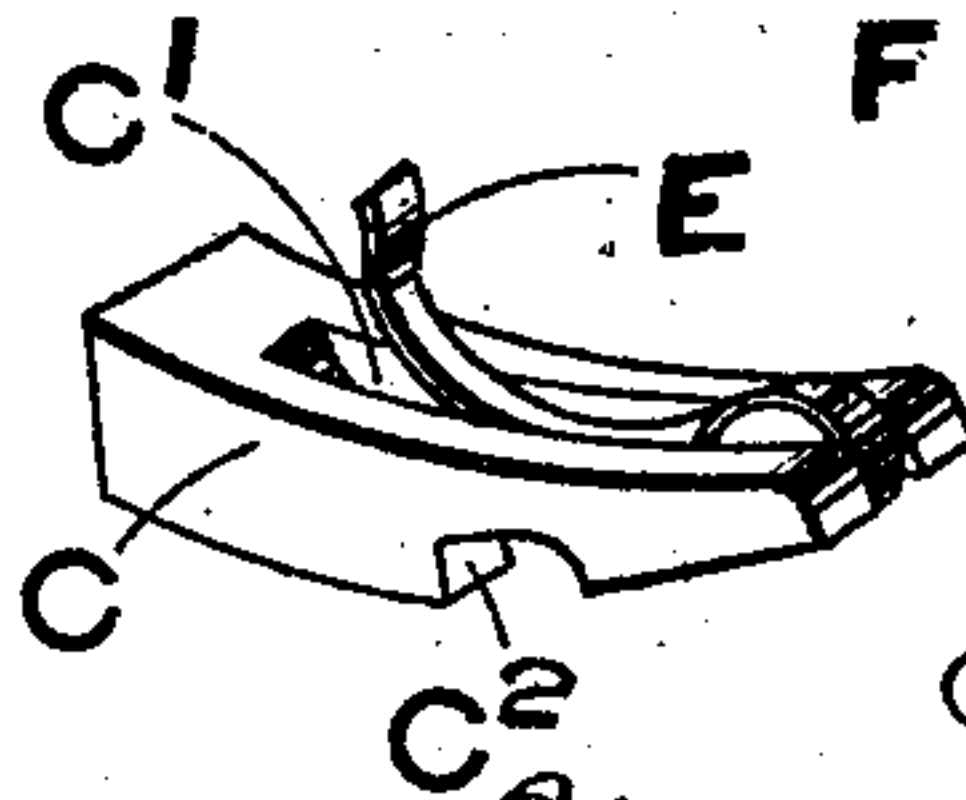


FIG. 3.



FIG. 4.



Witnesses

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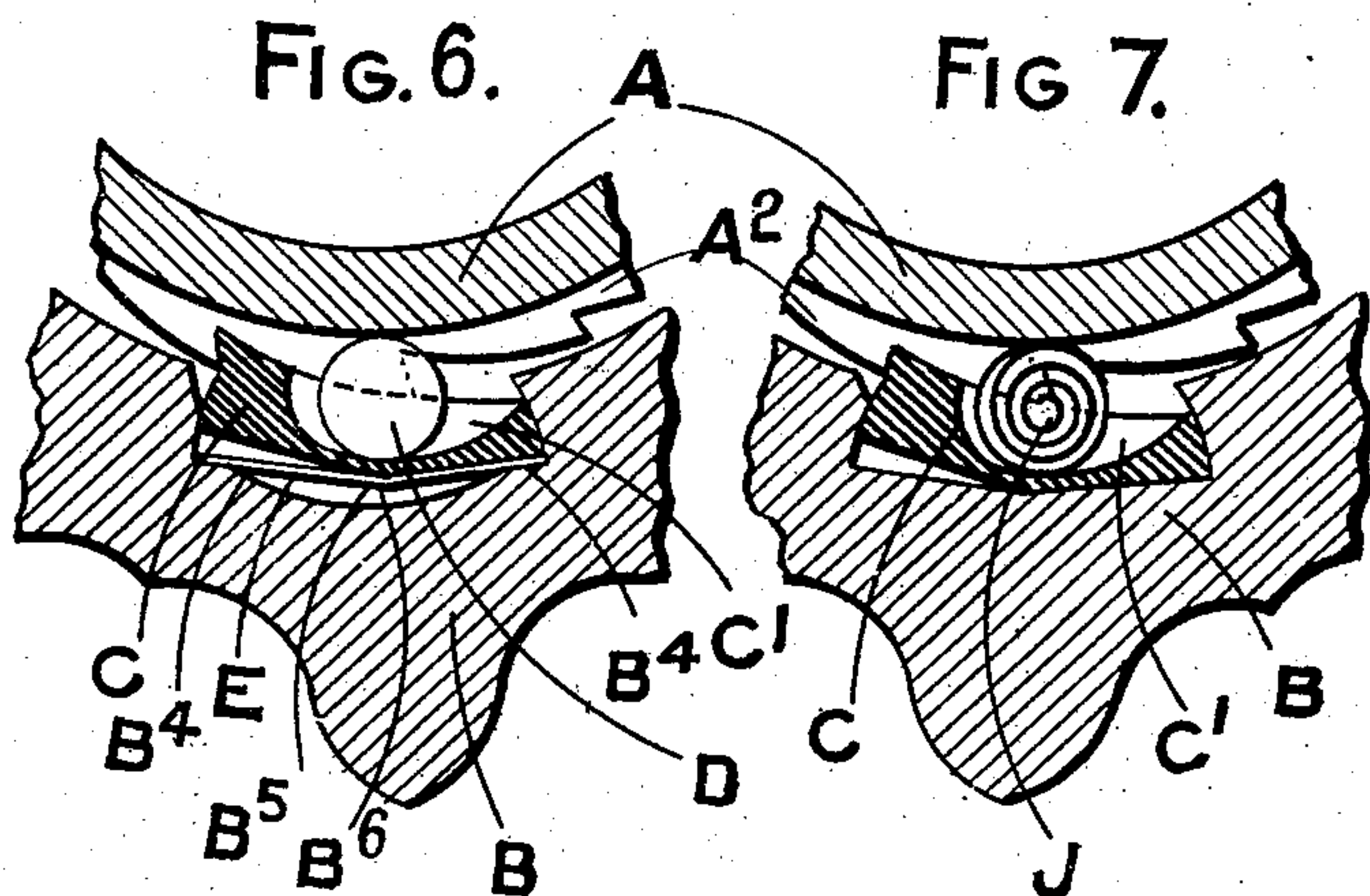
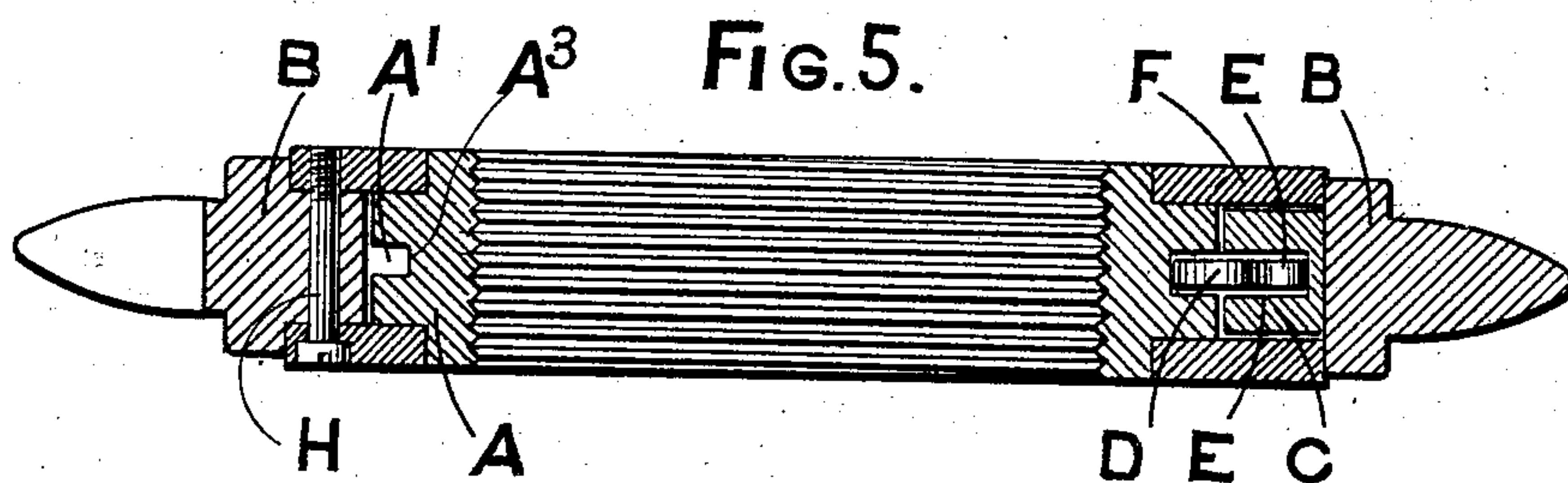
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3 Sheets—Sheet 2.



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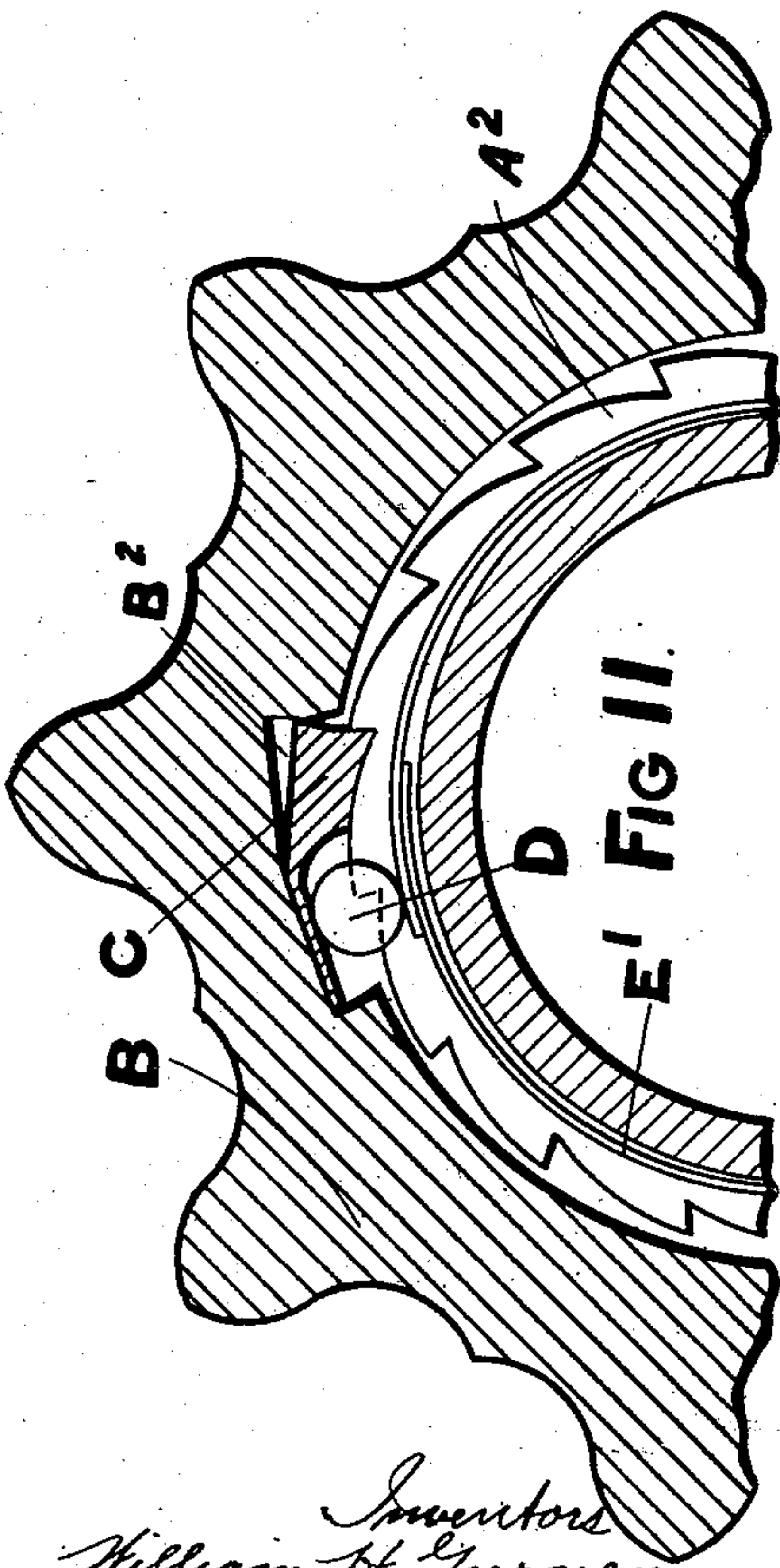
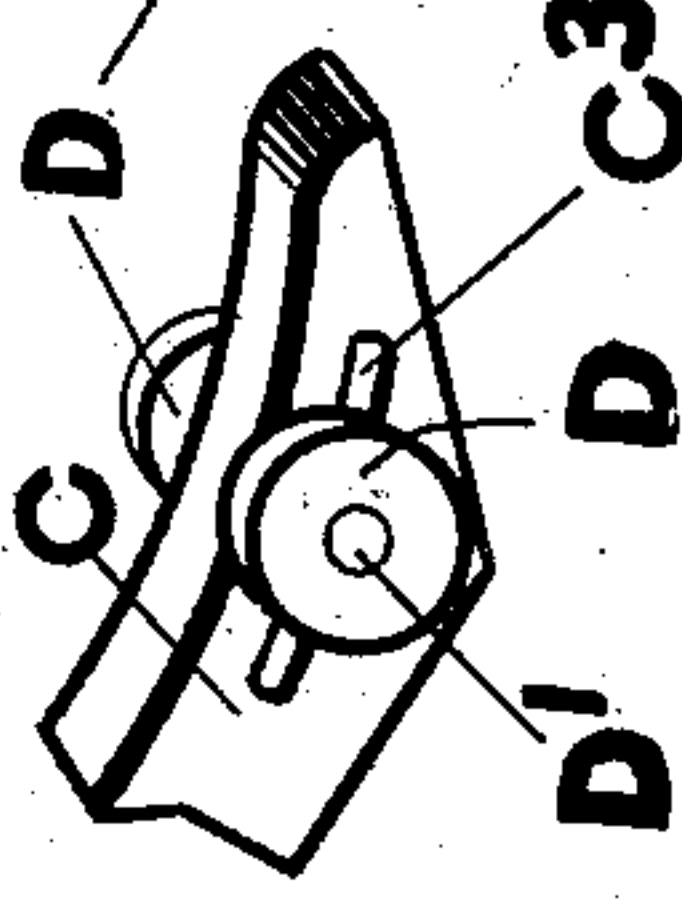
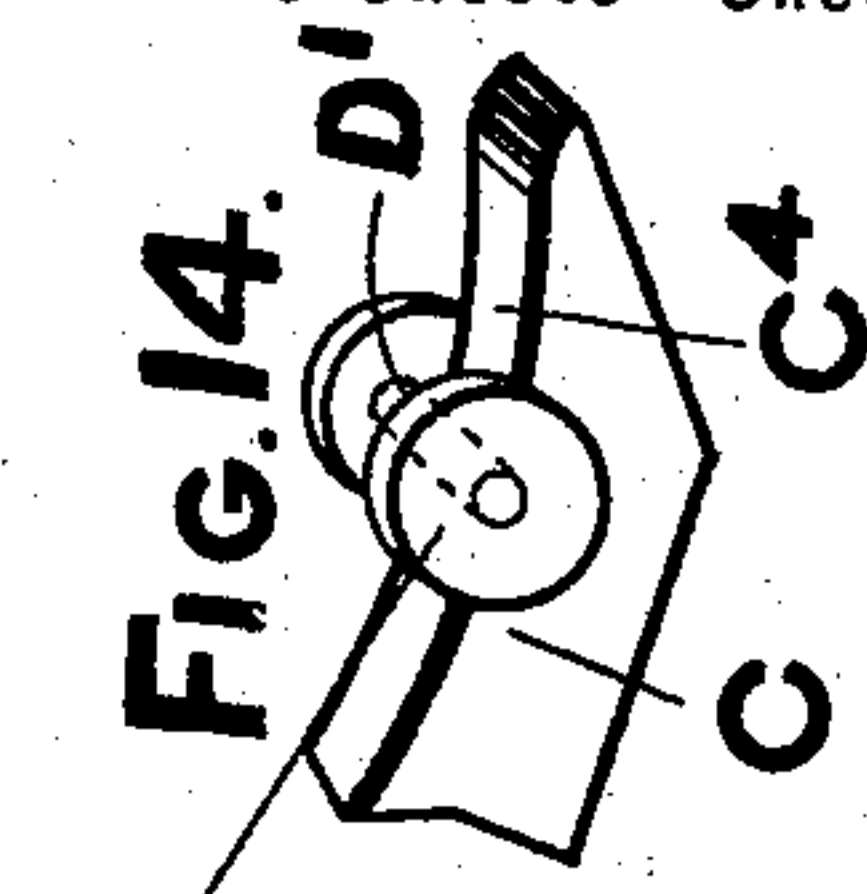
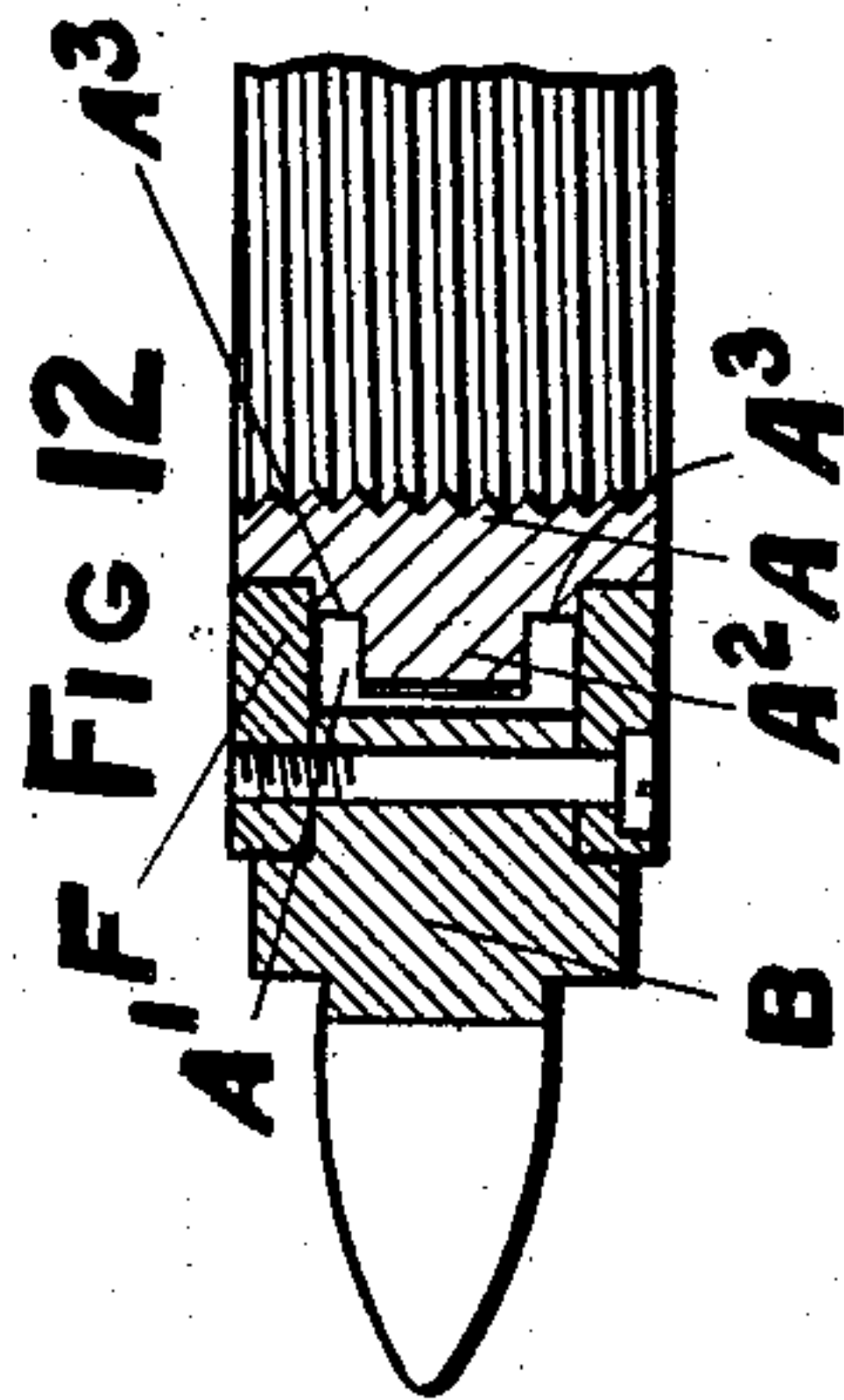
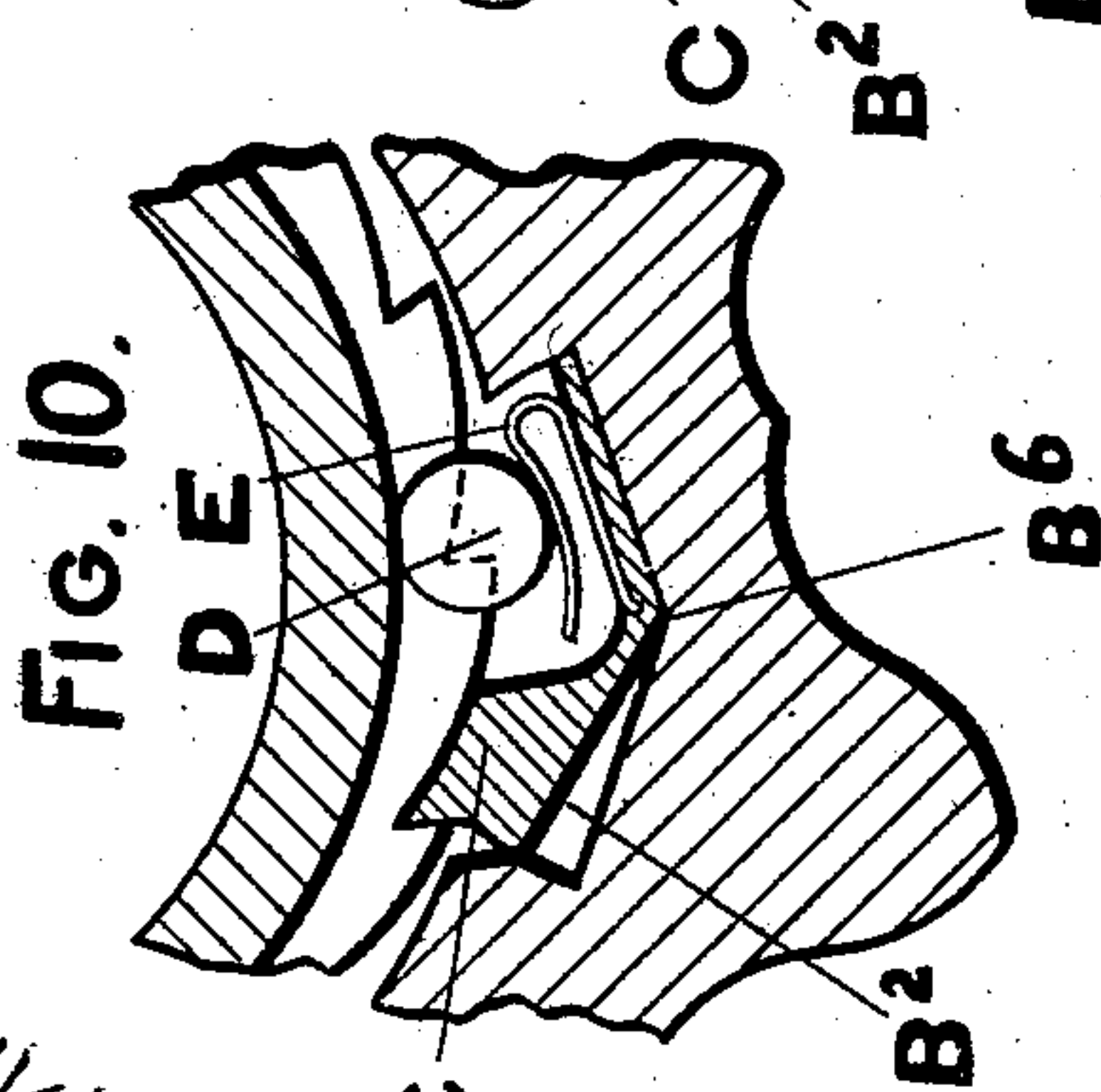
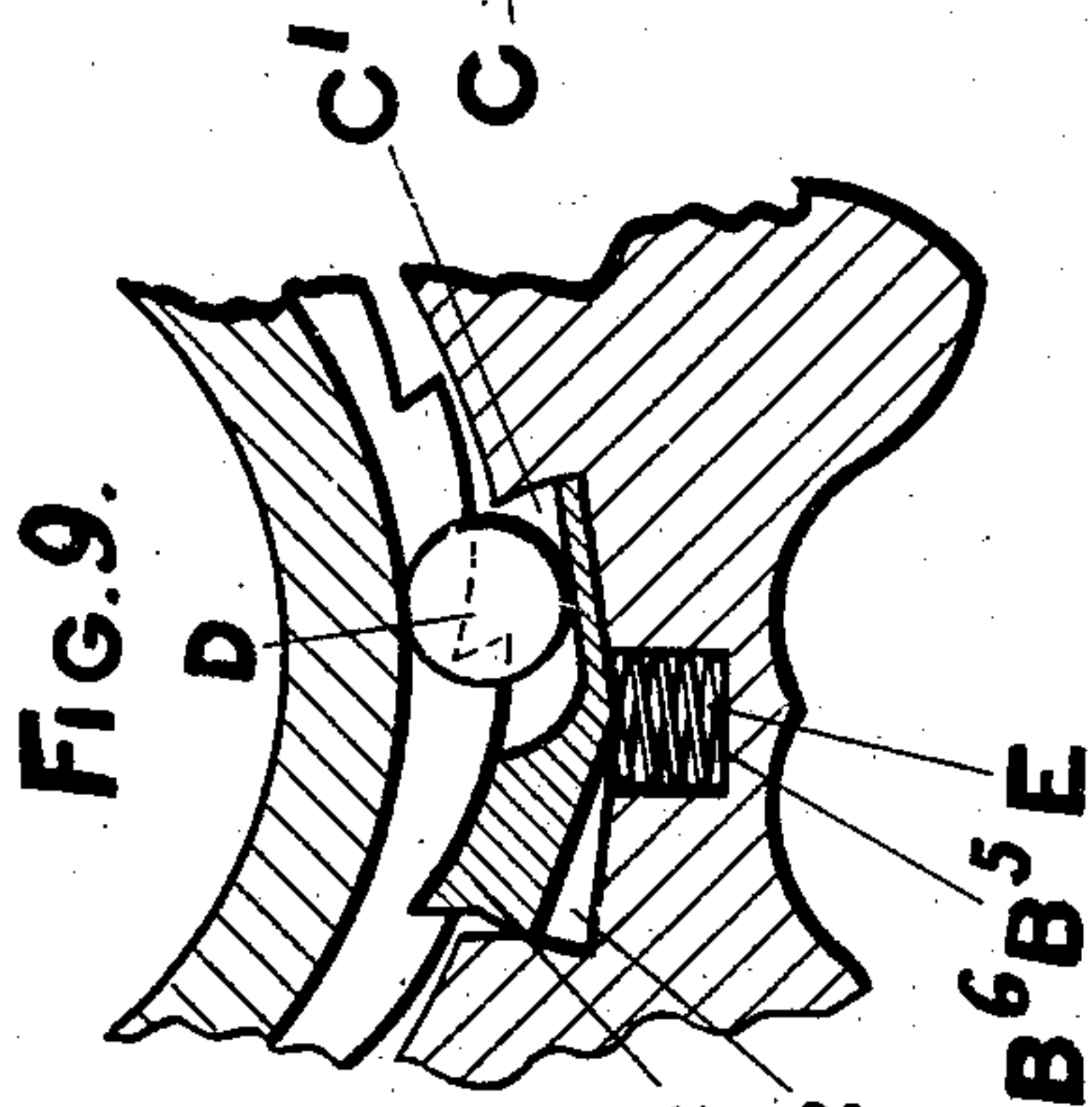
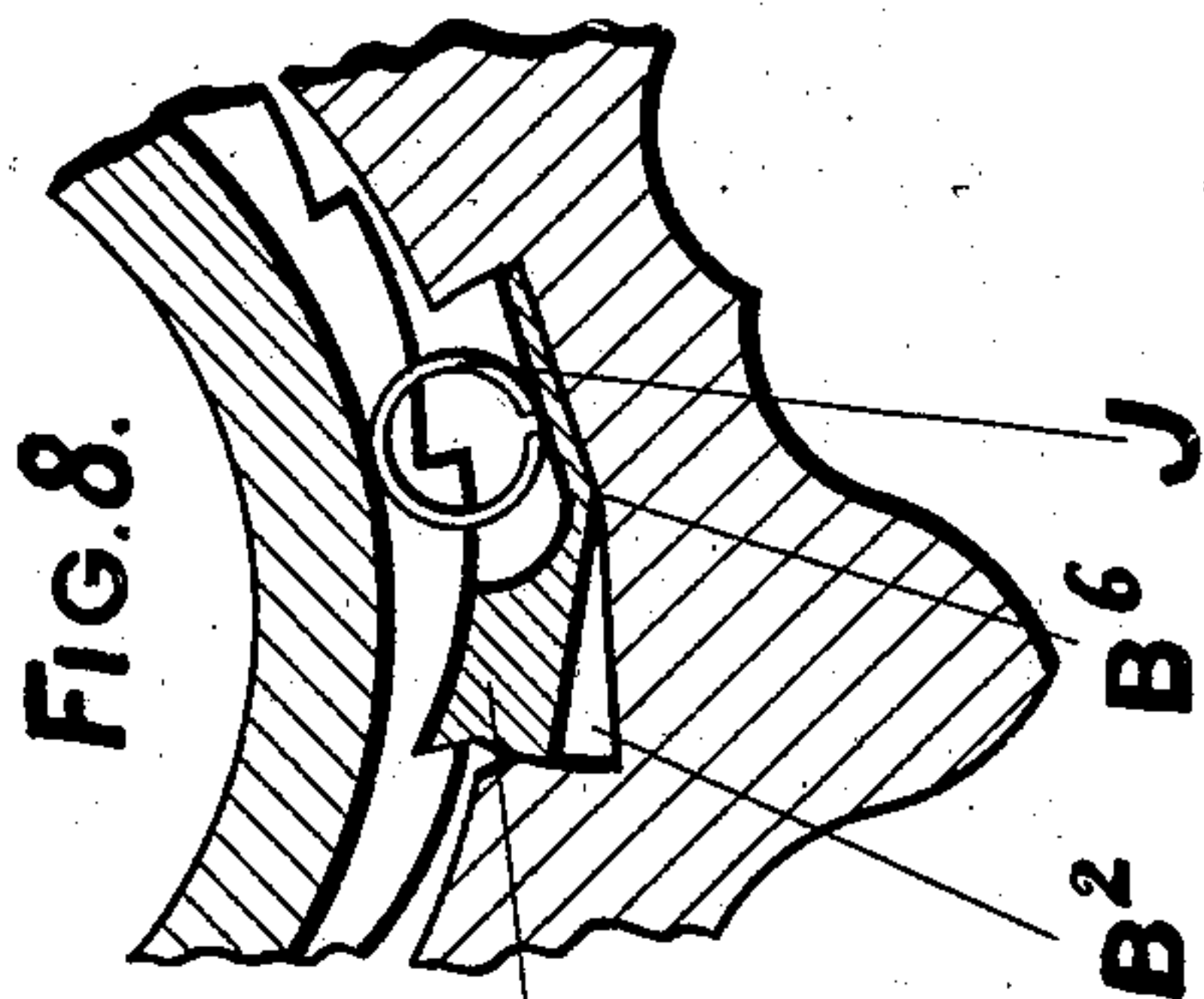
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

WILLIAM HENRY GURNEY AND SAMUEL LARK TAYLOR, OF FALMOUTH,
ENGLAND.

FREE-WHEEL OR LIKE CLUTCH.

SPECIFICATION forming part of Letters Patent No. 709,900, dated September 30, 1902.

Application filed March 6, 1901. Serial No. 50,086. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HENRY GURNEY and SAMUEL LARK TAYLOR, subjects of the King of Great Britain, residing at Falmouth, Cornwall, England, have invented a certain new and useful Improved Free-Wheel or Like Clutch, (for which we have made application in Great Britain under No. 14,094, dated the 7th of August, 1900,) of which the following is a specification.

This invention relates to pawl-and-ratchet clutches, its object being to provide means for moving and holding the pawls in inoperative position when one member of the clutch overruns the other and for returning the pawls to operative position on a reversal of the relative motion of the two members.

In carrying out this invention a cylindrical surface is provided on the ratchet-carrying member of the clutch, and the pawls are each formed with a recess containing a roller or the like which engages the cylindrical surface. Means are provided for allowing the roller to act upon the pawl at either side of its fulcrum, so that it can either move and hold the pawl in an inoperative position or return it to an operative position.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of a pawl-and-ratchet clutch constructed according to this invention. Fig. 2 is a section on the line 2 2 of Fig. 1. Figs. 3 and 4 are perspective views showing, respectively, the roller and pawl detached and hereinafter described. Fig. 5 is a section similar to Fig. 2, showing a modified construction of clutch. Figs. 6, 7, 8, 9, 10, and 11 are longitudinal sections of portions of a clutch, showing various modifications hereinafter described. Fig. 12 is a transverse section of part of a clutch according to this invention, showing a modified construction of ratchet. Fig. 13 is a perspective view of the pawl used with the ratchet shown in Fig. 12; and Figs. 14 and 15 are similar views to those shown in Fig. 13, illustrating, respectively, two modified constructions of pawl.

Like letters indicate like parts throughout the drawings.

In the construction of clutch illustrated in Figs. 1 to 4, inclusive, the ratchet-carrying portion A is adapted to be screwed to a wheel-

hub. The hub on each part A is mounted as a driven element. An annular groove A' is formed in the middle of the ratchet-teeth A², forming a cylindrical surface A³ on the ratchet-carrying member A. The other member B of the clutch embraces the ratchet-carrying member A and is provided with sprocket-teeth B', thus forming a chain-wheel. One or more, preferably three, pockets B² are formed in the interior surface of the chain-wheel B, and a pawl C is situated within each pocket. The pawls are recessed, as shown at C', and a roller D is situated in the recess of each pawl and engages with the cylindrical surface A³, formed by the groove A' in the ratchet-wheel A. Projections B³ are formed within the pockets B² and act as fulcrums to the pawls C, which are themselves recessed on their under sides, as shown at C², Fig. 4, for the reception of the projections B³. The middle portions of the projections B³ may be cut away, so as to form a continuation of the recess C' of the pawls C. A spring E is secured to each pawl C and is situated within the recess C'. The roller D bears upon the spring E, which tends to hold it in engagement with the cylindrical surface A³. When one member of the clutch overruns the other, each of the rollers D, owing to its engagement with the cylindrical surface A³, is carried from the position shown in the lower portion of Fig. 1 to the end of the spring E, as shown at the right-hand side of Fig. 1, thus moving the pawl out of engagement with the ratchet-teeth A². The spring E is preferably bent, as shown, in order to limit the movement of the roller D. On a reversal of the relative motion of the two members A and B the roller D will travel back to its original position and act upon the pawl C at the other side of its fulcrum B³, thus returning it to operative position. As shown in Fig. 2, the parts are held in position by two side plates F, which are screw-threaded on their outer edges and engage with similarly-screw-threaded flanges B⁴, formed on each side of the chain-wheel B, the inner edges of the side plate F forming a bearing for the chain-wheel B upon the ratchet-wheel A. Balls G are arranged between the two bearing-surfaces. The bearing may be adjusted by screwing the side plates F and is

locked by screws H. If desired, the ball-bearings may be dispensed with, as shown in Fig. 5, the chain-wheel and ratchet-wheel being suitably recessed and held together by the side plates F, which in this case are simply secured by the screws H.

Fig. 6 illustrates a modified construction of pawl, in which the spring E is situated beneath the pawl, the latter rocking upon the spring. In this case the projections B³ are dispensed with and the spring E is carried by shoulders B⁴, formed by continuing the pocket B², as shown at B⁵. The recess C' is so formed that as the roller D is caused to move from one side of the fulcrum B⁶ to the other by the relative movement of the parts A and B of the clutch it moves and holds the pawl in an inoperative position or returns it to operative position. The spring E, while acting as a pivot or surface upon which the pawl C may rock, tends to cause the roller D to always be in contact with both the cylindrical surface A³ and the recess C' in the pawl C.

In the modification illustrated in Fig. 7 the roller D and spring E are combined in the form of a volute spring J. If desired, the volute spring J may be replaced by a spring split ring J, as shown in Fig. 8, or two such split rings may be employed and may be either as shown or formed with overlapping ends. In all these cases the arrangement is such that the combined spring and roller J is always in engagement with both the cylindrical surface A³ and with the recess C' of the pawl C.

Fig. 9 illustrates a modification of the arrangement described with reference to Fig. 6, in which the flat spring there shown is replaced by a coil-spring E, situated within the recess B⁵. The pawl C has its fulcrum B⁶ upon the spring E or upon a plate or the like carried by the said spring.

The construction illustrated in Fig. 10 is a modified form of the arrangement shown in Fig. 1, the projections B³ being replaced by forming the bottom of the pocket B² with sloping floors meeting at a point B⁶, which latter serves as a fulcrum for the pawl, the under side of which is similarly shaped. In this case also the spring E may be differently formed, as shown.

In the construction illustrated in Fig. 11 all the rollers D bear upon the same spring-surface E', which is formed by placing a spring-band within the groove A². The ends of the spring in this case may either overlap, as shown, or the spring may be otherwise arranged so as to always tend to keep the rollers in engagement with their respective pawls. If desired, of course the spring-surface E' could be obtained by a number of independent springs suitably situated within the groove A³.

If desired, a cylindrical surface A³ may be formed on one or both sides of the ratchet-teeth A² instead of as a groove in the center, as shown in Fig. 12, and in this case two rollers D may be used, connected together by a spindle D', Fig. 13. This spindle preferably

passes through a cam-slot C³ in the pawl C, extending across the fulcrum. The cam-slot C³ is shaped so that the spindle D', connecting the rollers D, will operate the pawl C either to move and hold it in inoperative position or to return it to operative position, according to the relative movement of the parts A and B of the clutch. A modified form of this arrangement would be to retain the central groove A² and recess C' and to provide the roller D with a short spindle on each side engaging a similar cam-slot or groove formed in the sides of the recess C'.

As a further modification of the arrangement of pawl and roller shown in Fig. 13 the spindle D' may bear upon the inner surface C⁴ of the pawl C, Fig. 14, instead of in a cam-slot, the surface being suitably formed so as to insure the relative motion of the two members of the clutch causing the desired operation of the pawl, or the rollers may bear upon suitably-shaped paths or springs C⁵, formed or secured on the sides of the pawls C, Fig. 15. In this case the spindle D' may be used or not, as desired.

It is to be understood that although the driving member has been described and illustrated as having the pockets containing the pawls and the driven member as carrying the ratchet, these parts may be reversed, the pawls being carried by the driven member and the ratchet being on the driving parts of the clutch.

Clutches constructed according to this invention may be used to connect two rotary members in all cases where it is desired to allow relative motion in one direction and not in the other.

It has been found in practice that good results are obtained when the roller or rollers D are only allowed to move up to the fulcrum of the rocking pawls and not beyond it, as the backlash is diminished and a quicker return obtained.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a clutch, the combination of a driving member, a driven member, ratchet-teeth carried by one member between the driving and driven members, a cylindrical surface adjacent to the teeth and carried by the same member, a rocking pawl carried loosely by the other member to rotate with it and move relatively thereto, a rolling body situated between the pawl and the cylindrical surface and which rocks the pawl into and out of engagement with the teeth and a spring which maintains the rolling body in contact with the cylindrical surface, substantially as set forth.

2. In a clutch, the combination of a driving member, a driven member, ratchet-teeth carried by one member between the driving and driven members, a cylindrical surface adjacent to the teeth and carried by the same member, a rocking pawl carried loosely by the other member and separate from it, a roll-

ing body situated between the pawl and the cylindrical surface and which rocks the pawl both into and out of engagement with the teeth and a spring which maintains the rolling body in contact with the cylindrical surface, substantially as set forth.

3. In a clutch, the combination of a driving member, a driven member, ratchet-teeth carried by one member between the driving and driven members, a cylindrical surface adjacent to the teeth and carried by the same member, a stationary rocking pawl carried by the other member, a rolling body situated between the pawl and cylindrical surface and a spring carried by the pawl and disposed between the pawl and rolling body, substantially as set forth.

4. In a clutch, the combination of a driving member, a driven member, ratchet-teeth carried by one member between the driving and driven members, a cylindrical surface adjacent to the teeth and carried by the same member, a recess in the other member, a stationary rocking pawl carried in this recess, a rolling body situated between the pawl and the cylindrical surface, and a spring to maintain the rolling body in contact with the cylindrical surface, substantially as set forth.

5. In a clutch, the combination of a driving member, a driven member, ratchet-teeth carried by one member between the driving and driven members, a cylindrical surface adjacent to the teeth and carried by the same member, a recess in the other member, a stationary rocking pawl carried in this recess, a rolling body situated between the pawl and the cylindrical surface, and a spring carried by the pawl and disposed between the pawl and rolling body, substantially as set forth.

6. In a clutch, the combination of a driving member, a driven member concentric with the driving member, ratchet-teeth carried on the periphery of one member, a cylindrical surface adjacent to the teeth and carried by the same member, a rocking pawl carried by and fulcrumed loosely on the other member which is formed annular, a rolling body situated between the pawl and cylindrical surface to rock the pawl into and out of engagement with the teeth and a spring to maintain the rolling body in contact with the cylindrical surface, substantially as set forth.

7. In a clutch, the combination of a driving

member, a driven member concentric with the driving member, ratchet-teeth carried on the periphery of one member, a cylindrical surface adjacent to the teeth and carried by the same member, a rocking pawl carried by and fulcrumed loosely on the other member which is formed annular, a rolling body situated between the pawl and cylindrical surface and a spring carried by the pawl and disposed between the pawl and rolling body, substantially as set forth.

8. In a clutch, the combination of a driving member, a driven member concentric with the driving member, ratchet-teeth carried on the periphery of one member, a cylindrical surface adjacent to the teeth and carried by the same member, a recess in the other member which is formed annular and lies outside the ratchet-teeth, a stationary rocking pawl carried in this recess, a rolling body situated between the pawl and cylindrical surface, and a spring carried by the pawl and disposed between the pawl and rolling body, substantially as set forth.

9. In a clutch, the combination of an inner member carrying ratchet-teeth on its periphery and a cylindrical surface adjacent to the teeth, an outer annular member, a recess in this member, a stationary rocking pawl carried in this recess, a rolling body situated between the pawl and the cylindrical surface of the inner member and a spring carried by the pawl and situated between the pawl and the rolling body substantially as set forth.

10. In a clutch, the combination of an inner member carrying ratchet-teeth on its periphery and a cylindrical surface adjacent to the teeth, an outer annular member, a recess in this member, a stationary rocking pawl carried in this recess, a recess in this pawl, a rolling body situated in the recess in the pawl and between the pawl and the annular surface of the inner member and a spring carried by the pawl and situated between the pawl and rolling body, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM HENRY GURNEY.

SAMUEL LARK TAYLOR.

Witnesses:

W. Y. SHARPE,

E. J. MOSELEY.