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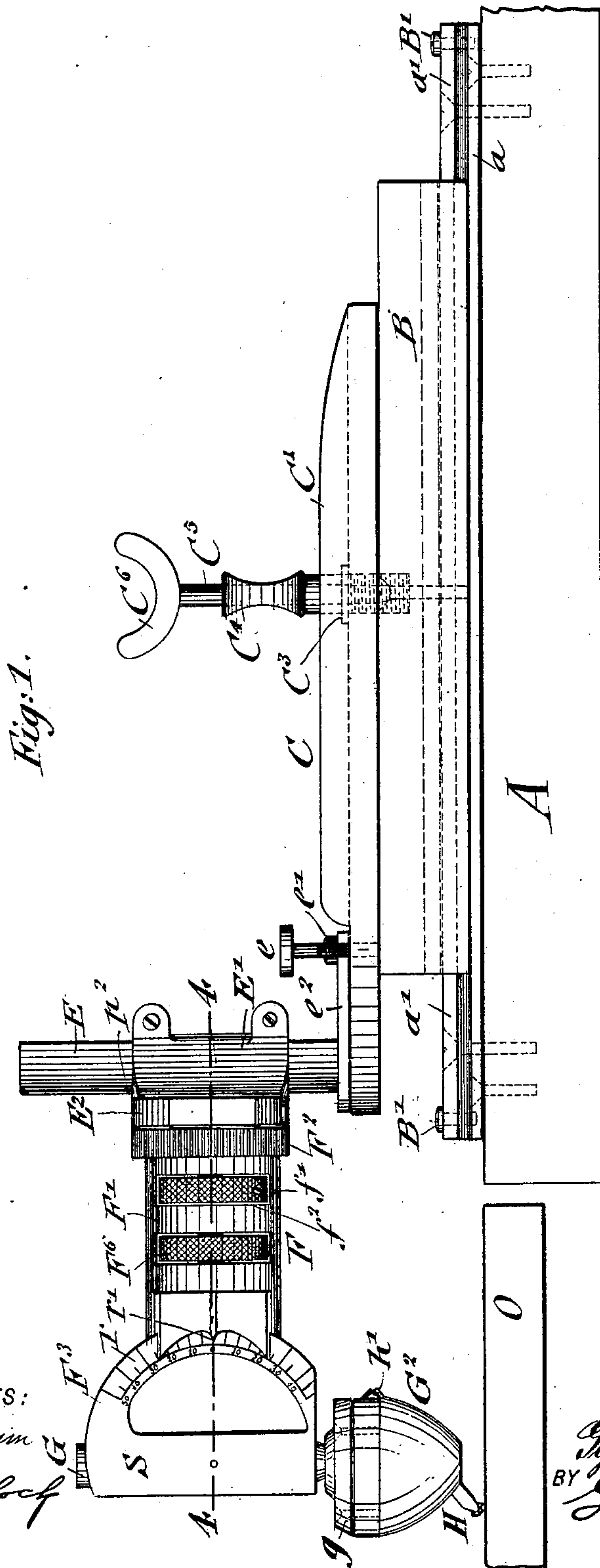
Patented July 2, 1901.

G. ARMENY.
DIAMOND POLISHING MACHINE.

(Application filed Feb. 14, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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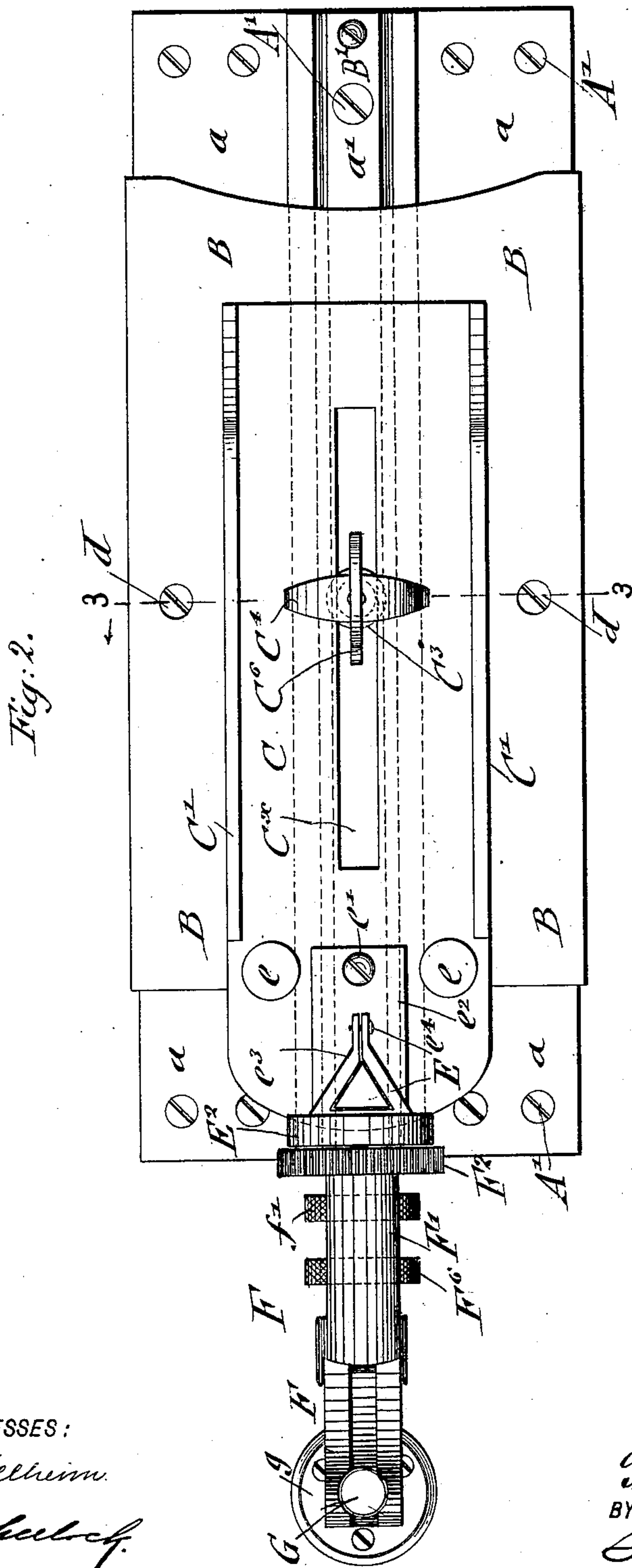
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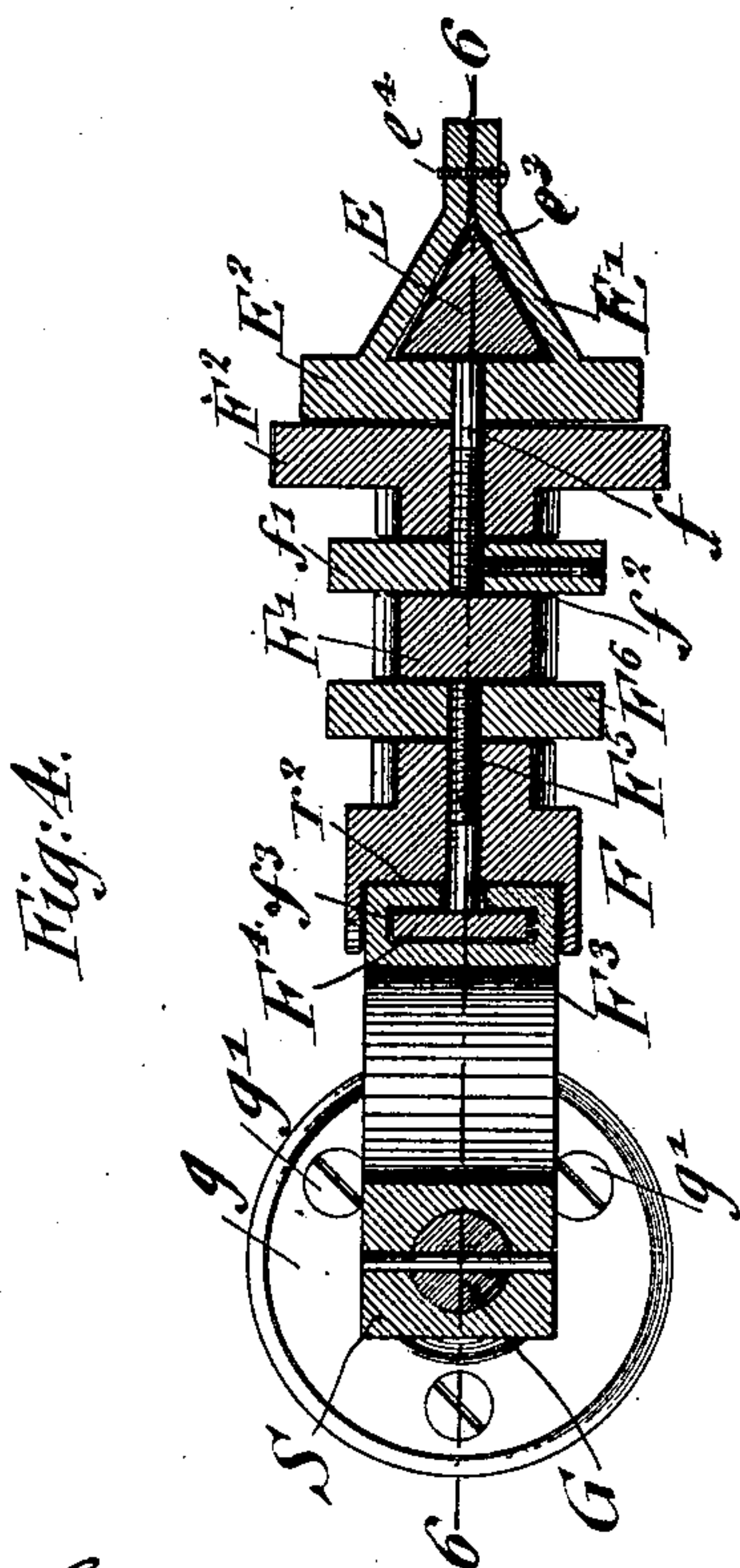
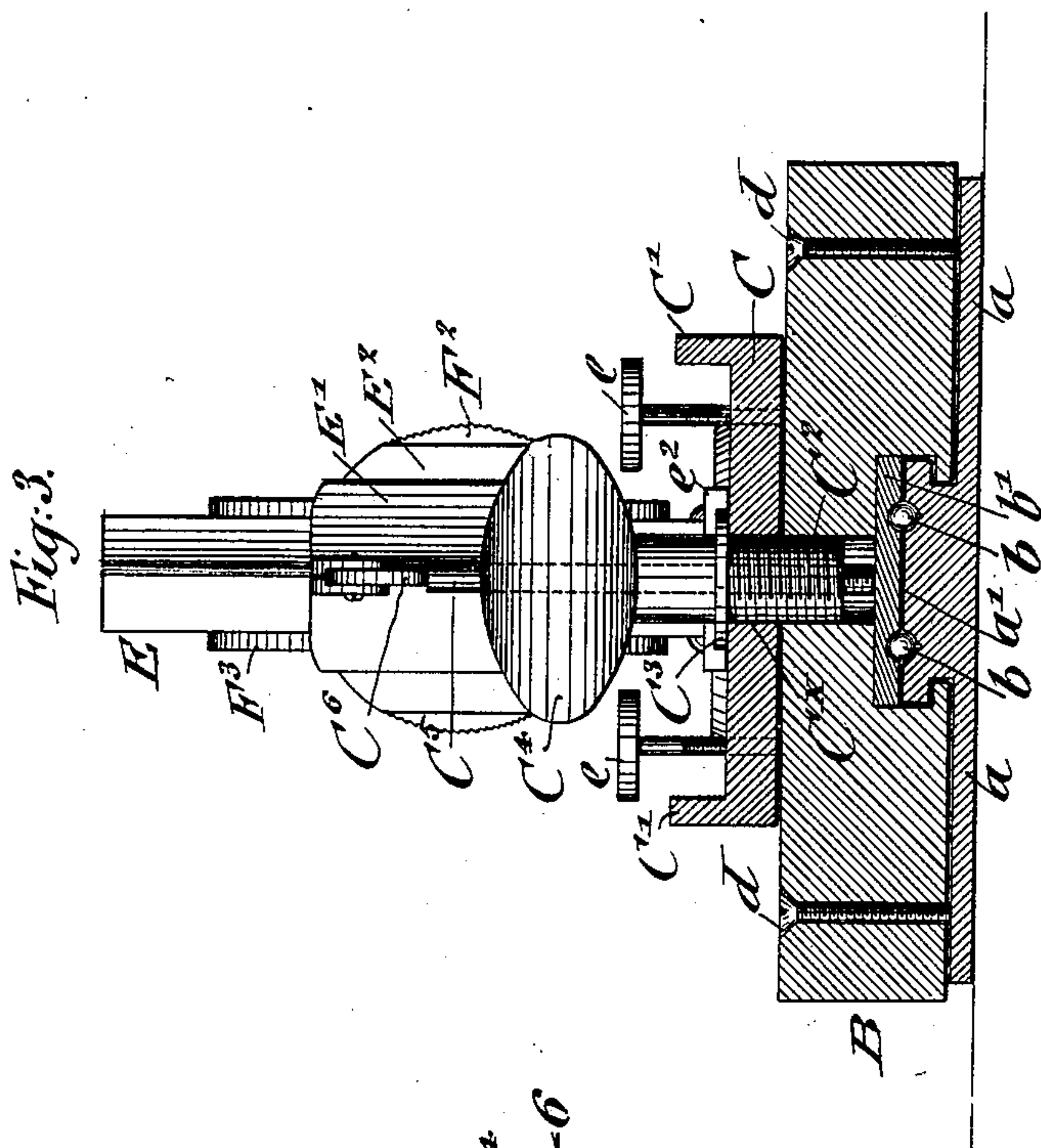
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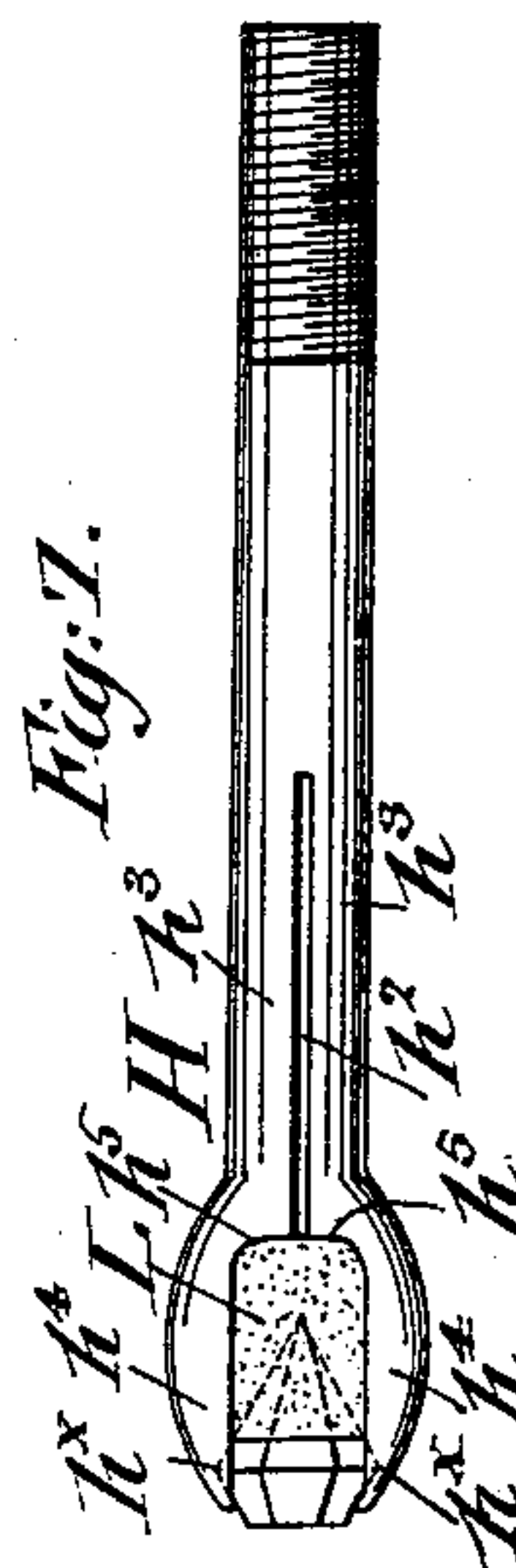
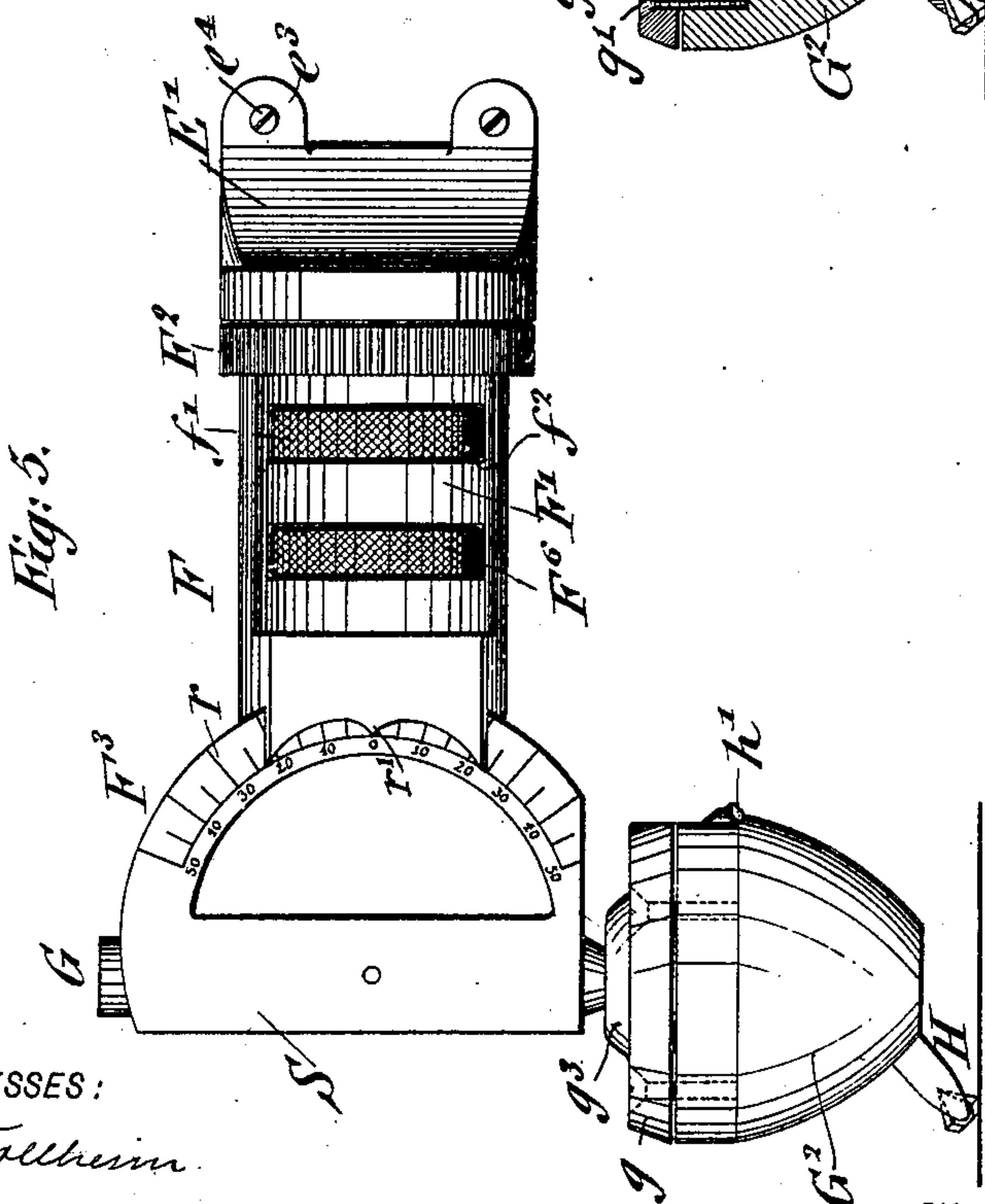
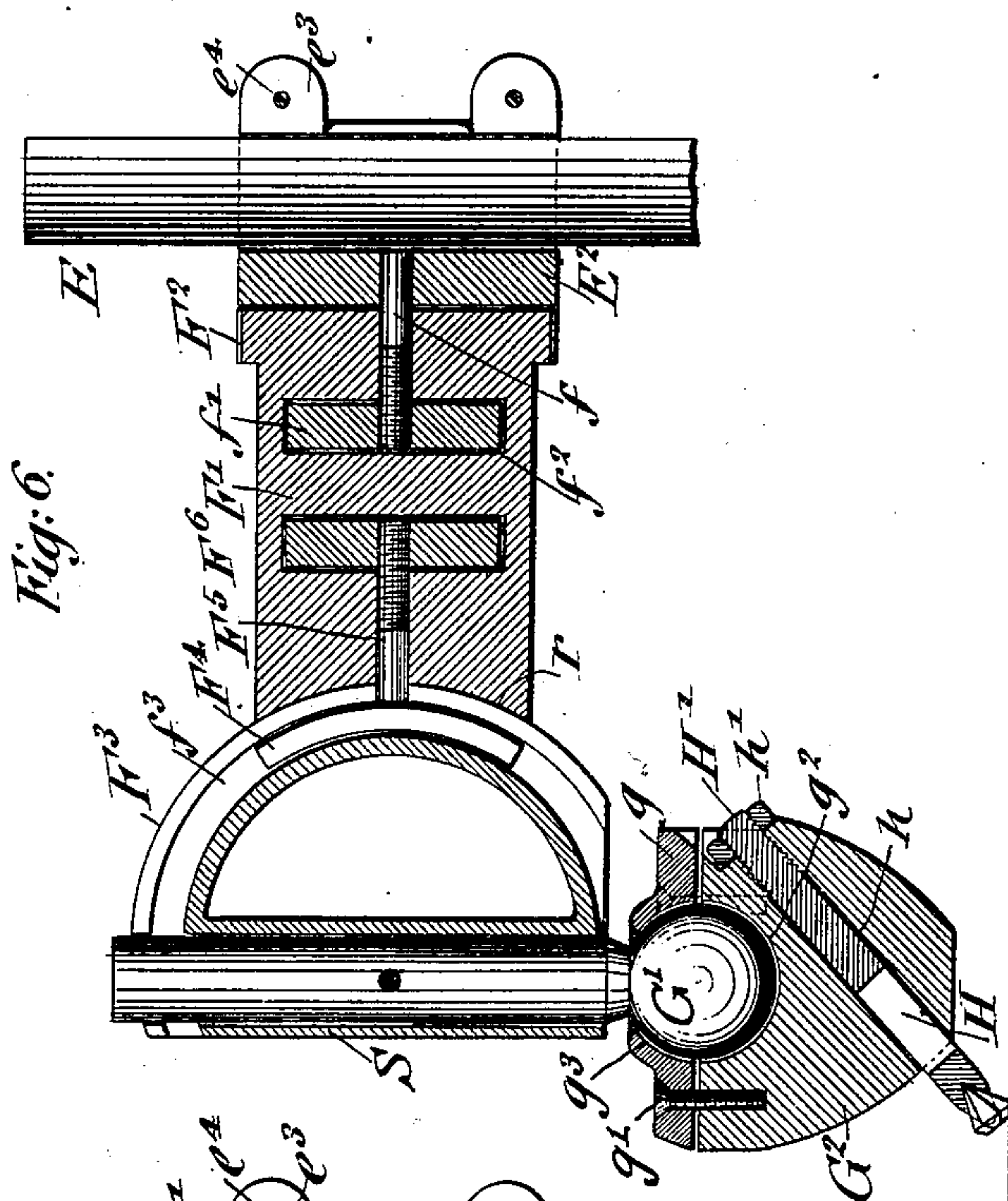
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

GYULO ARMENY, OF NEW YORK, N. Y.

DIAMOND-POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 677,613, dated July 2, 1901.

Application filed February 14, 1901. Serial No. 47,310. (No model.)

To all whom it may concern:

Be it known that I, GYULO ARMENY, a citizen of the United States, residing in New York, borough of Bronx, in the State of New York, have invented certain new and useful Improvements in Diamond-Polishing Machines, of which the following is a specification.

This invention relates to certain improvements in diamond-polishing machines by which the table, culet, and facets of diamonds and other precious stones may be accurately and quickly polished, so as to substitute the more accurate machine-work for the hand labor generally used for this purpose heretofore.

The invention consists of a diamond-polishing machine which comprises a bed-plate provided with a guideway, a slide-block movable on said way, and preferably supported thereon by antifriction-balls, an adjustable slide-plate on said block and provided with a standard, a dop-supporting frame mounted on said standard and provided with a downwardly-projecting ball, and a dop provided with a socket corresponding with said ball and with an inclined clutch for holding the diamond, such ball-and-socket joint permitting the free adjustment of the dop and changing the angle of the clutch.

The invention also consists of a clutch provided with recessed spring-jaws, the operative ends of the jaws being offset from the shanks of the jaws, so as to form shoulders or abutments at the outer end of the slit between the shanks of the jaws, so that a seat for a piece of soft metal is formed.

The invention consists, further, of certain details of construction and combinations of parts, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of my improved diamond-polishing machine. Fig. 2 is a plan view of the same. Fig. 3 is a vertical transverse section on line 3 3, Fig. 2, in the direction of the arrow. Fig. 4 is an enlarged horizontal section on line 4 4, Fig. 1. Fig. 5 is a side elevation of the dop-supporting frame, dop, and clutch detached from their support. Fig. 6 is a vertical section on line 6 6, Fig. 4;

and Fig. 7 is an enlarged side elevation of the clutch.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the bed-plate of my improved diamond-polishing machine. The bed-plate is superposed by two side plates *a a* and a central rail or guideway *a'*, the latter being raised above the side plates *a a*, so as to guide the slide-block B thereon. Screws *A'* attach the plates *a* and guide-rail *a'* to the bed-plate A. The slide-block B can be readily moved forward and backward in the ways by the attendant, its motion being limited by stops *B'* and ease of motion of the block being secured by means of antifriction-balls *b*, which are interposed between a steel plate *b'*, located in a central longitudinal recess of the slide-block, and the central guideway *a'*, the top of the guideway and the under side of the said steel plate being provided with suitable raceways for the balls *b*. The slide-block B is provided at each side with steadying-screws *d*, which pass through the block and which serve to form contact with the plates *a* of the base-plate A, said screws serving to set the slide-block in properly-leveled position, so as to permit the easy forward-and-backward motion of the same on the guideways and antifriction-balls.

On the top of the slide-block B is supported a centrally-slotted slide-plate C, which is provided with longitudinal flanges *C'* at its sides, so as to permit the easy grasping of the same and the shifting of the slide-block in forward and backward direction on the guideways. The slide-plate C is connected with the slide-block B by means of a clamping-screw *C²*, the threaded lower end of which engages an interiorly-threaded socket of the slide-block, as shown clearly in Fig. 3. The clamping-screw extends through a slot *C^x* in the slide-plate C and is provided with a shoulder *C³* above the threaded part, that bears on the top of the slide-plate, while the upper end is provided with a thumb-piece *C⁴*, so as to facilitate the tightening or loosening of the clamping-screw. The clamping-screw *C²* is provided with a central bore, through which extends a clamping-screw *C⁵*, which is provided at its upper end

with a thumb-piece C^6 for handling the same and abuts at its lower end on longitudinal steel plate b' , located in the center recess of the slide-block B, so as to form a rigid connection of the slide-plate with the steel plate.

The plate C is provided at its front portion with a standard E, preferably of triangular cross-section, for the support of the dop-supporting frame F, and near the same, at each side of the standard E, with a set-screw e , which screws e serve for adjusting the slide-plate C, and thereby the dop-supporting frame F, slightly higher or lower relatively to the central clamping-screw C^2 whenever a slight raising or lowering of the stone relatively to the polishing-disk is required. The standard E is rigidly supported at the end of the slide-plate C by means of a set-screw e' , which screws through a footpiece e^2 and permits the vertical adjustment of the frame F by means of a socket E' of corresponding shape, to which the dop-supporting frame is attached. The socket E' is provided with ears e^3 and clamping-screws e^4 , so as to be tightly applied to the standard E. The dop-supporting frame F is applied to the guide-socket E' by a horizontal pin f , fixed on the socket. The socket E' is provided with a disk-shaped face portion E^2 , on which is supported by center pin f the horizontal portion F' of the dop-supporting frame F, the rear end of which is provided with a milled disk-shaped head F^2 adjacent to the disk E^2 , and the central connecting-pin f being provided with a knurled nut or head f' , located in a transverse recess f^2 of the horizontal dop-supporting frame, as shown in Figs. 1 and 4. The shank of the connecting-pin is threaded, as is also the knurled head, so that the knurled head may be applied with greater or less tightness to the horizontal portion F' and permit thereby the more or less easy turning of the same on its horizontal axis.

To the front end of the horizontal portion F' of the dop-supporting frame F is applied a segmental frame F^3 , which is capable of adjustment on the end of the horizontal portion F' , it being provided for that purpose with an undercut center groove f^3 , in which is located a friction-block F^4 , which is clamped with more or less pressure by a set-screw F^5 , provided with a knurled nut or head F^6 in the same manner as the set-screw or pin of the horizontal portion. The block F^4 , guided in the center ways of the segmental guide-frame F^3 , is adjustable to the required degree of friction on the same, so as to permit the adjustment of said guide-frame F^3 to any suitable angle relatively to the horizontal plane.

A spindle G is fixed in a sleeve S of the segmental frame F^3 , to the lower end of which spindle is applied a dop G^2 , the same being connected therewith by a ball-and-socket joint.

Referring more particularly to Figs. 5 and 6, G' indicates a ball or spherical head formed on the lower end of the spindle G, so as to

protrude below the segmental frame F^3 . An orificed cap-plate or box g is secured to the top of the dop G^2 by means of screws g' , said dop having a hemispherical top recess g^2 and the cap-plate having a complementary hemispherical recess g^3 , so that a socket is formed which receives the ball G' , whereby a ball-and-socket joint connects the dop with the spindle. The ball-and-socket joint permits of a quicker and more varied adjustment of the dop than can be obtained by the axial adjustment of the horizontal portion of frame F and the circular adjustment of the segment F^3 , and it may be used either separately or together with the said adjustments. Ordinarily, however, when a quicker adjustment of the dop is required the friction-tight dop is taken hold of and shifted to the desired position. The dop G^2 is provided with an inclined guide-opening h , in which is located the forked spring-clutch H, the bifurcations of which are provided with recesses h^x , engaging the diamond or other precious stone to be polished. The clutch is adjusted at the upper end by means of a screw-nut h' , which engages the threaded shank H' of the clutch, so as to set it higher or lower in the dop G^2 . By lowering it the clutch spreads apart, and by withdrawing it the clutch tightly clamps the stone to be polished, as shown clearly in Fig. 6. The dop and its clutch are supported above a rotary polishing-disk O, of the well-known construction, which rotates in close proximity to the slide-block on the table.

Clutch H is of peculiar construction, as shown more clearly in Fig. 7. At its outer end it is split at h^2 , so as to form parallel shanks h^3 of jaws h^4 , which are offset from the split h^2 to form shoulders or abutments h^5 . It is apparent that by tightening up the nut h' the jaws h^4 will be caused to firmly bind upon the stone. The slit or split h^2 permits of sufficient spring of the jaws without causing a wide gap, and, in fact, this portion of the clutch is practically protected within the dop, so that no particles of diamond-powder may lodge therein. The wide gap between the offset jaws h^4 forms a space into which a leaden or equivalent soft metallic filling-piece L may be inserted. Before the diamond is clutched this space is filled neatly with such filling-piece L, so as to leave no crevices or spaces into which diamond-powder may lodge. The diamond is then seated at the table or culet into the filling-piece L and clutched. If, as in the ordinary clutch, a wide gap was left between the jaws, the diamond-powder from the polishing wheel or disk O would lodge therein and prevent the polishing action. It has been found in practice that an ordinary steel clutch when grasping the stone does not bind so firmly upon the same as to prevent vibration of the stone. This is due to the unyielding or hard nature of the steel. In my invention the clutch is composed of phosphor-bronze, which is both strong enough to secure the stone and soft enough to set more or less softly

and yieldingly on the stone, so that in connection with the leaden filling-piece L the stone is practically embedded in a soft and yielding seat, practically as in the old form of lead dop, and the stone will not jar or vibrate. The phosphor-bronze, while softer than steel, is, so to speak, a "cool" metal and heats up but slightly.

By means of the axially-adjustable horizontal portion F' of the dop-supporting frame, the segment that moves in a vertical plane at the end of the same, and the axially-adjustable dop the facets of the stone to be polished can be adjusted to any desired position relatively to the polishing-disk, the horizontal portion permitting the adjustment toward the vertical plane, the guide-segment toward the horizontal plane, and the ball-and-socket joint the adjustment of the dop on its axis, so that thereby every requirement of a diamond-polishing machine is obtained. The freedom of motion permitting the adjustment of the dop on its axis also enables the clutch to be pointed in different directions above the polishing-wheel, according to the grain of the diamond, and, in fact, the ball-and-socket joint not only permits this adjustment, but also every requisite adjustment, in a quick manner for angles of the facets with respect to the girdle, for the angles of the facets to each other, and for the table and culet, so that a great variety of adjustments may be obtained in my machine. The guide-segment F³ is preferably graduated at one side at r and operated in connection with an index r' on the ways r^2 of the horizontal supporting part, so that the degree of the angle to which the dop has to be set can be readily ascertained and secured whenever the ball-and-socket joint is not used for obtaining the angular adjustment of the axis of the dop with respect to the spindle.

My improved diamond-polishing machine has the advantage that the polishing of the facets can be accomplished in a more accurate manner and more quickly than by hand, owing to the ball-and-socket adjustment and the mathematical adjustment of the facets of the stone by the dop-supporting frame, so that not only the table and culet, but also the side and bottom facets, can be polished one after the other in a quick, exact, and comparatively economical manner. All the attendant has to do is to properly watch the facets and to produce intermittently the forward and backward sliding of the slide-block, so as to move the facet over nearer to or farther away from the axis of the polishing-disk, and thereby change the relative position of the stone to the rotating disk and produce the more effective polishing action of the same. This to-and-fro motion of the slide-block with the dop-supporting frame is only required when the final polishing of the facet is to be accomplished.

What I claim as new is—

1. In a diamond-polishing machine, the combination of a bed-plate provided with guideways, a slide-block guided on said ways, anti-friction-balls located in raceways of the bed-plate and slide-block, a wear-plate located between the anti-friction-balls and the slide-block, means acting on the wear-plate for binding the wear-plate upon the balls and in turn upon the bed-plate, and for binding the slide-block upon the bed-plate, whereby the slide-block may be rigidly connected with the bed-plate, and a dop suitably supported from the slide-block, substantially as set forth.

2. In a diamond-polishing machine, the combination of a bed-plate provided with guideways, a slide-block guided on said ways, anti-friction-balls located in raceways between the bed-plate and slide-block, an adjustable slide-plate on said block, means for clamping the slide-plate to the block, means for clamping the slide-block to the bed-plate, a dop, and a dop-supporting frame suitably supported from the slide-plate, substantially as set forth.

3. In a diamond-polishing machine, the combination of a bed-plate, a slide-block guided on the same, an adjustable slide-plate on said block, means for clamping said slide-plate to the block, a standard at the end of said slide-plate, a horizontal frame secured adjustably to said standard, a dop-supporting frame, means for adjusting the same on said horizontal frame, a dop, means for adjusting the dop on its axis, and a clutch supported in an inclined position in said dop for holding the diamond or other stone, substantially as set forth.

4. In a diamond-polishing machine, the combination of a bed-plate, a slide-block guided on the same, an adjusting slide-plate on said slide-block, means for clamping the slide-plate to the slide-block, a standard supported at the end of said slide-plate, a horizontal frame guided on said standard, means for adjusting the frame on said standard, a graduated segmental frame guided in the end of said horizontal frame, means for adjusting the segmental frame in suitable position thereon, a dop supported thereon, means for axially adjusting said dop, and an inclined stone-holding clutch supported in said dop, substantially as set forth.

5. In a diamond-polishing machine, the combination of a bed-plate, a slide-block guided thereon, a standard suitably supported above the slide-block, a horizontal frame mounted on said standard and adjustable around its longitudinal axis, a dop-supporting frame, adjustable at an angle to the aforesaid frame, a dop, and means for holding the stone on the dop, substantially as set forth.

6. The combination with the dop, provided with an inclined hole, of a forked spring-clutch, the bifurcations of which project through one end of the hole and are adapted to clutch a stone, said clutch being longitudinally movable in said hole, and means at

the other end of said hole, for operating the clutch and for fixing it against movement, substantially as set forth.

7. The combination, with a dop-supporting spindle provided with a ball, of a dop provided with means for retaining a stone, said dop having a socket for receiving said ball, whereby a ball-and-socket joint is formed between the dop and the spindle, said ball being fixed relatively to the dop, and said dop being adjustable at various angles of inclination to the relatively fixed ball, substantially as set forth.

8. The combination, with a dop for a diamond-polishing machine, of an inclined stone-holding clutch carried by the dop, substantially as set forth.

9. The combination, with a dop-supporting spindle provided with a ball, of a dop provided with an inclined stone-holding clutch, said dop having a socket for receiving said ball, whereby the dop and clutch are adjustable at various angles to the ball, substantially as set forth.

10. The combination, with a clutch having suitable jaws, of a soft filling-piece inserted within said jaws and closing the space between the inner ends of the jaws, so that a stone may be seated in said filling-piece and be clutched by the outer ends of the jaws, substantially as set forth.

11. The herein-described clutch, consisting of a split body provided with recessed jaws offset from the split so as to form shoulders or abutments at the outer end of the split, and a soft-metal filling-piece resting between said jaws, against said shoulders, and the extremities of the said jaws projecting beyond the filling-piece so as to clutch a stone and to retain it in the seat formed by the filling-piece, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

GYULO ARMENY.

Witnesses:

JOSEPH H. NILES,
GEO. L. WHELOCK.