

No. 643,810.

Patented Feb. 20, 1900.

C. BURIAN.

CONTRIVANCE FOR AVOIDING COLLISIONS OF TRAINS.

(Application filed Sept. 25, 1899.)

(No Model.)

5 Sheets—Sheet 1.

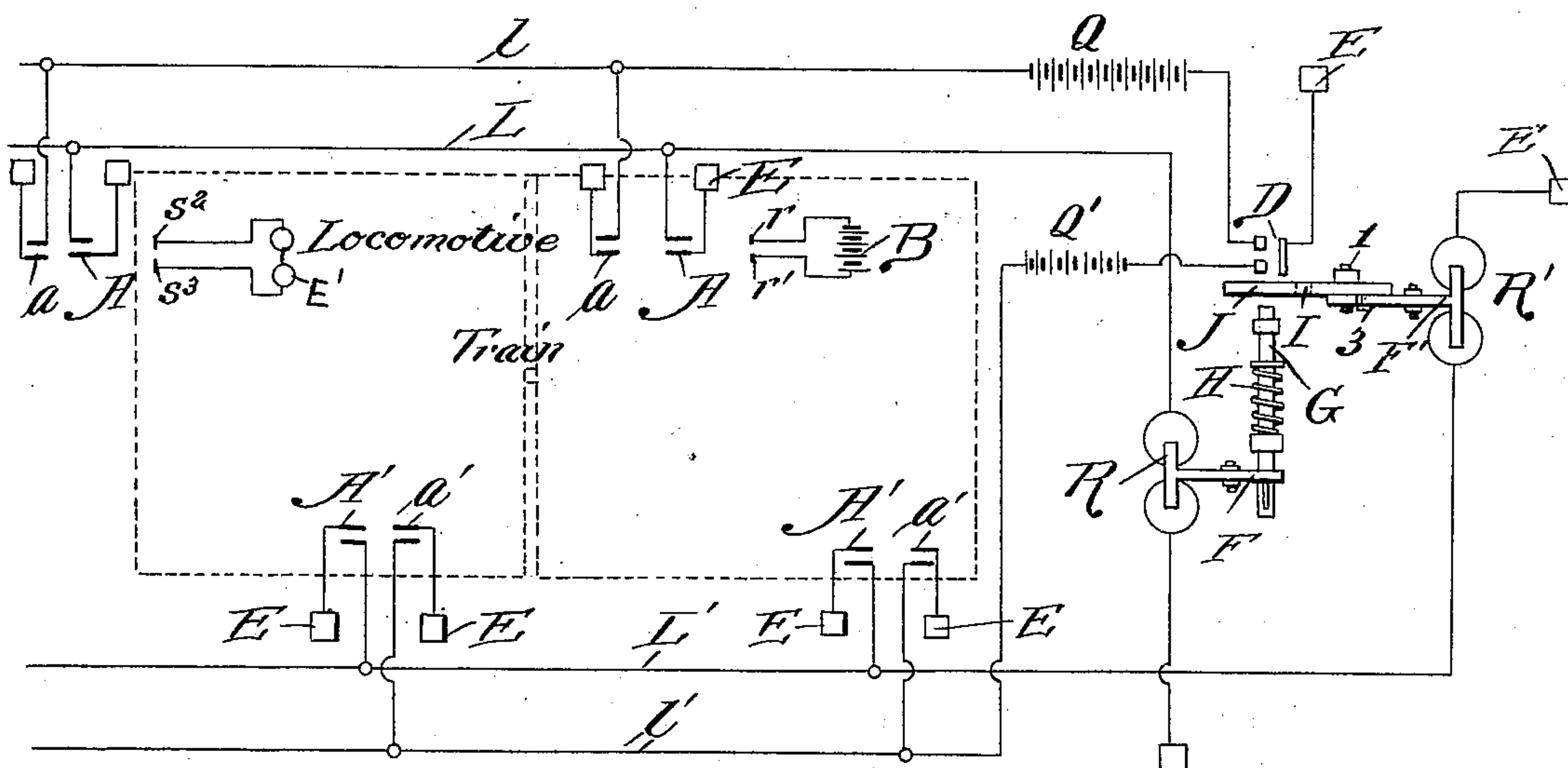


Fig. 1.

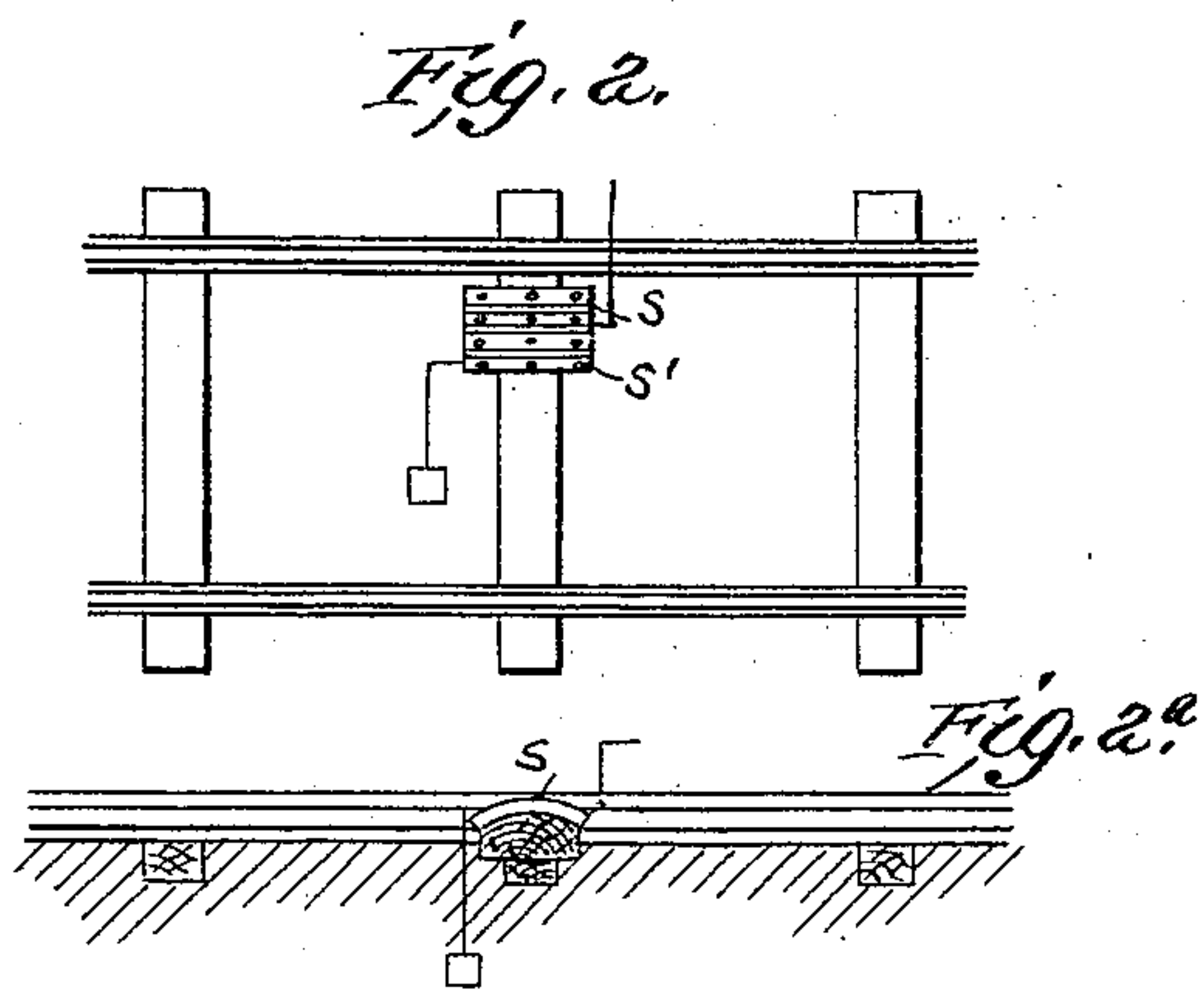


Fig. 3.

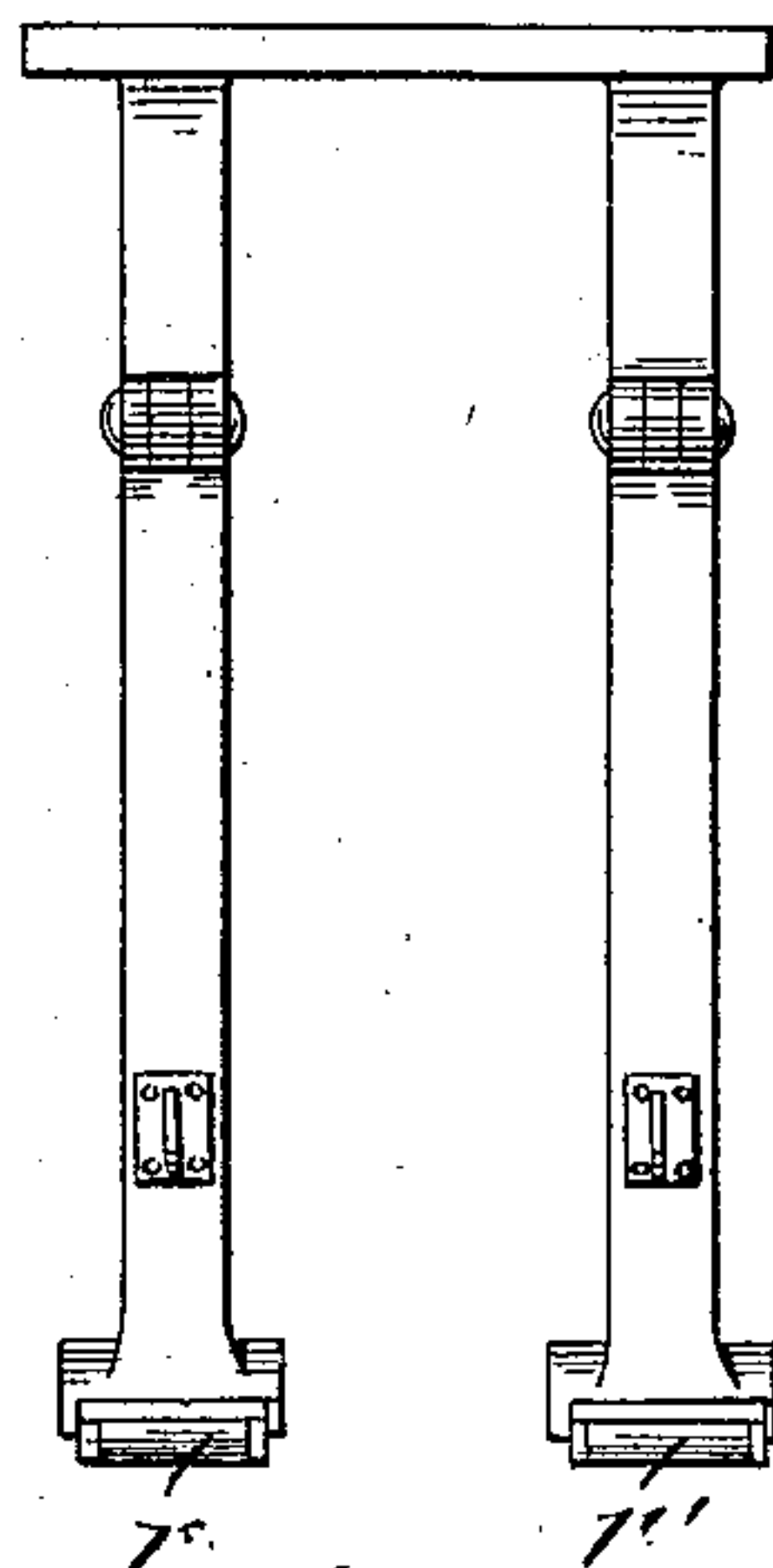


Fig. 4.

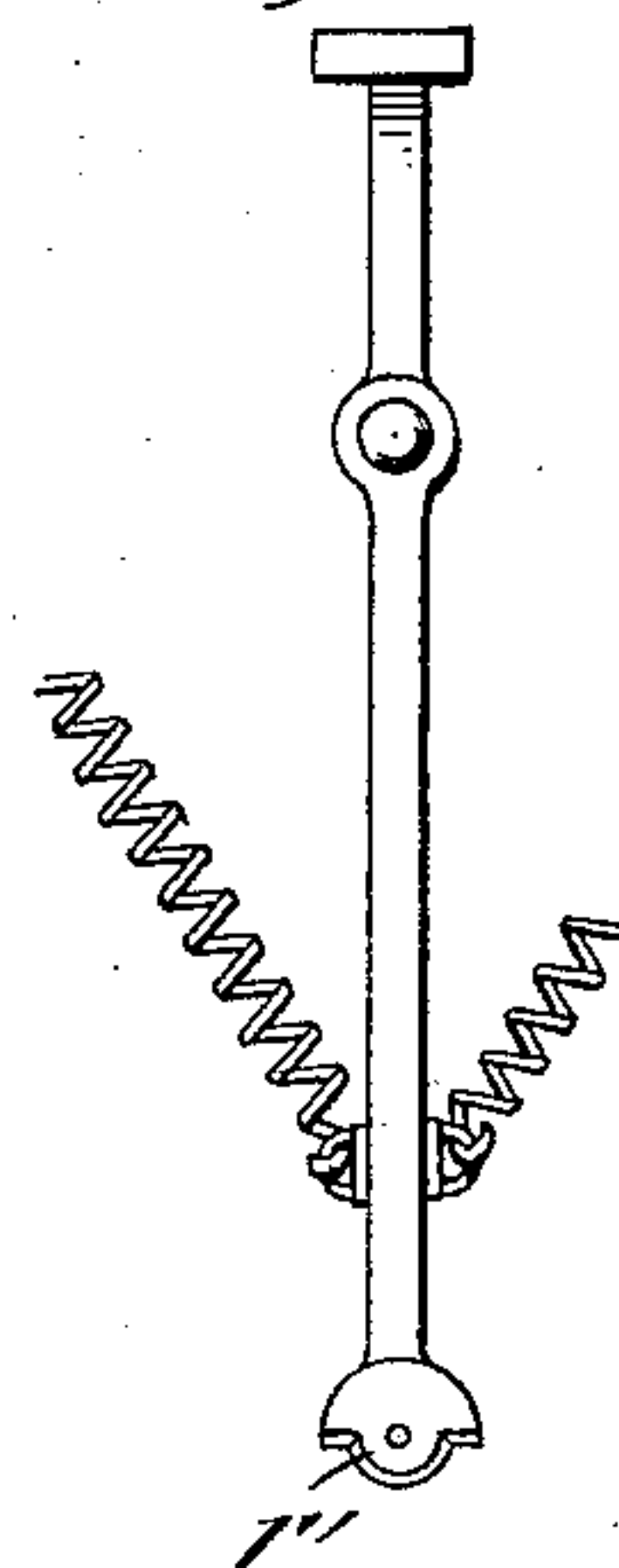
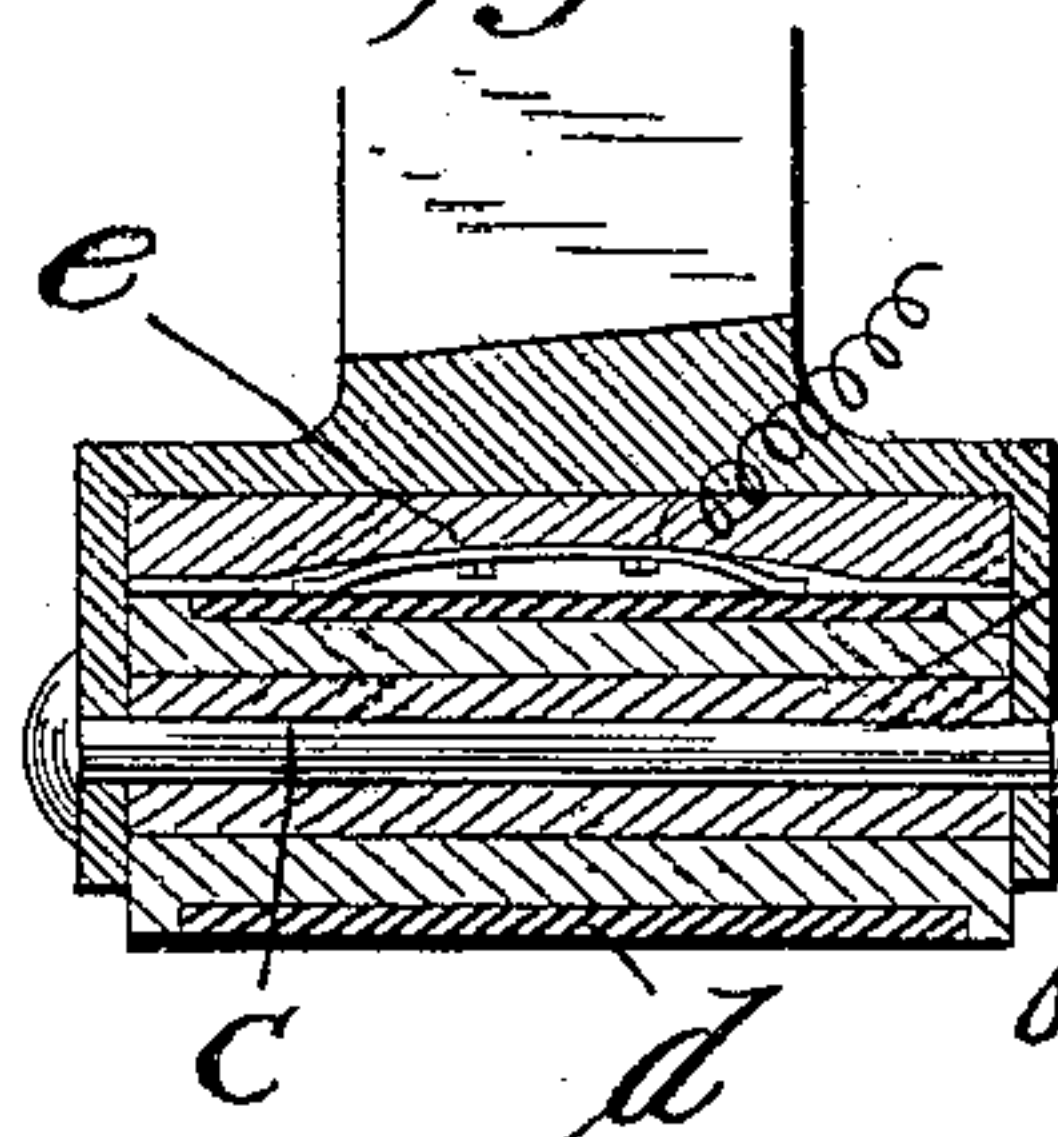


Fig. 5.



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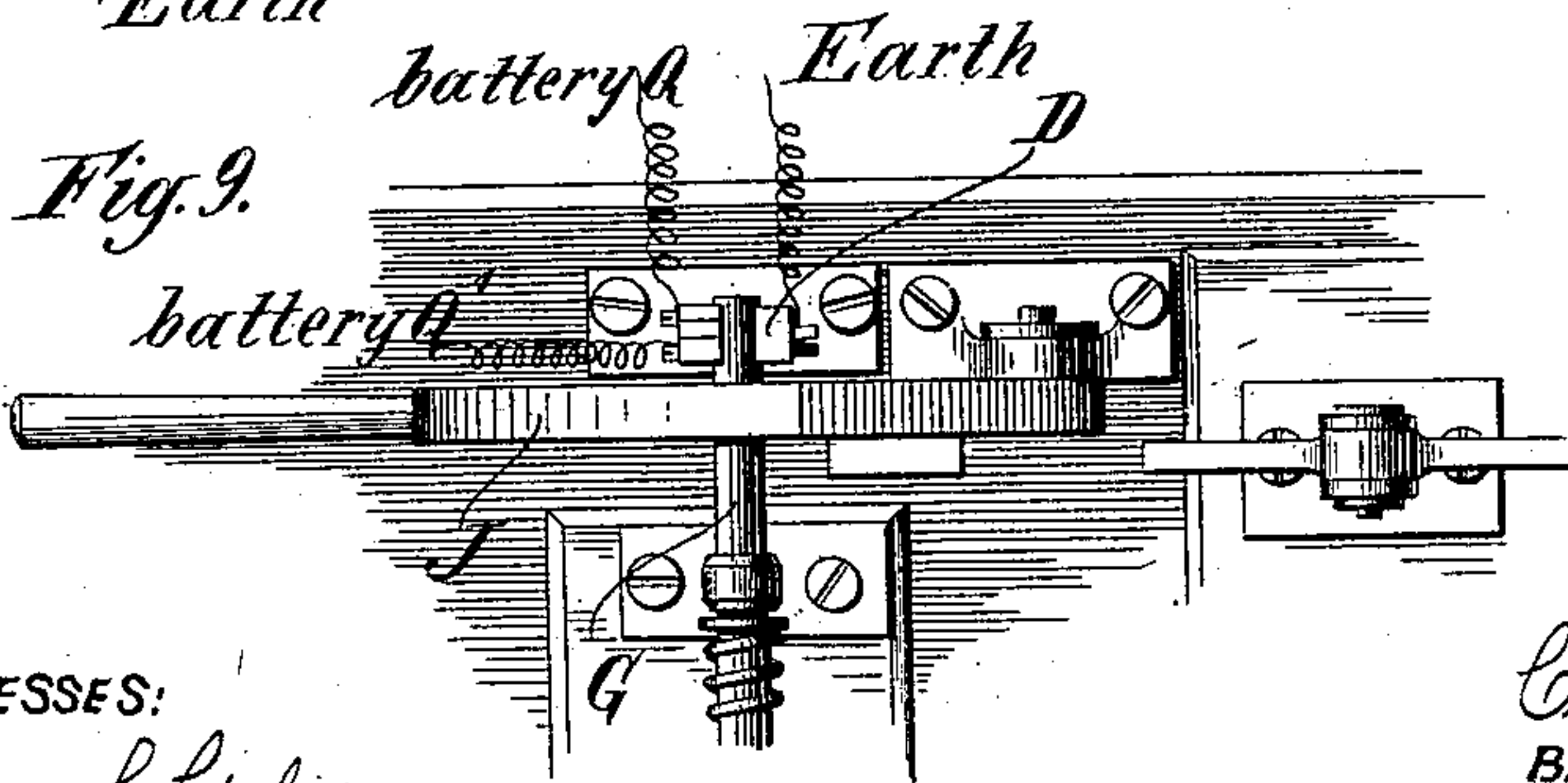
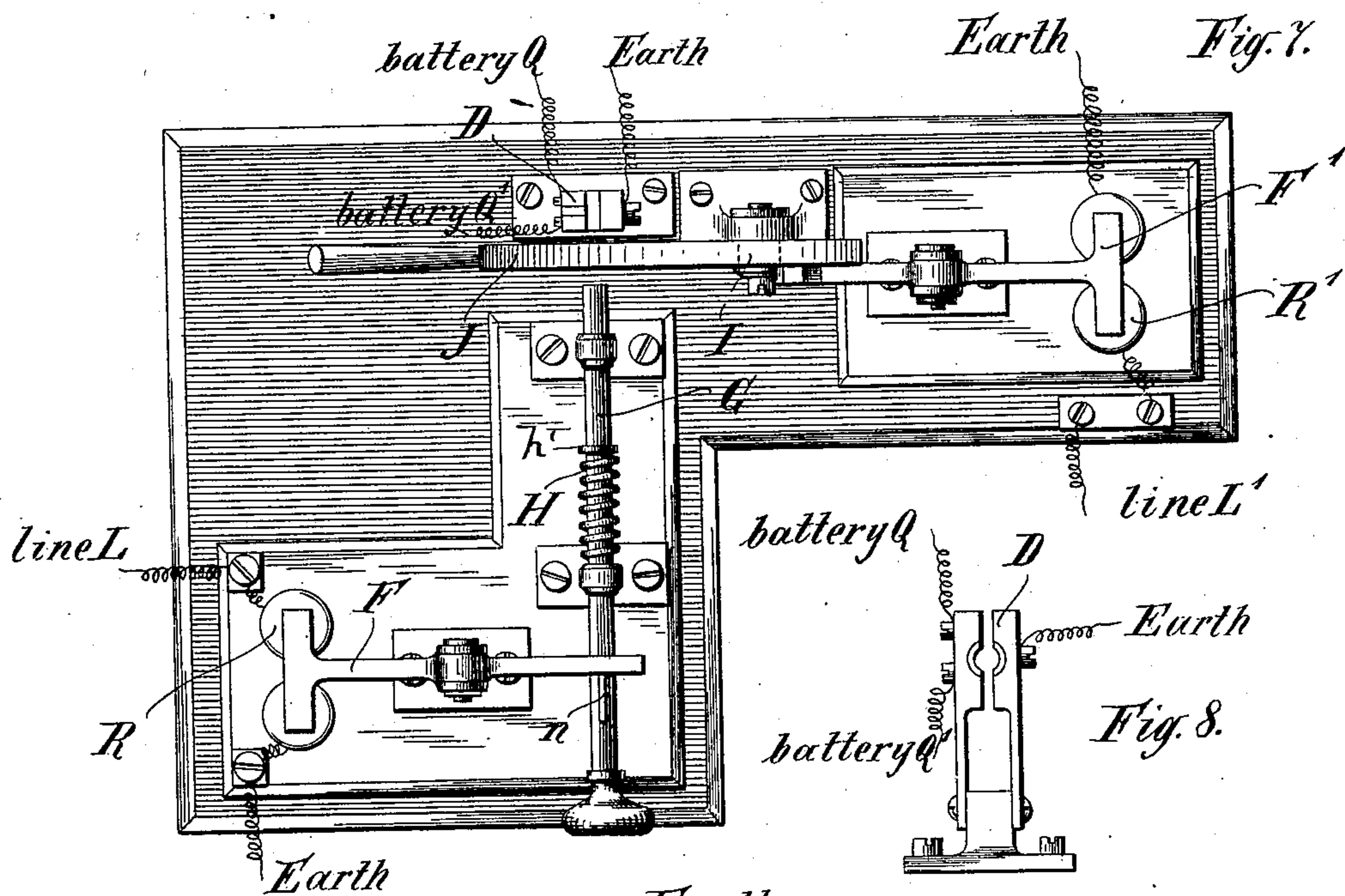
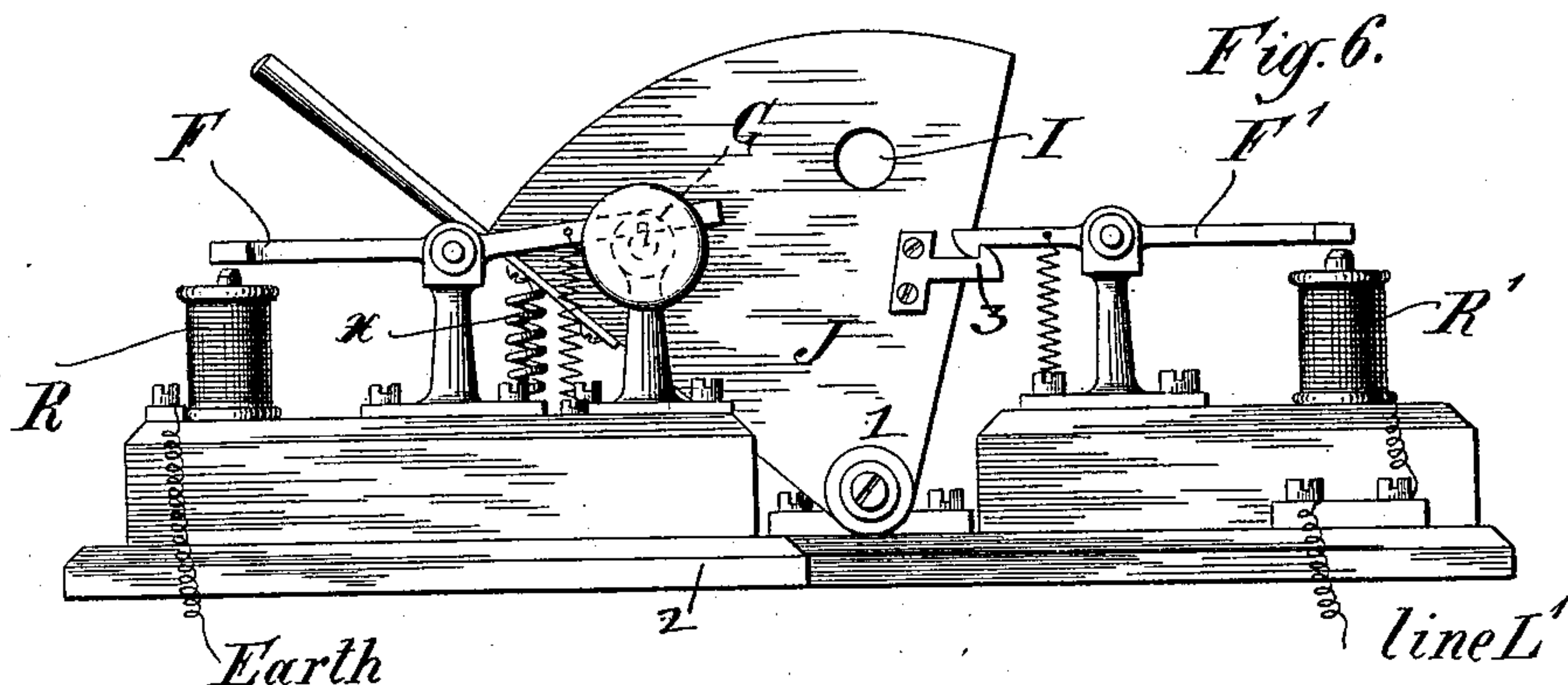
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5 Sheets—Sheet 2.



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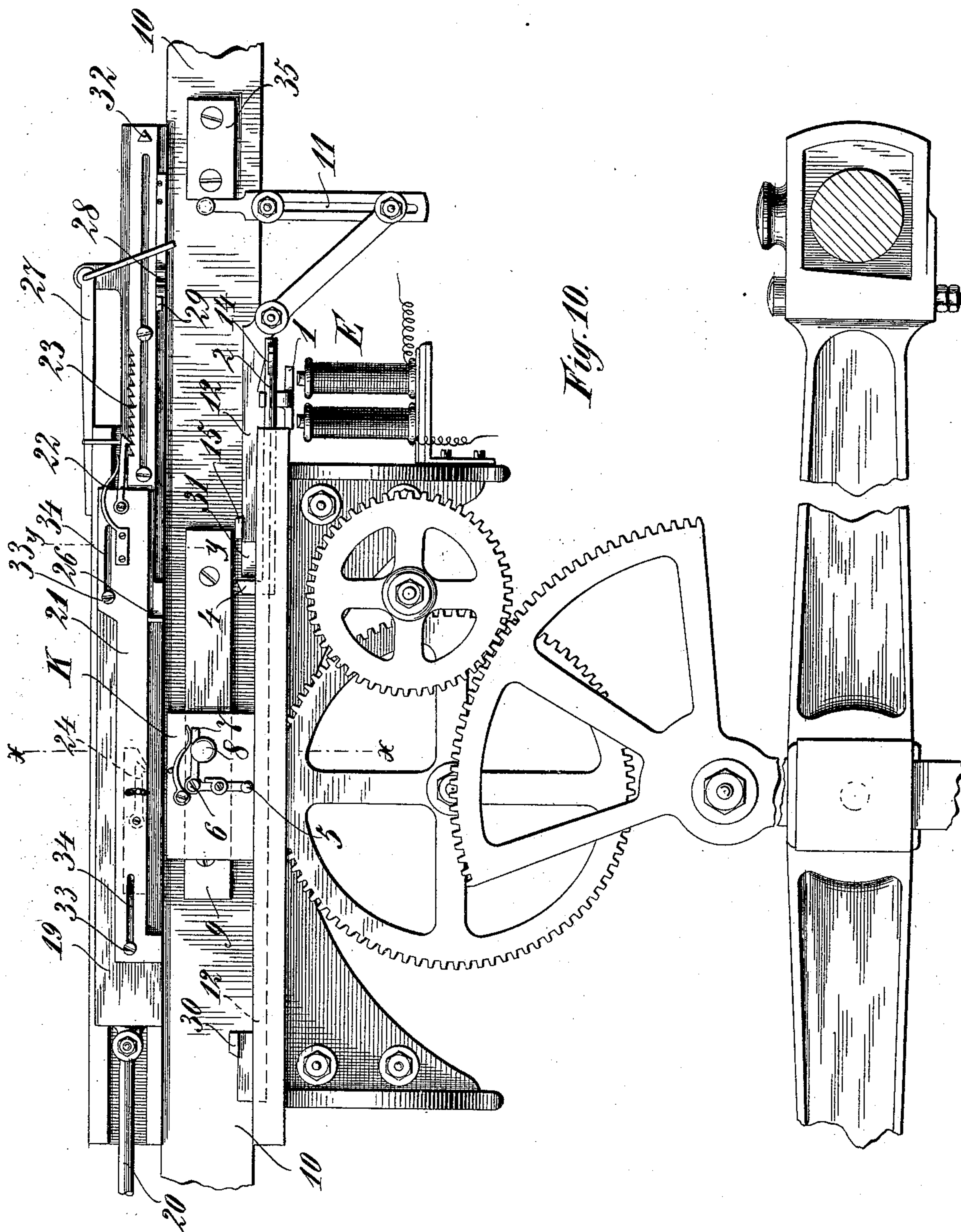
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5 Sheets—Sheet 3.



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5 Sheets—Sheet 4.

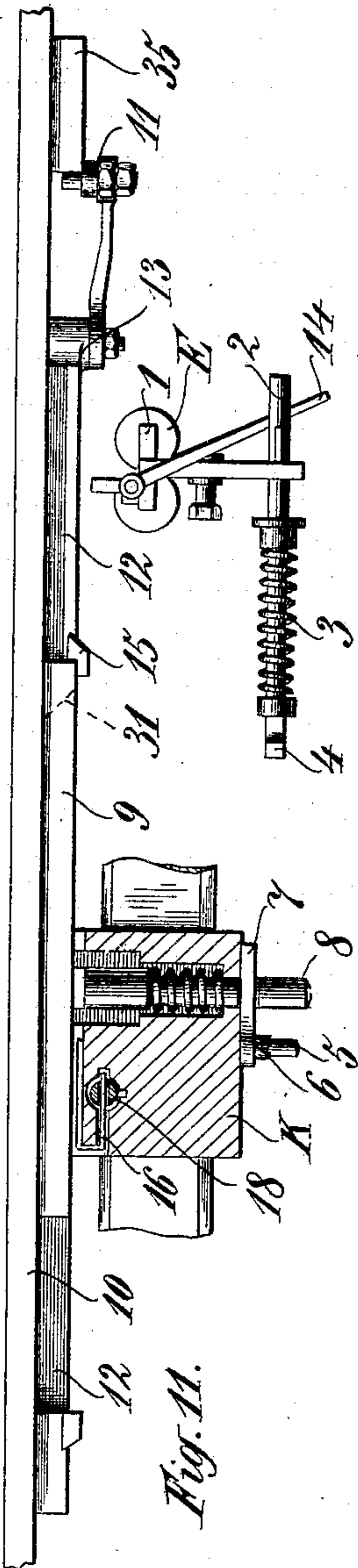


Fig. 11.

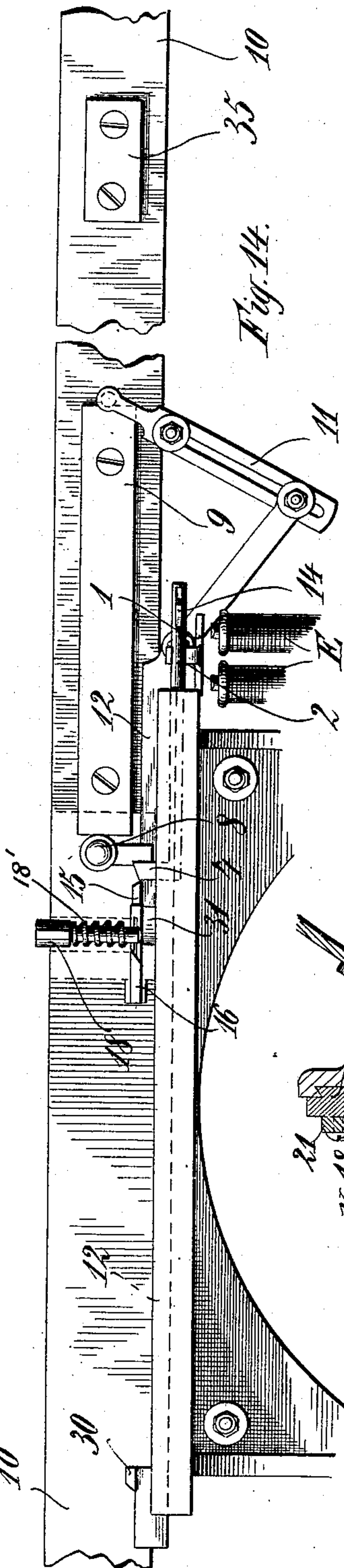


Fig. 14.

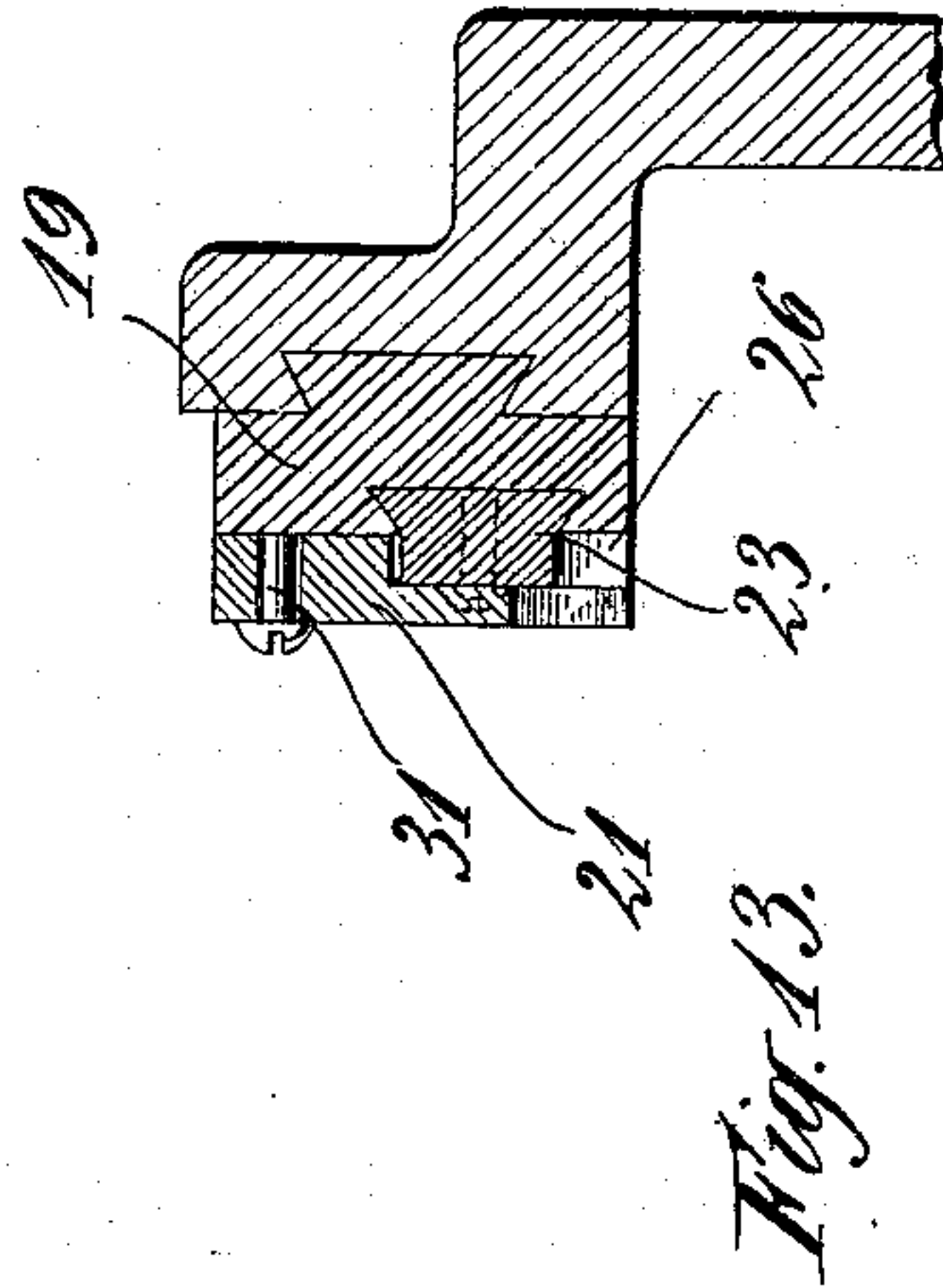


Fig. 13.

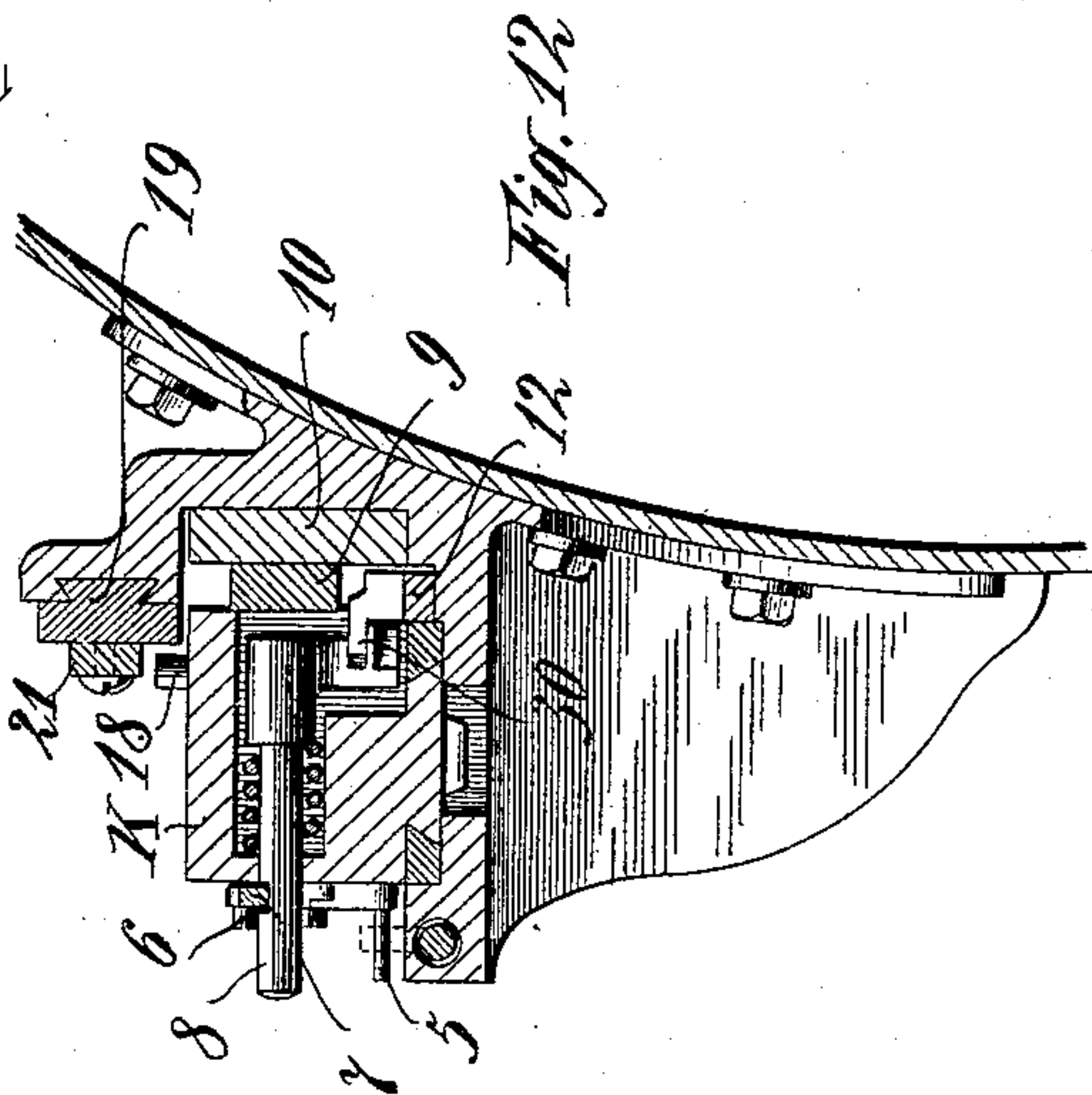


Fig. 12.

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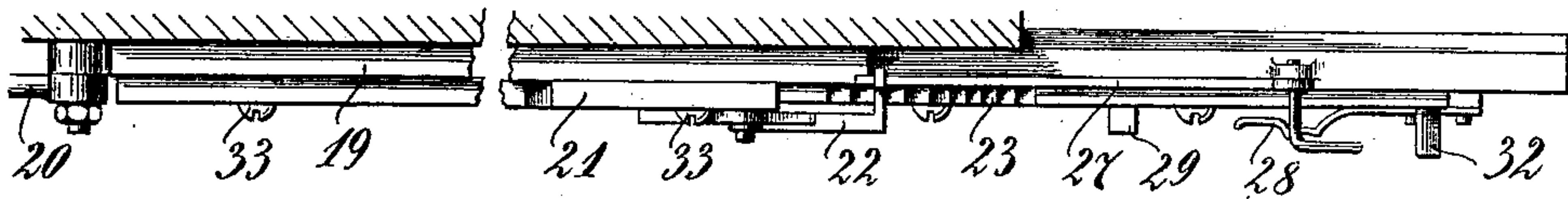
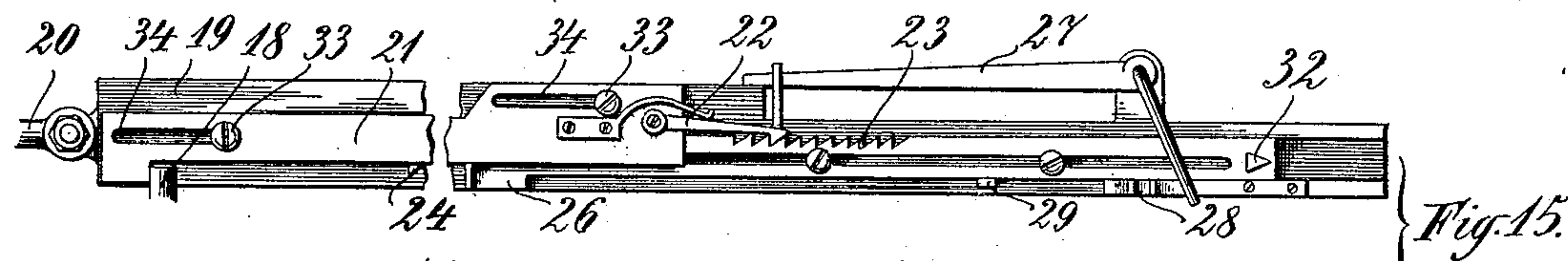


Fig. 16.

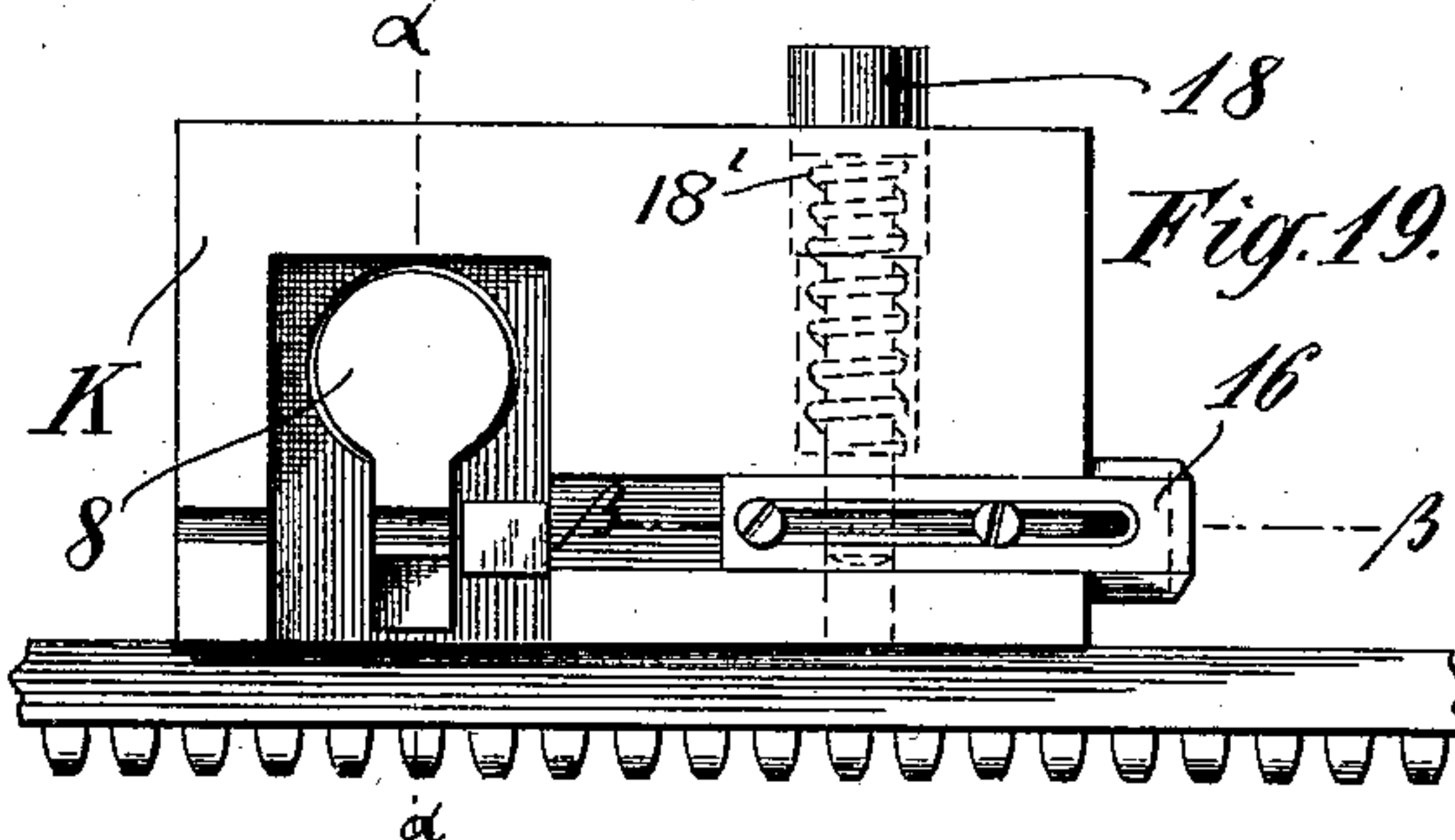
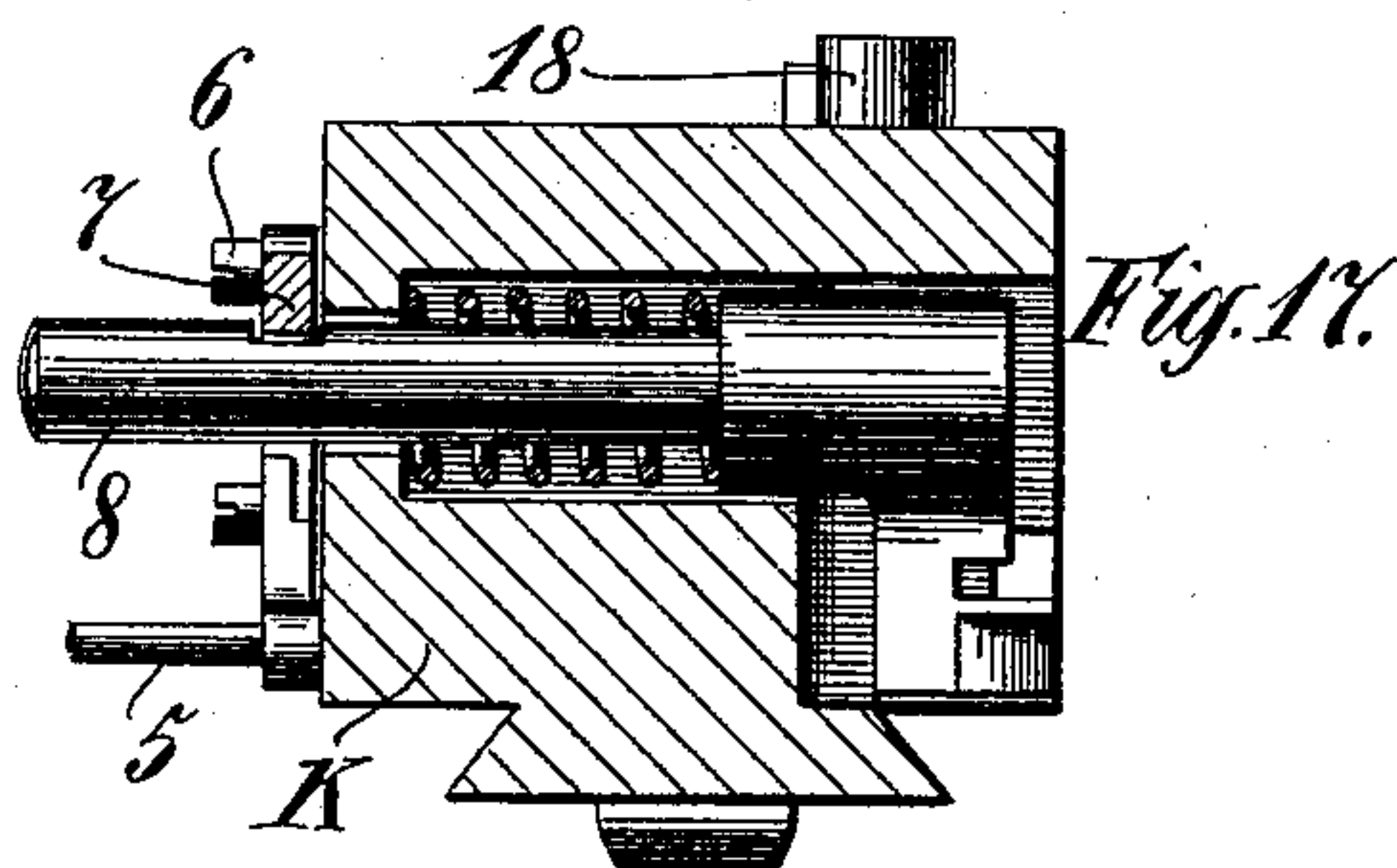
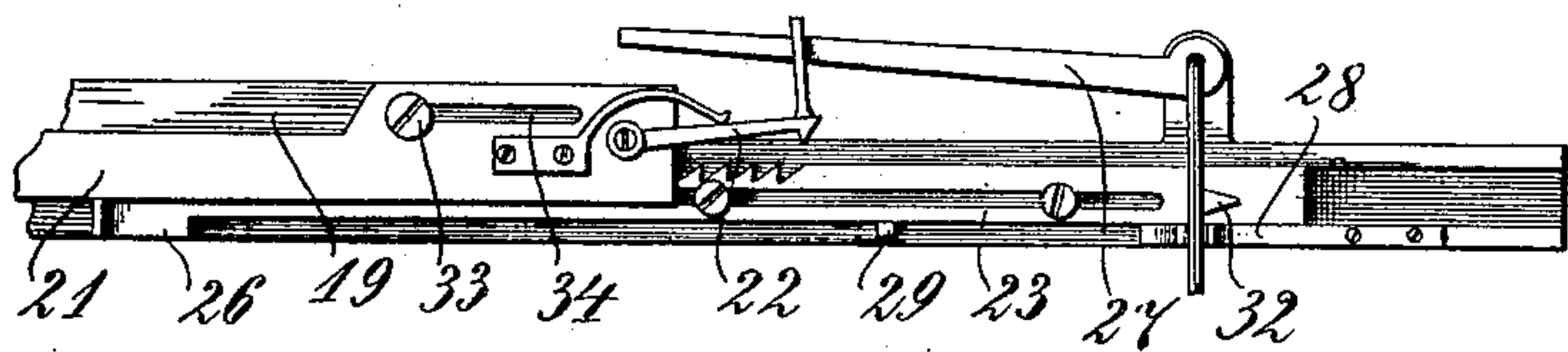


Fig. 19.

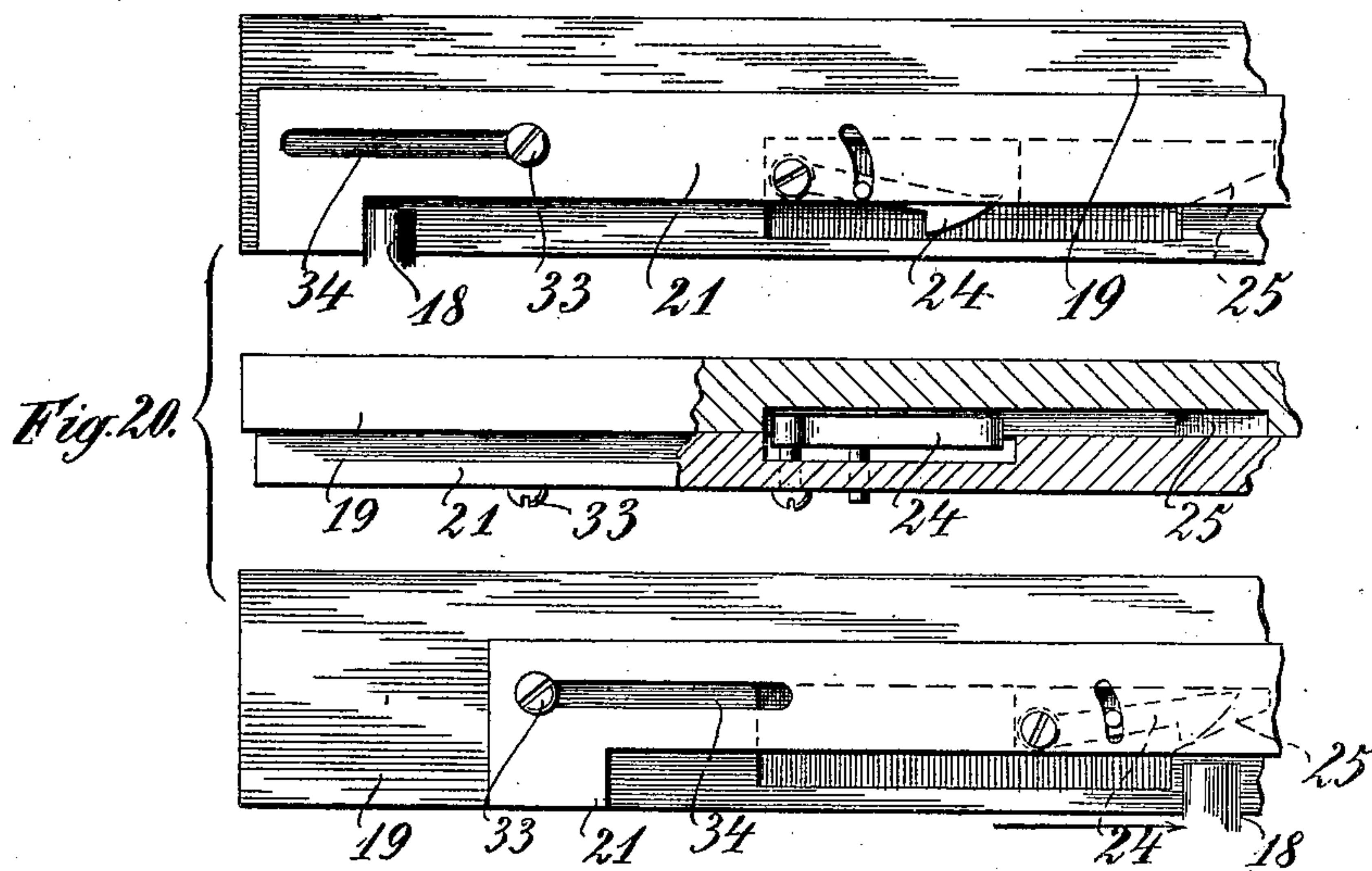


Fig. 20.

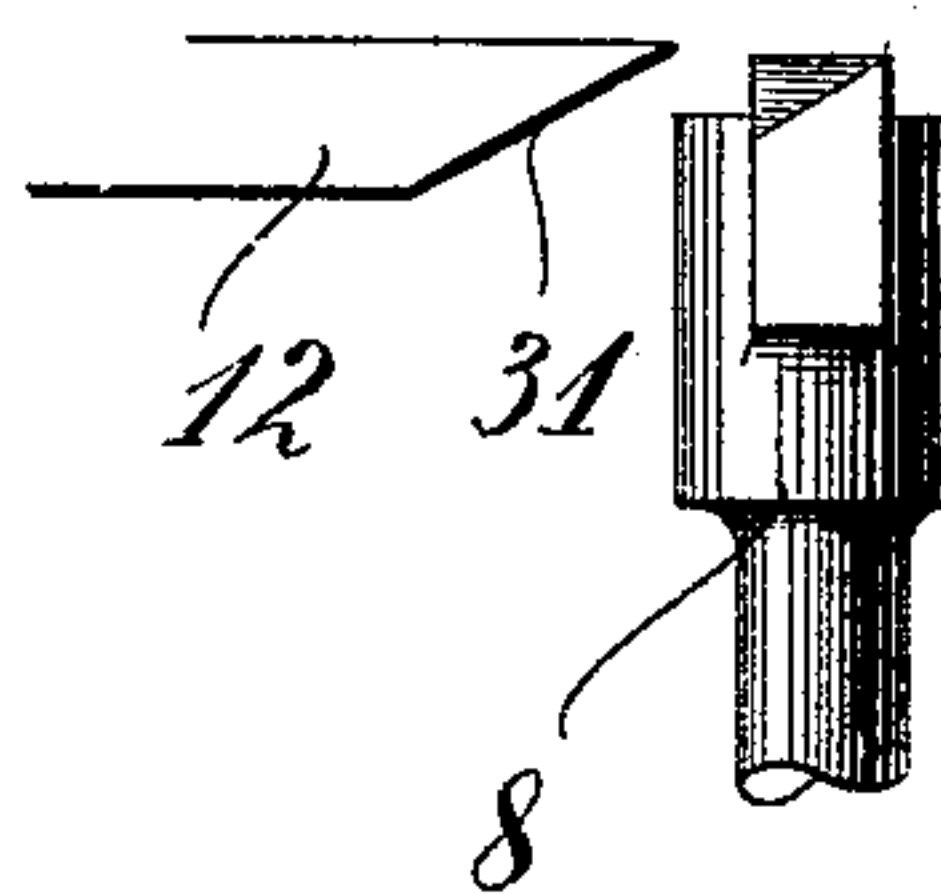


Fig. 21.

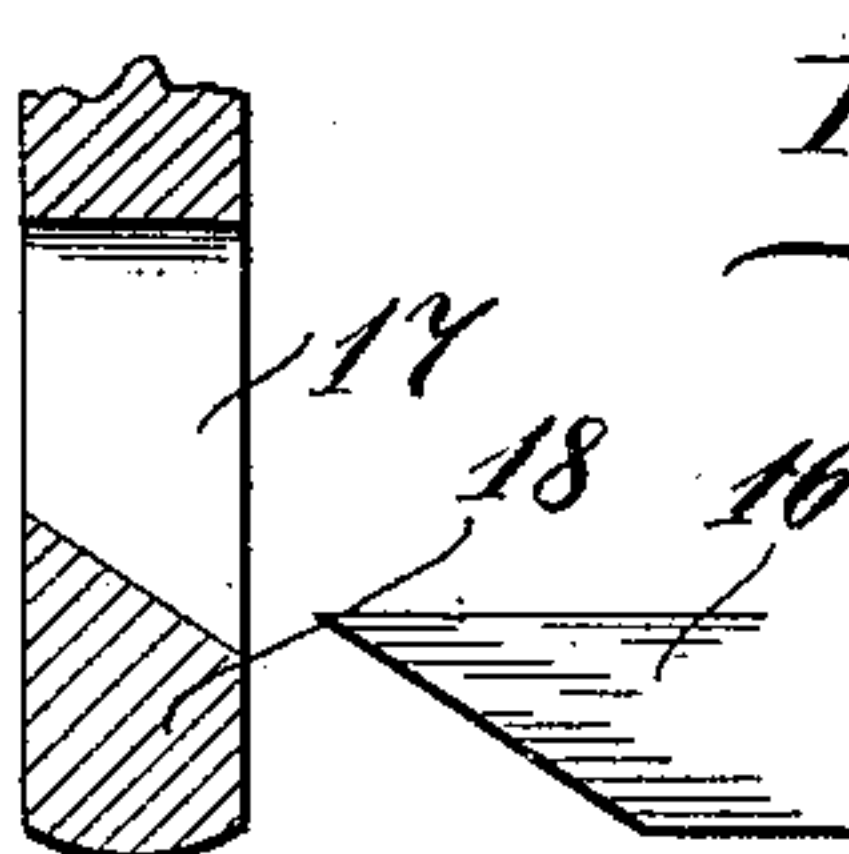
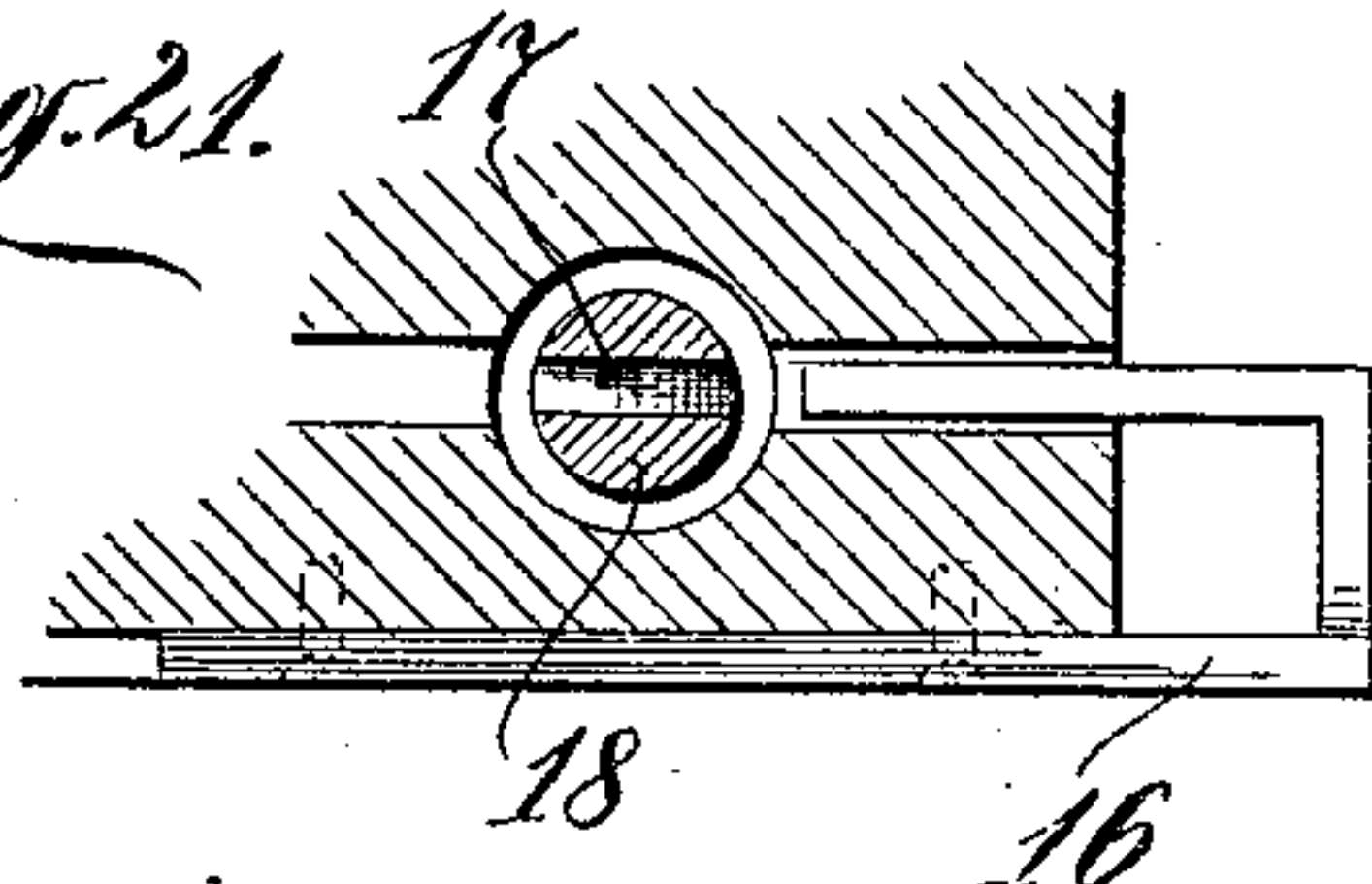


Fig. 22.



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UNITED STATES PATENT OFFICE.

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CONTRIVANCE FOR AVOIDING COLLISIONS OF TRAINS.

SPECIFICATION forming part of Letters Patent No. 643,810, dated February 20, 1900.

Application filed September 25, 1899. Serial No. 731,633. (No model.)

To all whom it may concern:

Be it known that I, CARL BURIAN, a citizen of the Empire of Austria-Hungary, and a resident of Bucharest, in the Kingdom of Roumania, Austria-Hungary, have invented certain new and useful Improvements in Contrivances for Avoiding Collisions of Trains, of which the following is a specification.

The object of my invention is to provide a system and apparatus whereby when two trains of cars enter or are upon the same block of the system the steam will be cut off at both engines and the brakes on both engines or trains will be set to arrest both engines or trains.

In the accompanying drawings, Figure 1 is a diagrammatic view of the system and the apparatus at the station. Fig. 2 is a plan view of a part of the track with the contact device. Fig. 2^a is a side view of one of the contacts. Fig. 3 is a front view of the contact devices carried by the car or train. Fig. 4 is a side view of Fig. 3. Fig. 5 is a detail sectional view of one of the contact-rollers. Fig. 6 is a side view of the apparatus at the station for closing the circuits. Fig. 7 is a plan view of Fig. 6. Fig. 8 is a detail front view of the contacts. Fig. 9 is a detail view of part of Fig. 7, showing the contact closed. Fig. 10 shows a view of the whole arrangement in its inoperative position; Fig. 11, a plan view of some of the parts in Fig. 10, partly in section; Fig. 12, a vertical section on line *xx* of Fig. 10; Fig. 13, a section through the braking device on line *yy* of Fig. 10. Fig. 14 shows the position of the different parts when the regulator or throttle-valve is closed. For the sake of clearness the sliding piece has been omitted and only the position of the bolts 8 and 18 shown. Fig. 15 shows the upper part of the arrangement for putting on the brake in side and plan view. Fig. 16 shows the position of the right-hand end of the braking device when the brake is completely applied. Fig. 17 is a vertical section through the sliding piece K on the line L L of Fig. 19. Fig. 18 shows a view from below of the bolt 8 and the chamfered portion of rod or rail 12. Fig. 19 is a back view of the sliding piece K. Fig. 20 shows the mechanism for effecting the further pushing of the latch 22 of the braking device. Fig. 21 rep-

resents a section on the line B B of Fig. 19 and a view of the device for setting free the bolt 18 in the sliding piece or putting the brake into motion.

Circuit-conductors L L' extend along the track. The wire L forms part of an earth-circuit, which includes the electromagnet R and the contacts A. The wire L' forms part of earth-circuits which include the contacts A' and the electromagnet R', the earth connection being designated by E. The contacts A and A', as shown, are out of line with each other, those marked A being intended to be closed by the train running in one direction, while the contacts A' are closed by the train running in the opposite direction. The contacts A are closed by being engaged by contact-rollers *r r'* on the train, said rollers being in connection with a battery B, carried on the train. When the rollers *r r'* (shown more clearly in Figs. 3, 4, and 5) make contact with the contacts A, the parts A L R of the earth-circuit are placed in connection with the battery B and the circuit is energized, so as to energize the magnet R. This magnet R has a pivoted armature-lever F, which normally engages a projection *n* on a bolt G, which slides in suitable bearings and is under tension of a spring H, which surrounds the bolt and presses upon a collar *h*. When the magnet is energized upon the passage of the train by the contacts A, the bolt G will be released and will strike against the face of a segment J. This segment is pivoted at 1 to a suitable base 2, and it has an opening I, through which the bolt G will pass when the segment is moved to present the opening of the bolt. The segment is placed under tension of a spring X, which tends to rock it toward the left, Fig. 6, so as to present the opening to the bolt; but when the system is set for operation the segment is in the position shown in Figs. 6 and 7 and the bolt is held retracted. The bolt, as before stated, will be released when a train gets on the block and closes the contacts A. In order to release the segment, a second train must get on the block and close the contacts A' in a manner similar to that described above in connection with the contacts A. This second train, therefore, has a pair of contact-rollers *r r'*, which engage the contacts A', it being understood that the con-

tacts A are for one and the contacts A' for the other train running in the opposite direction. This second train also has a battery, as B, and when its rollers engage the contacts A' this battery is placed in circuit with A' L' and the magnets R', the said magnets and one of the contacts A' being grounded. This second train will therefore through its battery B cause the magnets R' to be energized, and these will draw armature F' down and release the segment J. The armature engages a catch 3 on the segment. When this catch and armature F' are disengaged, the spring X will move the segment and present the opening I to the bolt G. This bolt, through the action of its spring H, will then pass through the hole I and close contact between the parts of the contact D. One part of the contact D is grounded and the other parts are connected through wires l l' with batteries Q Q', respectively, and with contacts a a', respectively. One of the contacts at a a' is grounded, and these contacts are normally open. They lie in the path of contacts s² s³, carried on the train and preferably on the locomotive. These contacts are connected by wires with a magnet E' on the locomotive or other part of the train, and when the contacts s² s³ on either train engages their companion contacts a a' the current from the battery Q or Q' will energize the magnet E, and this will operate suitable devices (not shown) to cut off steam and apply the brakes.

The various contacts in the line are formed, as indicated in Figs. 2 and 2^a, by curved pieces s s', fixed to the sleepers and insulated from each other. The contacts r r', carried by the train, are in the form of rollers, Figs. 3, 4, and 5. These rollers consist of cylinders b of non-conducting material turning on an axle c, journaled in the depending arms, Figs. 3 and 4, attached to the car or locomotive of the train. On the cylinder B is fixed a copper cylinder d, which is adapted to bear on the curved strips s s' of the contacts a a'. A spring e, bearing on the copper cylinder, is connected by a wire, Fig. 5, with the battery B. The contacts s² s³ are formed like the contact-rollers r r', and they are connected with the magnet E.

I have illustrated in dotted lines one of the trains. It will be seen that it requires the presence of two trains on the block and their contact with the contacts A A' in order to place the circuits E a l Q D E and E a' l' Q' D E in condition for operating the magnets E on the train when the contacts s² s³ on the trains engage the contacts a a'. If a train has been wrecked on the open line and another train is expected to enter the same block, it is only necessary to connect the contacts r r' of the train by suitable wires with the contacts a or a', as the case may be. This will have the same effect as though the train had passed over the contact a or a' before being wrecked.

The device for effecting the shutting off of the steam and applying the brakes acts in the following manner: When a current passes through the electromagnet E, the same will attract the armature 1, and thereby set the bolt 2 free, which bolt is thus pushed forward by a spring 3, a projection 4 coming into the reach of the lever 5, fastened on the sliding piece K, which receives in any manner—for instance, through the gearing, as represented in Fig. 10 of the drawings—from the connecting-rod of the engine a to-and-fro movement. If the sliding piece K, Fig. 10, is moved toward the right, the lever 5 can slide over projection 4, because it is provided with a joint; but in going back the said lever 5 is held by projection 4 and compelled to turn around the pin 6, whereby the arm 7 is lifted out of a groove of the bolt 8 and the latter shoots forward under the influence of a spring till it reaches plate 9, Fig. 11, and slides along on the same till it reaches the left-hand end of said plate and is pushed across the end of the plate to the prismatic bar 10. The motion of the sliding piece K is then reversed. The bolt 8 will bear against the left end of the plate 9 and push the same before it toward the right. Plate 9 being fixed to the bar 10, the latter must follow the movement and close the steam-valve, which is connected with said bar 10. On its way toward the right the right-hand end of plate 9 will push against the upper end of the slotted lever 11, Fig. 14, and move the same also toward the right. Thus the slide 12, connected with its lower end, is moved toward the left. The projection 13 then pushes against the short arm of lever 14, whose long arm slides in a slot in the bolt 2 and pulls the same so far back that the armature of the magnet 1 arrives again before the catch of the bolt 2 and holds it fast. At the same time the chamfered part 31 of slide 12, Figs. 10, 11, and 18, passes into the line of the downwardly-directed shoulder of the bolt 8 and pushes the same so far back that the lever 7 can catch again into the groove or notch of the same. The steam is then shut off, and the bolts 2 and 8 are again in their positions of rest. The backward movement of the bolt 8 takes place before the sliding piece K has reached the right-hand end of its travel. This moves still farther toward the right, and thus slides over the stop 15, seated sidewise on the slide 12, and passes beyond the upper edge of the same. On the rear side of the sliding piece K a groove is provided for the reception of this stop. The dimensions are so chosen that the stop 15 has pushed back the slide 16, fixed in the sliding piece K, Figs. 11, 19, and 21, to its extreme left-hand position, so that its bent end is pulled out of the slot 17 of the bolt 18 and sets the latter free, so that it can move upward under the influence of a spring 18'. It thus passes before a prismatic bar 19, which is movably guided by means of dovetails in an undercut groove of the plate carrying the whole appa-

ratus and which is in connection with the brake-lever by means of the rod 20. On the front of bar 19 a sliding bar 21 is arranged, which is fastened on the said bar 19 by means of pins 33, passing through the guide-slots 34, so that it can move for a distance equal to the length of these slots 34. On the right-hand end thereof is a catch or pawl 22, engaging with a toothed bar or rack 23. The latter is joined with the bar 19 by means of a dovetail and engages a recess in the slide 21, Fig. 13. Supposing the bolt 18, Fig. 10, is set free and moved toward the left, it will then push against the downwardly-projecting end of the slide 21 and take the same with it so far as the guide-slots 34 allow. It then makes the backward movement from the left to the right, the bolt 18 meeting the latch 24 and pulling the same toward the right; but the said catch 24 being fixed to the slide 21 the latter must follow this movement. Consequently the catch or pawl 22 is moved a few teeth farther on toward the right on the rack 23. The beveled part 25 of the bar 19 as the bar 21 and the catch 24 move toward the right pushes the catch 24 upward, so that it sets the bolt 18 free, Fig. 20, allowing the same to continue its course unhindered till it meets the downwardly-directed shoulder 26 of the rack 23, and thus pushes the latter before it. The slide 21 must also follow the movement of rack 23, and, when the end of the guide-slot 34 of it is reached, also the bar 19 and the brake-rod 20 joined therewith. The brake is consequently put on slightly. By the movement toward the left of the sliding piece the bolt 18 passes underneath catch 24 and releases the brake again a little when it arrives at the left end of the slide 21 and takes the same with it. On its return toward the right the latch 22 is again moved farther on for a few teeth, and the brake is again applied, but this time harder than before. The dimensions are so chosen that the brake is completely applied when the latch 22 has pulled the rack 23 toward the left to the last tooth, Fig. 16. Then a projection 32, arranged at the end of rack 23, engages the downwardly-directed arm of the angle-lever 27 and pushes the same before it, so that the latch 22 is brought out of engagement with the rack 23. The lever 27 is held in its lifted position by the catching of the spring 28 into a notch. The steam-valve is then closed and the brake completely applied. At the same time all the parts are brought back into their original positions, with the exception of the bolt 18, the latch 22, and the slide 12.

If the engine is required to be again put into motion after the danger of collision is over, the brake and the steam-valve are opened by hand. In opening the throttle-valve the bar 10 is pulled toward the left. The shoulder 35 fastened thereon then presses against the upper end of the lever 11 and brings the same, and thus also the slide 12, back into its original position, and the catch 30 thereon is again

within reach of the sliding piece K. When the engine starts, the sliding piece K moves toward the right and pushes against shoulder 26. The catch 22 is still lifted. Consequently the rack 23 alone follows the movement. On the lower part of the latter is arranged a projection 29, which pushes against the end of the spring 28 and presses the same down, so that the lever 27 is free, and the catch 22 again engages the rack. At the end of the movement of the sliding piece K toward the left the catch 30 pushes against the slide 16 and presses the same into the slot 17 of the bolt 18 and draws the latter downward. All the parts are then brought back into their original positions, and the engine can work as usual till the armature of the magnet 1 is again attracted by the electromagnet E.

Instead of the arrangements here described for effecting the braking of the train and shutting off the steam any other arrangement fulfilling this purpose may be used.

What I claim is—

1. In combination, the contacts A, A', disposed along the track, and one being arranged to be closed by a train running in one direction and the other being arranged to be operated by a train running in the other direction, circuit-wires l, l' , one for each train, batteries in said circuit-wires, said wires l, l' , forming parts of open circuits, contacts a, a' and D in said circuits l, l' , means for closing the contacts D comprising the batteries on the trains with contacts on the train in the circuit of said batteries arranged to engage the contacts A, A', electromagnets on the trains arranged to control the stopping mechanism of the train and contacts on the train connected electrically with said electromagnets and arranged to engage the contacts a, a' , whereby the said electromagnets will be energized from the batteries in the circuits l, l' , substantially as described.

2. In combination, the electromagnets on the trains controlling the stopping devices, the contacts on the train connected electrically with said magnets, the lines l, l' having batteries Q, Q', for energizing the magnets on the train, said lines having also contacts a, a' to engage the contacts on the train, contacts D controlling the lines l, l' to render the batteries Q, Q', active when the contacts on the train engage the contacts a, a' , means controlling the contacts D, comprising the electromagnets R, R', and the contact-closer controlled thereby, the lines L, L', and the contacts A, A', in said lines, and the batteries on the train with contacts r, r' , on the train and in circuit with said batteries for engaging the contacts A, A', substantially as described.

3. In combination, the electromagnets on the train for controlling the stopping devices, the contacts s^2, s^3 in circuit with said electromagnets, the lines l, l' , the contacts a, a' , therein in line with the contacts s^2, s^3 on the train, the batteries Q, Q' in the lines l, l' , the contacts D for controlling the lines l, l' , the

bolt G for closing the contacts at D, the electromagnet R controlling the bolt G, the disk J having a hole therein through which the bolt may pass to close the contacts D, the electromagnet R' controlling the segment, the lines L, L' including the magnets R, R', the contacts A, A', controlling the lines L, L', and the batteries on the train having contacts to engage the contacts A, A'.

4. In combination, toothed wheels said wheels being operated from a moving part of the locomotive and a sliding block K operated from said toothed wheels, said block having a rack on its under side engaging one of the toothed wheels, a horizontal spring-governed bolt 8 and a vertical spring-governed bolt 18 guided in said block, means for retaining and releasing said bolts and connections operated by said bolts for operating the steam-valve and brake, substantially as described.

5. In combination with the sliding block K, means for giving it a to-and-fro motion from the connecting-rod of the locomotive, a spring-pressed bolt 8 carried by the block, a spring-pressed bolt 2 ending in an upturned nose, an armature for ordinarily retaining the bolt 2, an electromagnet on the locomotive controlling the armature, a bent lever 5 on the sliding block, said bolt 2 engaging with the articulated end of the downwardly-directed arm of the bent lever 5, said lever 5 controlling the bolt 8 and connections operated from the bolt 8 by which the steam-valve is operated.

6. In combination, the sliding block, means for operating the same from the moving parts of the locomotive, a spring-pressed bolt carried by the block, a bar 10, a casing in which said bar is guided, a plate 9 on the bar arranged to be engaged by the spring-bolt to be moved thereby, the said bar 10 being connected to the steam-valve to operate the same, means for holding the spring-bolt retracted, means for releasing the bolt comprising the electromagnet and devices controlled thereby, means for resetting the bolt and the said electrically-controlled devices comprising the lever 11, said lever being in the path of the plate 9 and a shoulder 35 on the bar 10 for returning the lever 11, substantially as described.

7. In combination, the sliding block K, means for reciprocating the same from an operating part of the locomotive, a spring-bolt 8 carried by the reciprocating block, means for holding said bolt connections to be operated by said bolt for controlling the steam-valve, said connections comprising the bar 10 with the plate 9 thereon, releasing means to operate the holding means of the bolt, said releasing means comprising a bolt 2, an armature for holding the same, and an electromagnet for controlling the armature, a lever 14 for returning the bolt to be engaged by the armature, a slide 12 having a portion to return the spring-bolt 8 and having also a shoulder 13 to operate the lever 14, and a lever con-

nected with the slide, said lever being operated by the final movement of the connection leading to the steam-valve, substantially as described.

8. In combination, the sliding block, means for operating the same from a moving part of the locomotive, a bolt carried by the said block, means for holding the bolt inoperative, connections to be operated by said bolt for setting the brake, a slide 12 having a projection 15 for releasing said bolt from its holding means, means for operating said slide, said means including a bolt 8 carried by the slide means for holding the bolt inactive, releasing means electrically controlled and a slide-bar operated by the bolt when released, said slide-bar controlling the operation of the slide 12, substantially as described.

9. In combination, the sliding piece, the bolt 18 carried thereby, means for holding said bolt, means for releasing the same, said releasing means being electrically controlled, a bar 19 with connections to the brake mechanism, a plate 21 having a sliding connection with the bar 19 and means for limiting the sliding movement, a pawl 22 carried by the plate 21 a rack-bar 23 carried by and having sliding connection with the bar 19, said plate 21 and rack-bar having projections to be struck by the spring-bolt and a yielding catch 24 carried by the plate 21 to be struck by the bolt for shifting the plate with its pawl in relation to the rack-bar, said bar 19 having an incline to release the catch from the bolt, to allow the bolt to engage the projection on the rack-bar for operating the bar 19 and the brake connections, substantially as described.

10. In combination, the sliding piece, the bolt 18 carried thereby, means for holding said bolt, means for releasing the same, said releasing means being electrically controlled, a bar 19 with connections to the brake mechanism, a plate 21 having a sliding connection with the bar 19 and means for limiting the sliding movement, a pawl 22 carried by the plate 21, a rack-bar 23 carried by and having sliding connection with the bar 19, said plate 21 and rack-bar having projections to be struck by the spring-bolt, and a yielding catch 24 carried by the plate 21 to be struck by the bolt for shifting the plate with its pawl in relation to the rack-bar, said bar 19 having an incline to release the catch from the bolt, to allow the bolt to engage the projection on the rack-bar for operating the bar 19 and the brake connections, a lever 27 for lifting the pawl out of the rack, means on the rack-bar for operating the lever, a spring-catch for holding the lever and means on the rack-bar for releasing the catch from the lever 27, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CARL BURIAN.

Witnesses:

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