

# UNITED STATES PATENT OFFICE.

JOHN W. KING, OF NEW YORK, N. Y.

## RAILWAY-CAR.

SPECIFICATION forming part of Letters Patent No. 785,174, dated March 21, 1905.

Application filed April 30, 1903. Serial No. 154,941.

*To all whom it may concern:*

Be it known that I, JOHN W. KING, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Railway-Cars, of which the following is a specification.

My invention relates to railway-cars; and its primary object is to provide an underframe of improved construction especially adapted for freight-cars of the types known as "gondolas," "flat-cars," "box-cars," "hopper-cars," "tank-cars," &c.

A further object of the invention is to provide a car-body of improved construction in which strength, rigidity, and durability will be combined with simplicity and economy of building.

The distinguishing characteristic features of my improved underframe is its center sill, which comprises a vertically-disposed main or body member having horizontal projections in combination with a horizontally-disposed and longitudinally-extended reinforcing member secured to the projections of the vertical member.

A prominent feature connected with the invention resides in the fact that the horizontally-disposed reinforcing member of the center sill is of extended character relative to the underframing of the car, while the vertical member of said sill comprises sections which abut and are secured at their contiguous ends to the bolsters, thus permitting the former to be of continuous character for attaining all the advantages consequent upon such construction. Efficient means are also provided at the end portions of the underframing, bracing the body sides contiguous to the end sills and relative to the center sill, so as to fortify the end portions of the car structure against transverse or torsional strains.

The construction of my improved car will be fully described hereinafter in connection with the accompanying drawings, which form part of this specification, and its novel features will be defined in the appended claims.

In the drawings, Figure 1 is an isometric view showing in transverse section a car embodying the invention, the car-body being of

gondola type. Fig. 2 is a similar view illustrating my improved center sill and novel bolster arrangement in connection with a box-car. Fig. 3 is a fragmental perspective view of one of the end portions of the underframe, disclosing characteristic features of my invention. Fig. 4 is a detail plan view illustrating a portion of the underframe at one end of the car structure, the means for bracing parts against lateral or torsional strain being more particularly shown. Fig. 5 is a detail vertical cross-sectional view taken in a plane intermediate of one of the bolsters and the adjacent end sill.

The center sill of the car-underframe comprises a vertically-disposed member 1, having horizontally-projecting flanges 2 and a reinforcing horizontal member 3, secured below the vertical member 1. The central member of the center sill in the form of the invention shown in the drawings consists of an I-beam, and the horizontal reinforcing member is shown as consisting of a channel-iron, with its flanges 4 turned downward or in depending relation to the body of the channel. This construction constitutes a very simple and effective form of center sill and is my preferred construction. The invention consists, broadly, of a center sill comprising a vertically-disposed flanged member and a reinforcing horizontally-disposed member below the vertical member and of longitudinally-extended character.

An important advantage of my improved form of center sill is that it permits of the employment in a car-underframe, and in a horizontal plane coincident with the center sill, of continuous bolsters 5 in connection with a continuous draft member, thus obviating the expensive and cumbersome lateral stays or trusses ordinarily required for supporting and bracing sectional bolsters. In pursuance of this feature of the invention the upper member of the center sill is of sectional character, the contiguous ends of sections of which abut against and are secured to the adjacent bolster at opposite sides of the latter by angle-plates 5<sup>a</sup>, the lower horizontal member of said sill extending continuously immediately beneath the bolsters.



secured below the vertically-disposed member  
10 and having vertical side flanges.

9. In a car-underframing, a center sill comprising a vertically-disposed member including a plurality of longitudinal sections, and a horizontally-disposed longitudinal member  
15 secured and extending below said vertically-disposed member, said horizontally-disposed member having vertical flanges.

10. In a car-underframing, a center sill comprising a vertically-disposed I-beam, and a  
20 channel below said beam, said channel having its flanges turned downward.

11. The combination in an underframe for cars, with a center sill comprising a vertically-disposed member including a plurality  
25 of longitudinal sections, and a horizontally-disposed member secured and extending continuously relative to said vertically-disposed member, and a continuous bolster against which abuts the contiguous ends of the sections  
30 of the vertically-disposed member.

12. The combination in an underframe for cars, with a center sill comprising a vertically-disposed member including a plurality of longitudinal sections having lateral flanges, and  
35 a horizontally-disposed member secured and extending continuously relative to said vertically-disposed member, and a continuous bolster against which abut the contiguous ends of the sections of the vertically-disposed member.

13. The combination in an underframe for cars, with a center sill consisting of a vertically-disposed member and a horizontally-disposed member having vertical flanges, of a  
40 continuous bolster, and plates secured to opposite sides of the center sill.

14. The combination in an underframe for cars, with a center sill consisting of a vertically-disposed member and a horizontally-disposed member having vertical flanges, of a  
45 continuous bolster, and plates secured to opposite sides of the center sill, and extending under the bolster.

15. In a car the combination with a body comprising a floor and sides, the latter depending below the floor plane and forming  
5 side sills of continuous bolster provision beneath and connected to the side sills, and a center sill embodying a vertical member disposed in the same horizontal plane as that occupied by the side sills and bolster provision and secured to the latter.

16. In a car, the combination with the center sill and bolsters, of a body, the sides of which intersect the horizontal plane of the center sill and bolsters, and form side sills,

central portions, and a center sill comprising a vertically-disposed member in a horizontal  
75 plane common with that of said central bolster portions, said center sill extending at each end beyond the positions of the continuous bolsters, of diagonal braces at the end portions of the frame, connected at their inner  
80 ends with the center sill and suitable side sills to which the outer ends of the braces are connected.

18. The combination with an underframe for cars having a center sill comprising a vertically-disposed member, and bolsters, of body  
85 sides depending within the horizontal plane of the center sill, and diagonal braces at the end portions of the frame, connected independently of the floor by being attached at  
90 their inner ends directly to the vertical member of the center sill and at their outer ends to the depending parts of the body sides.

19. The combination with an underframe for cars having continuous bolsters and a center  
95 sill comprising a vertically-disposed member extending at each end to points beyond the position occupied by the said bolsters, of body sides depending below the floor plane, and diagonal braces at the end portions of the  
100 frame and connected independently of the floor by being attached at their ends with the center sill and at their outer ends to the depending body sides.

20. The combination in an underframe for  
105 cars, with a center sill consisting of a vertically-disposed member having horizontally-projecting flanges, and a horizontally-disposed member, of a continuous bolster, and parallel side plates secured to opposite sides of the center  
110 sill and extending under the bolster.

21. The combination in an underframe for cars, with a center sill consisting of a vertically-disposed member having horizontally-projecting flanges, and a horizontally-disposed  
115 member having depending flanges, of a continuous bolster, and parallel side plates secured to opposite sides of the center sill and extending under the bolster.

22. In an underframe for cars, the combination with a continuous bolster, of a center  
120 sill consisting of a vertically-disposed member having horizontally-projecting flanges and a horizontally-disposed member extending under and beyond the bolster, and side plates  
125 or bars on opposite sides of the center sill connecting the latter to the end sill of the car.

23. The combination in an underframe for cars, with continuous bolsters, the latter presenting uninterrupted vertical faces at their  
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No. 785,175.

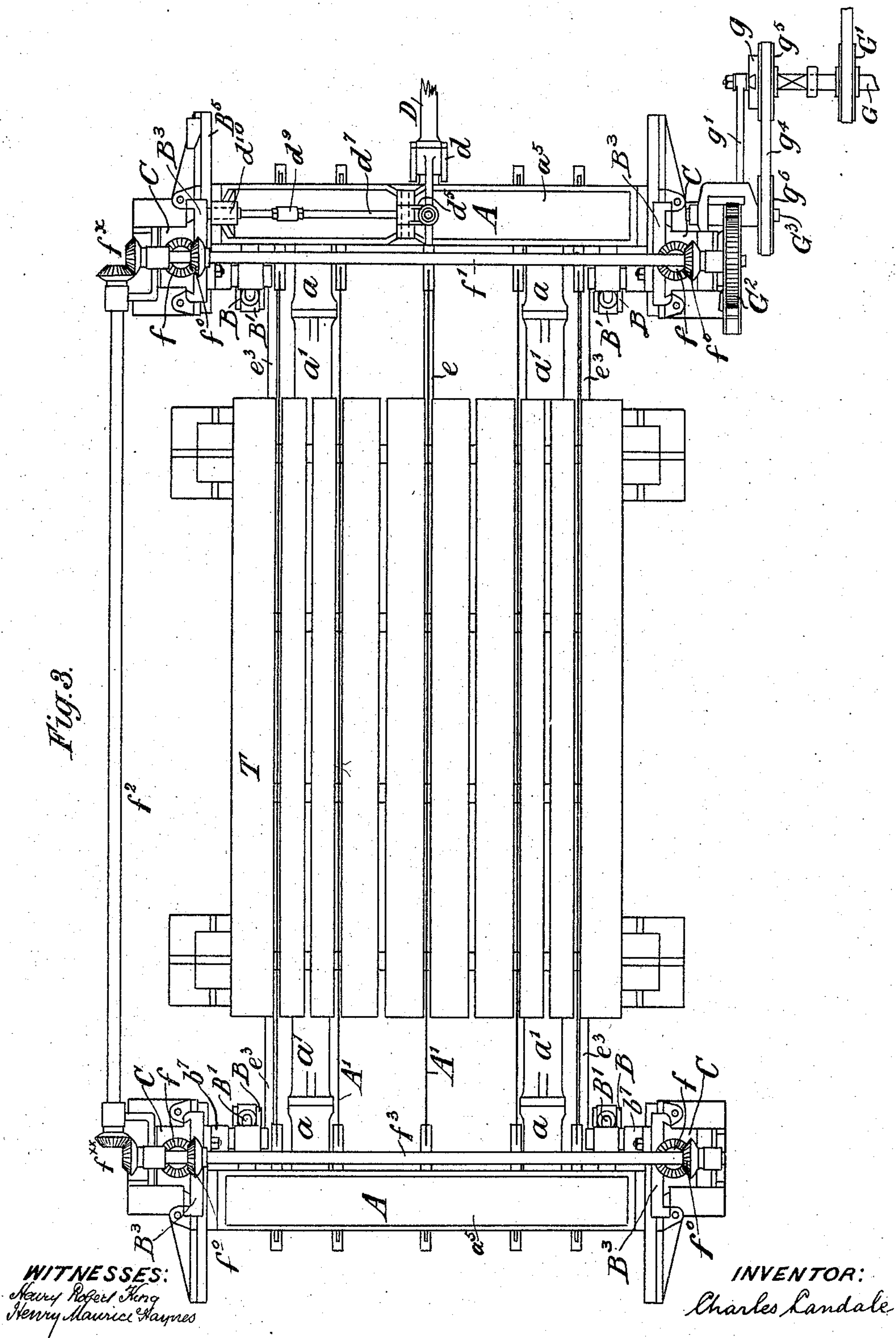
PATENTED MAR. 21, 1905.

C. LANDALE.

APPARATUS FOR CUTTING OR SAWING SLATE, STONE, METAL, WOOD,  
OR OTHER MATERIALS.

APPLIOATION FILED NOV. 29, 1902.

8 SHEETS—SHEET 3.



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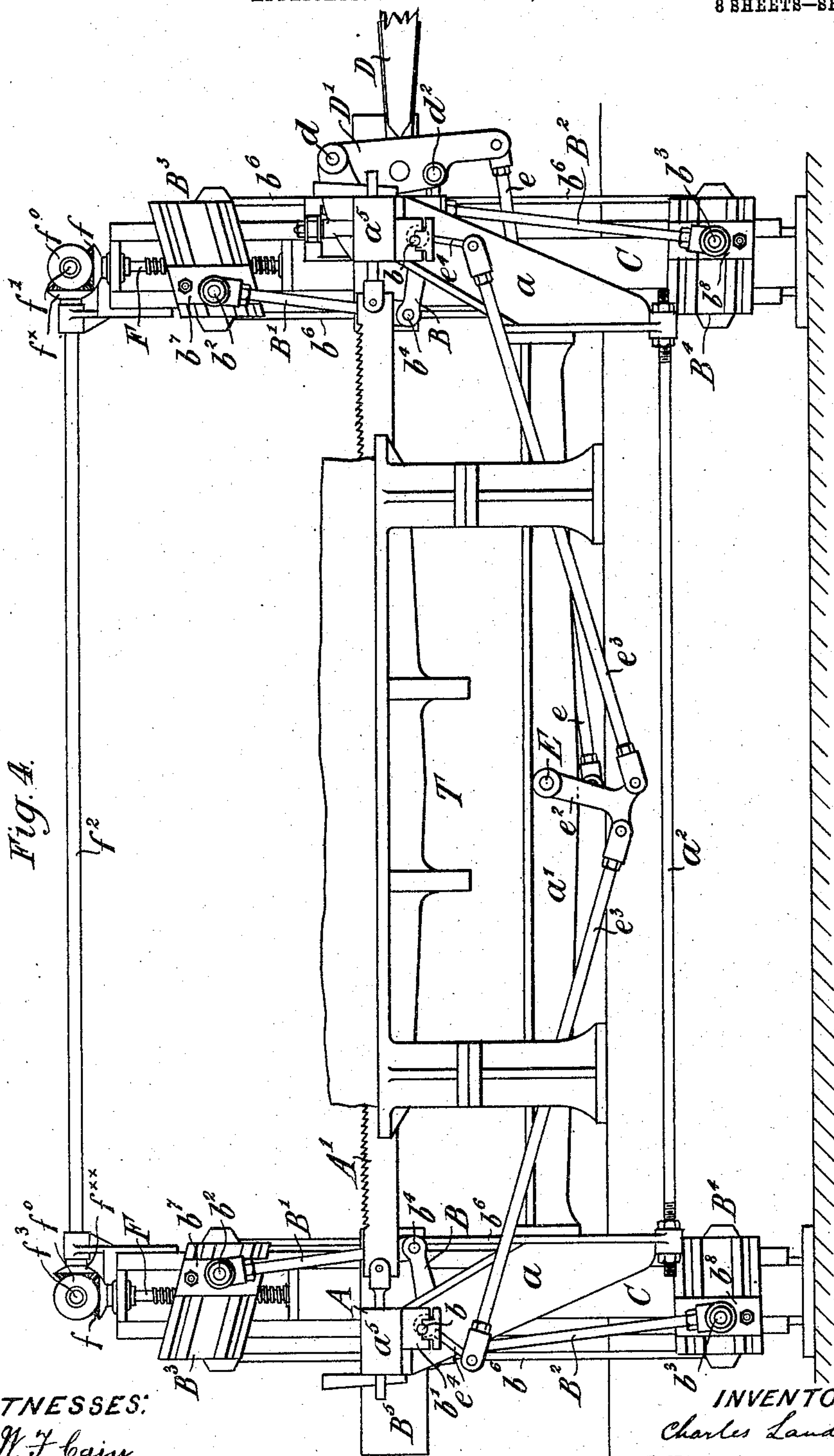


Fig. A.

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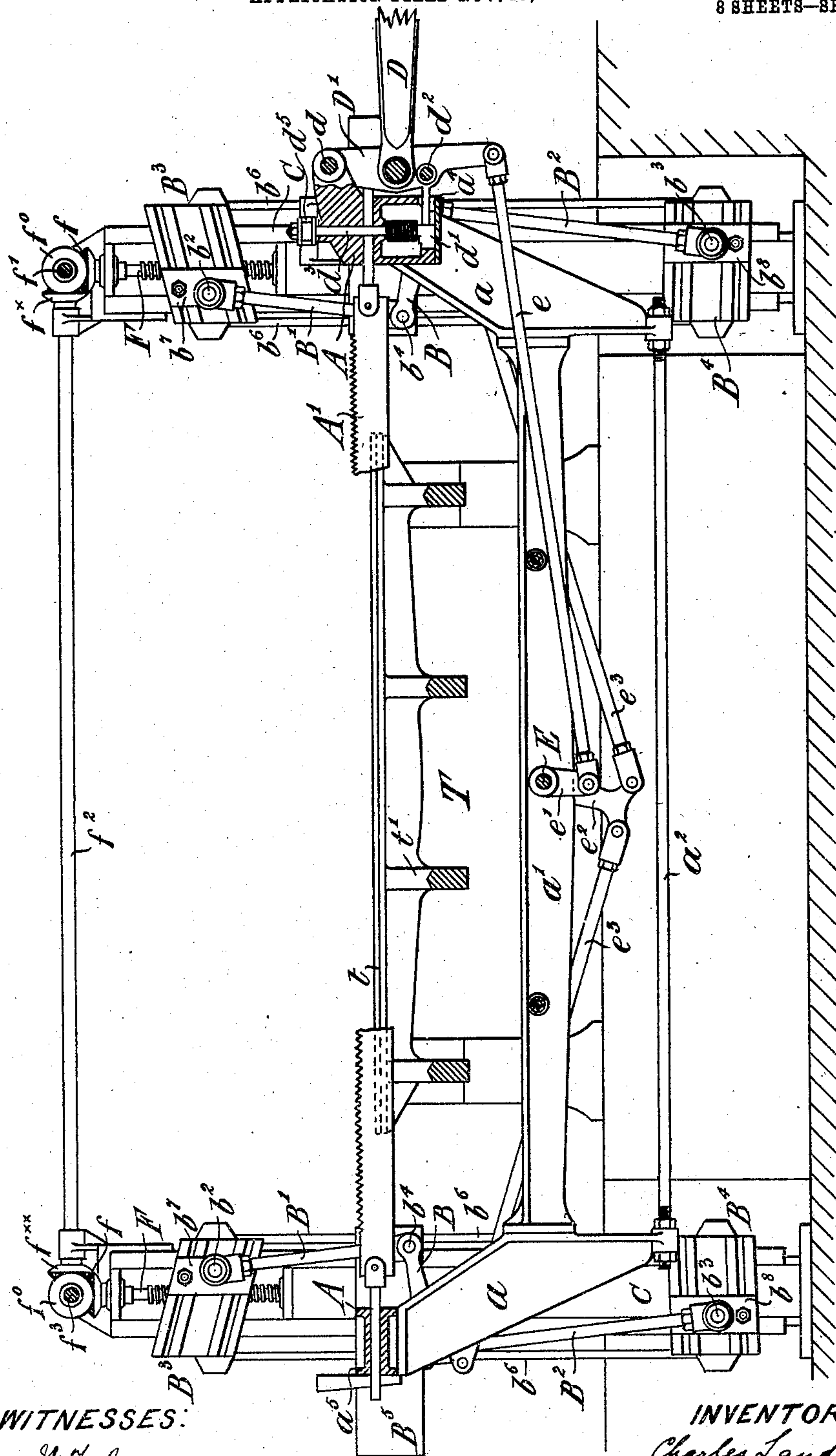
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Fig. 5.



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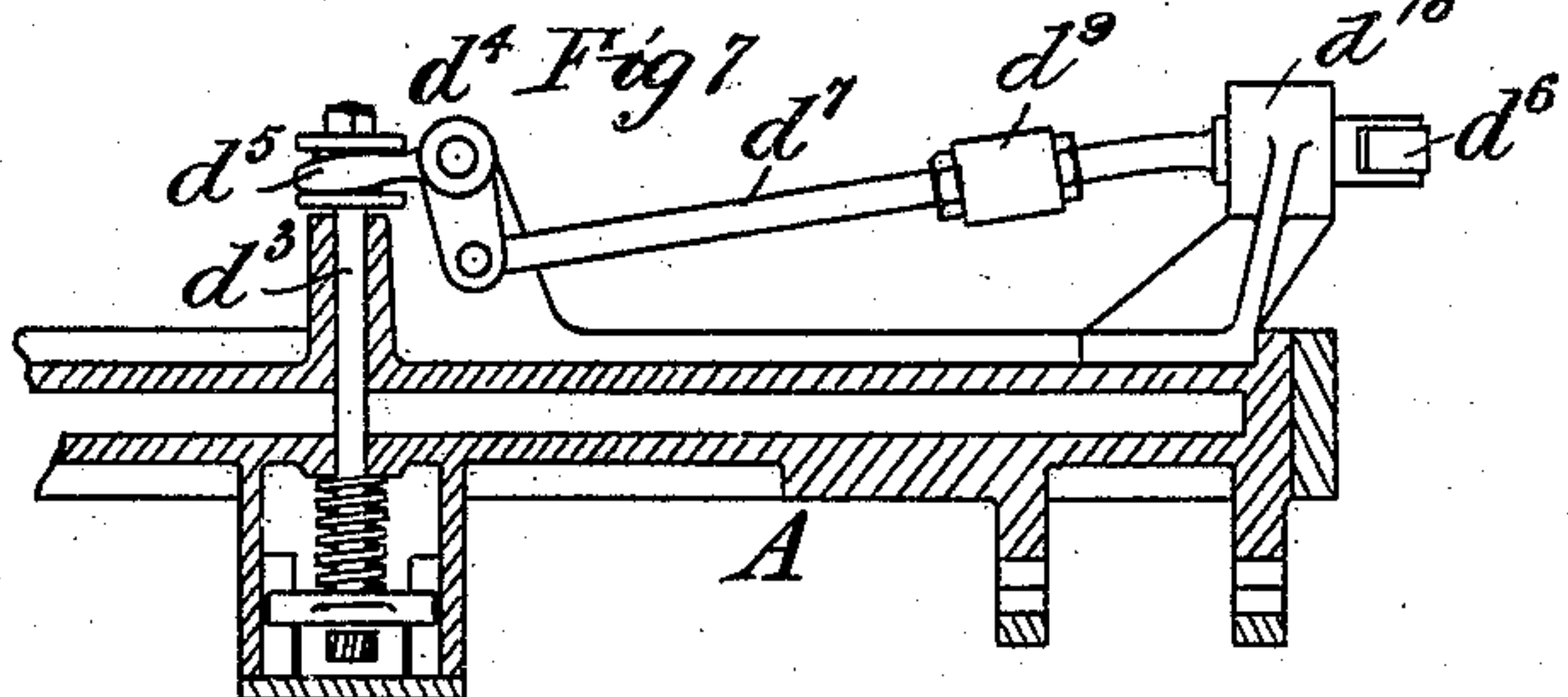
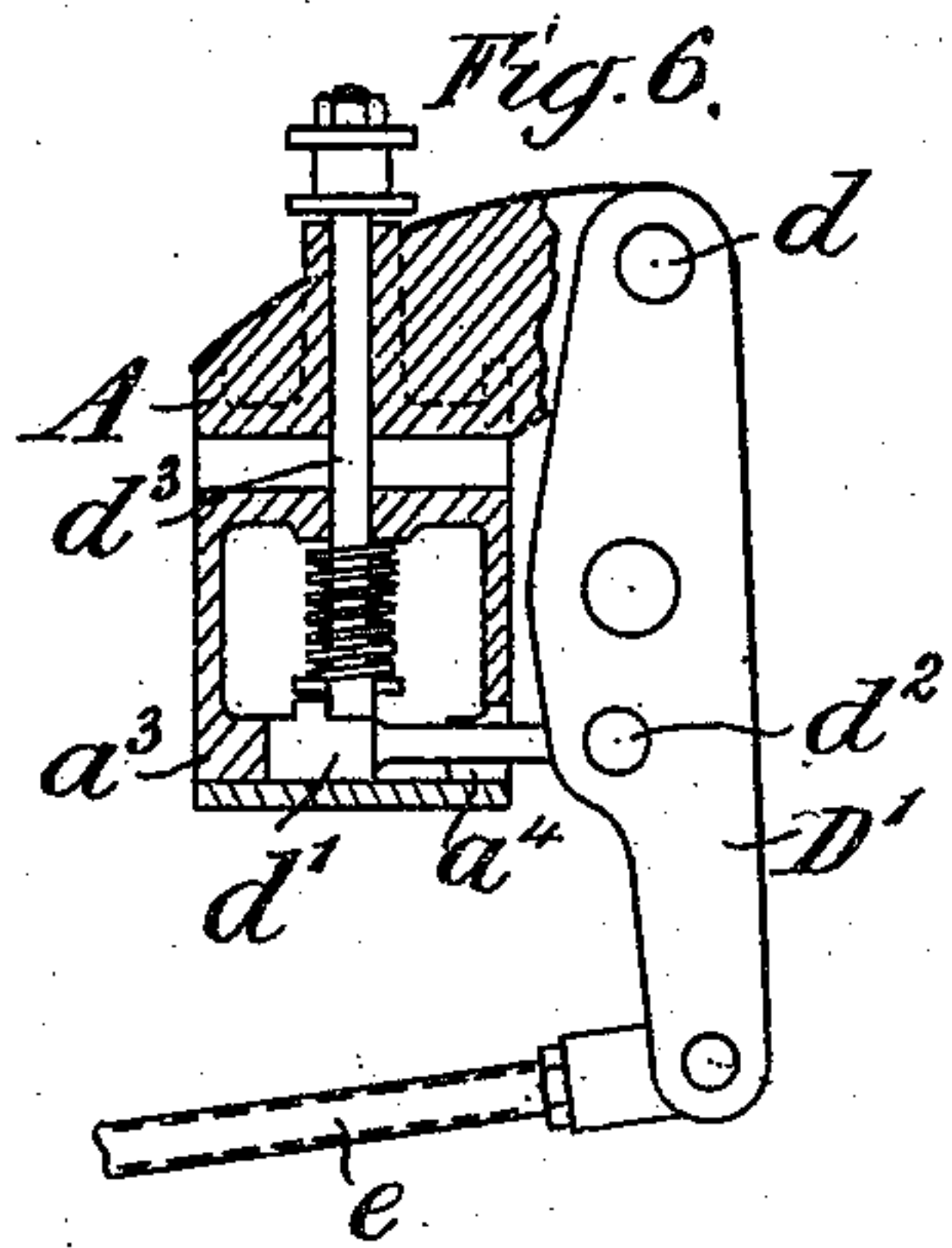
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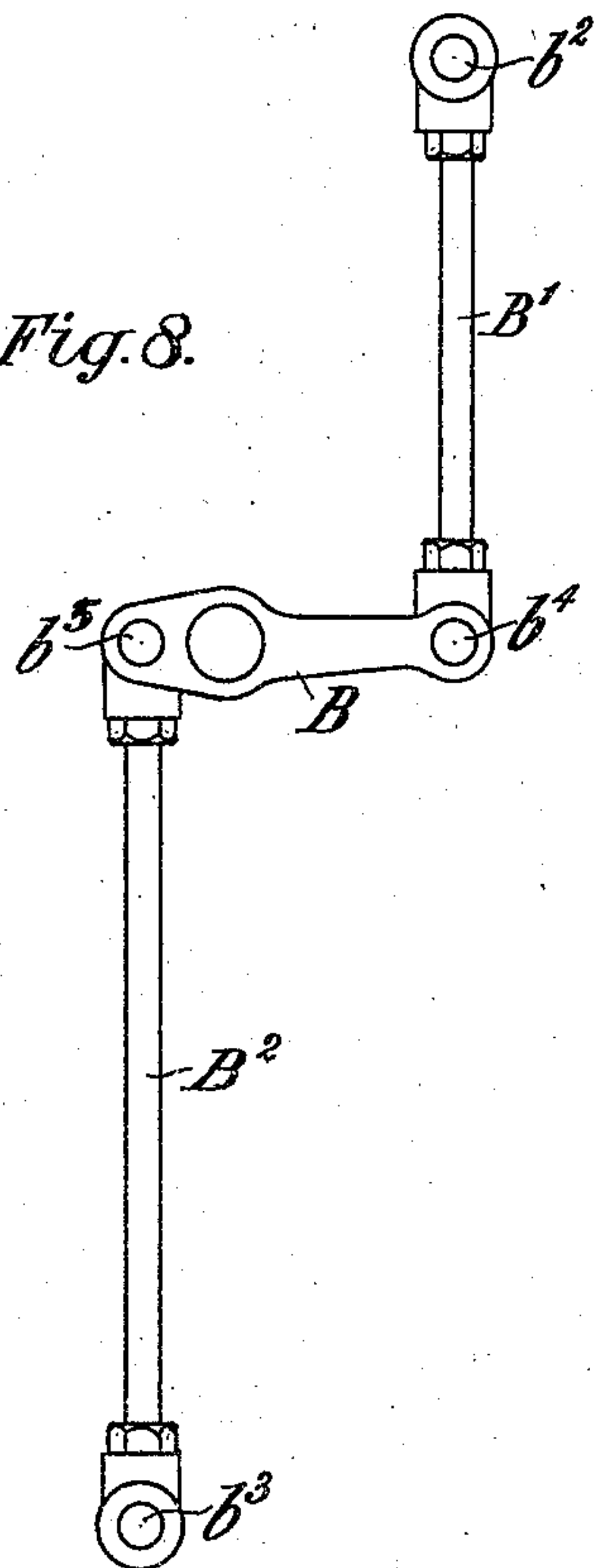
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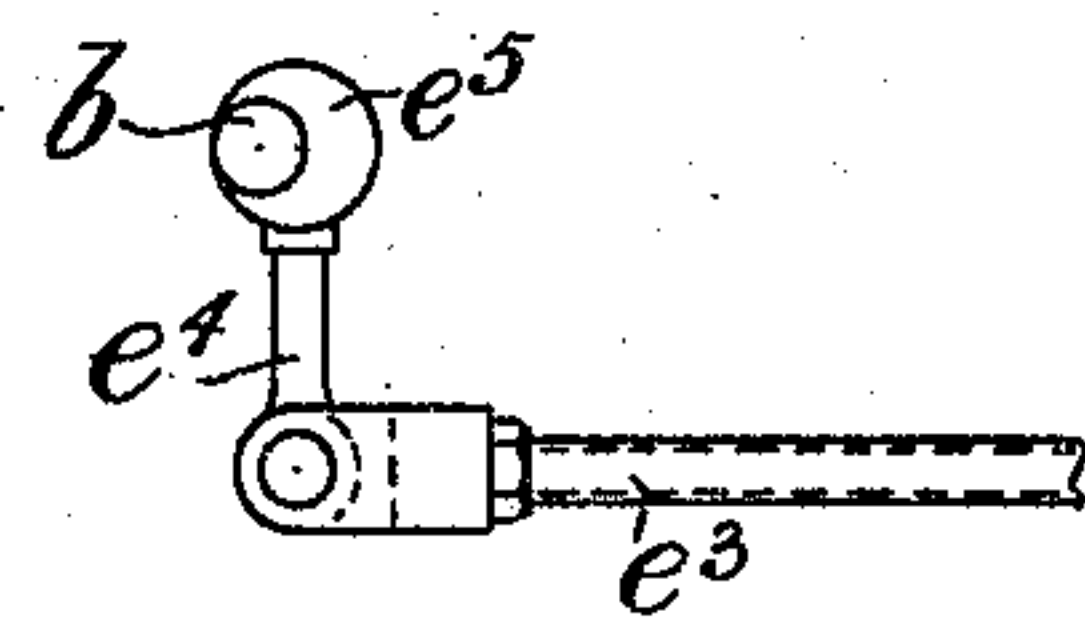
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*Fig. 8.*



*Fig. 9.*



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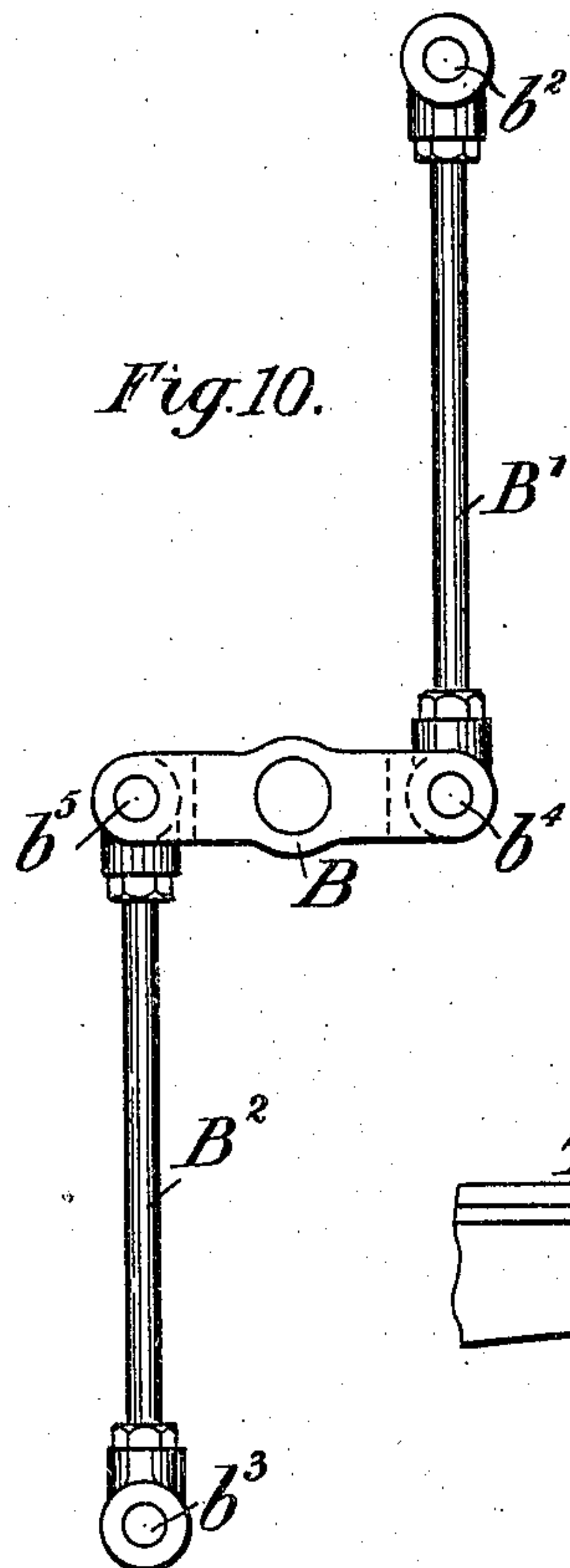


Fig. 10.

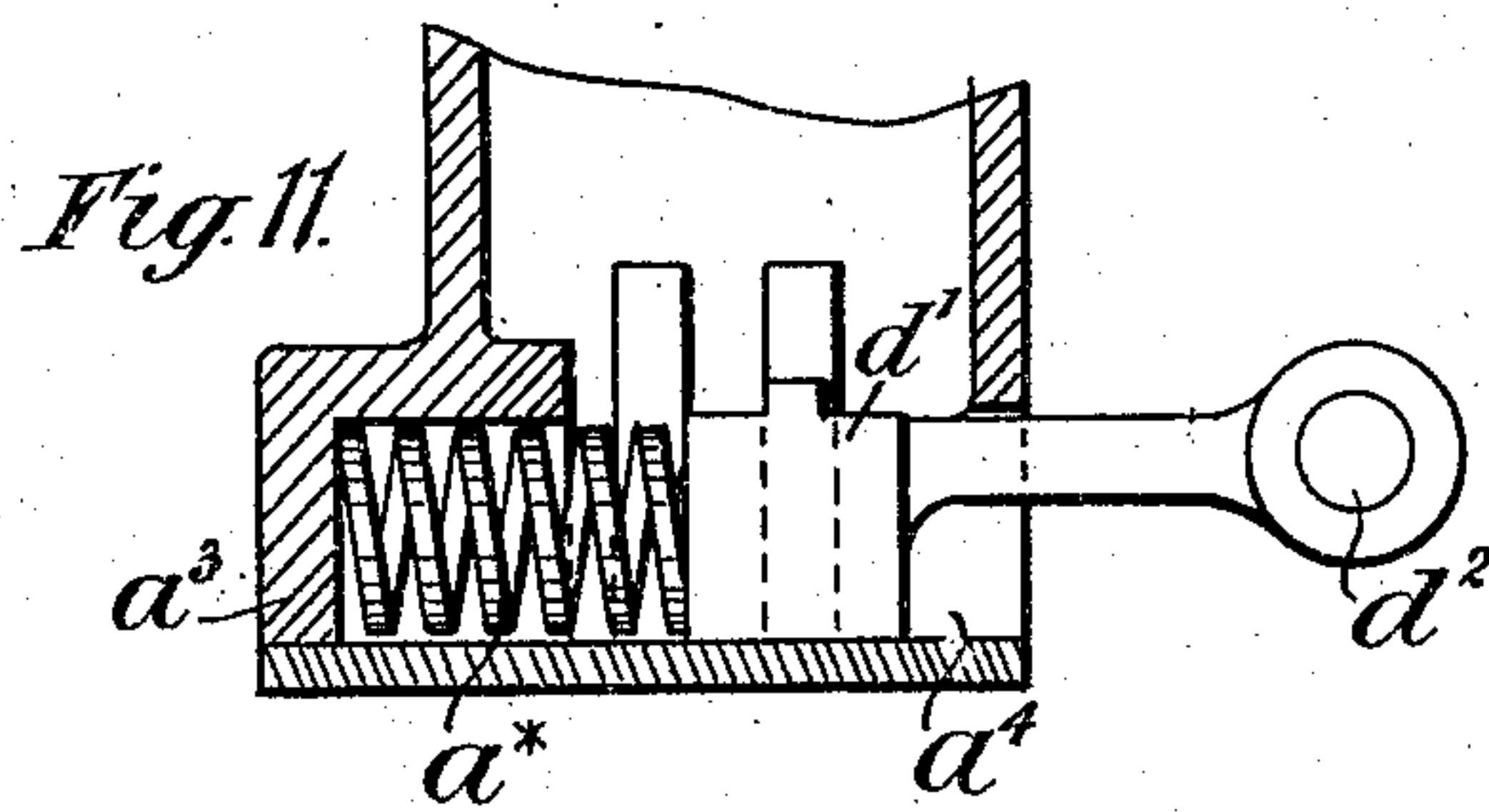


Fig. 11.

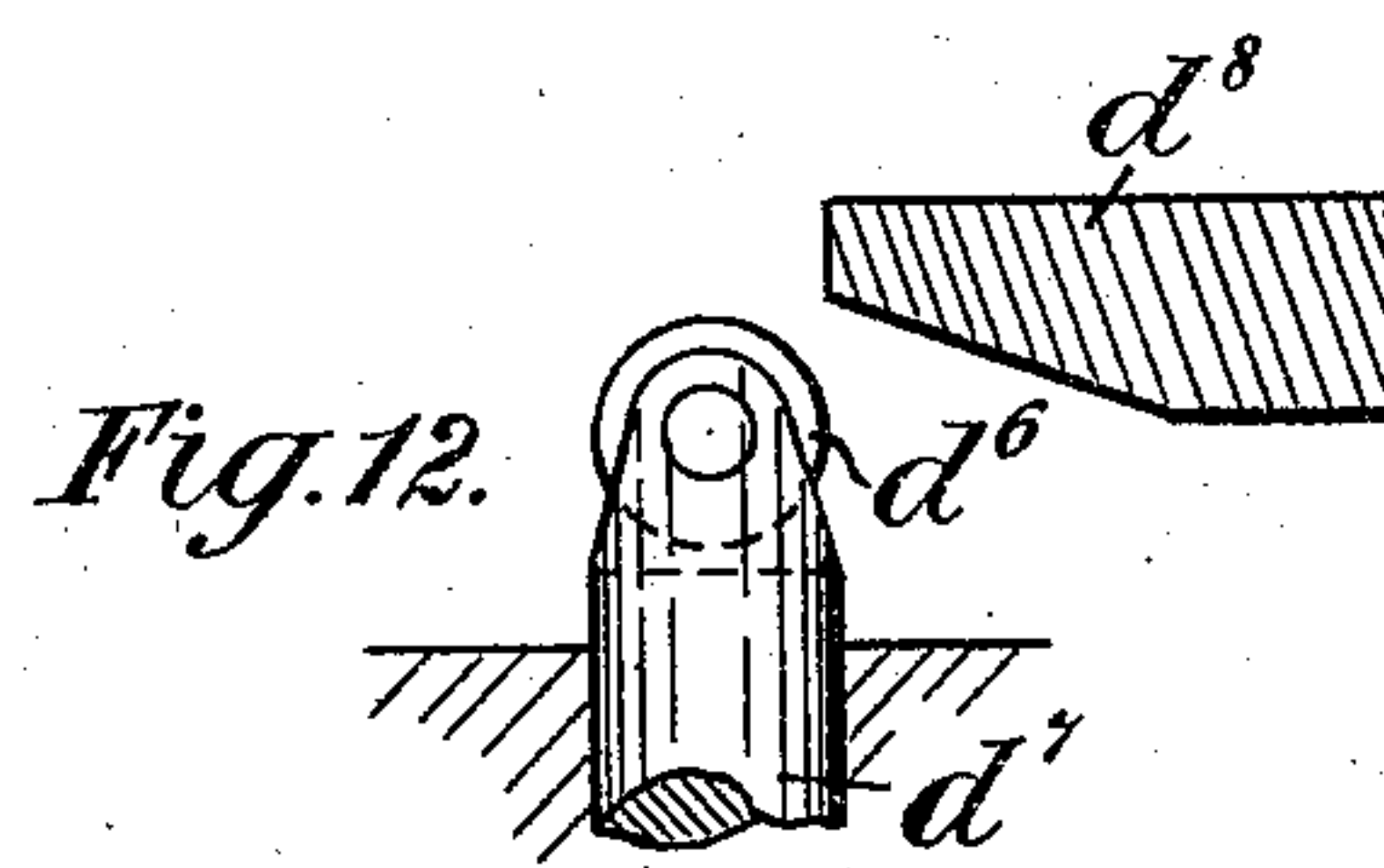


Fig. 12.

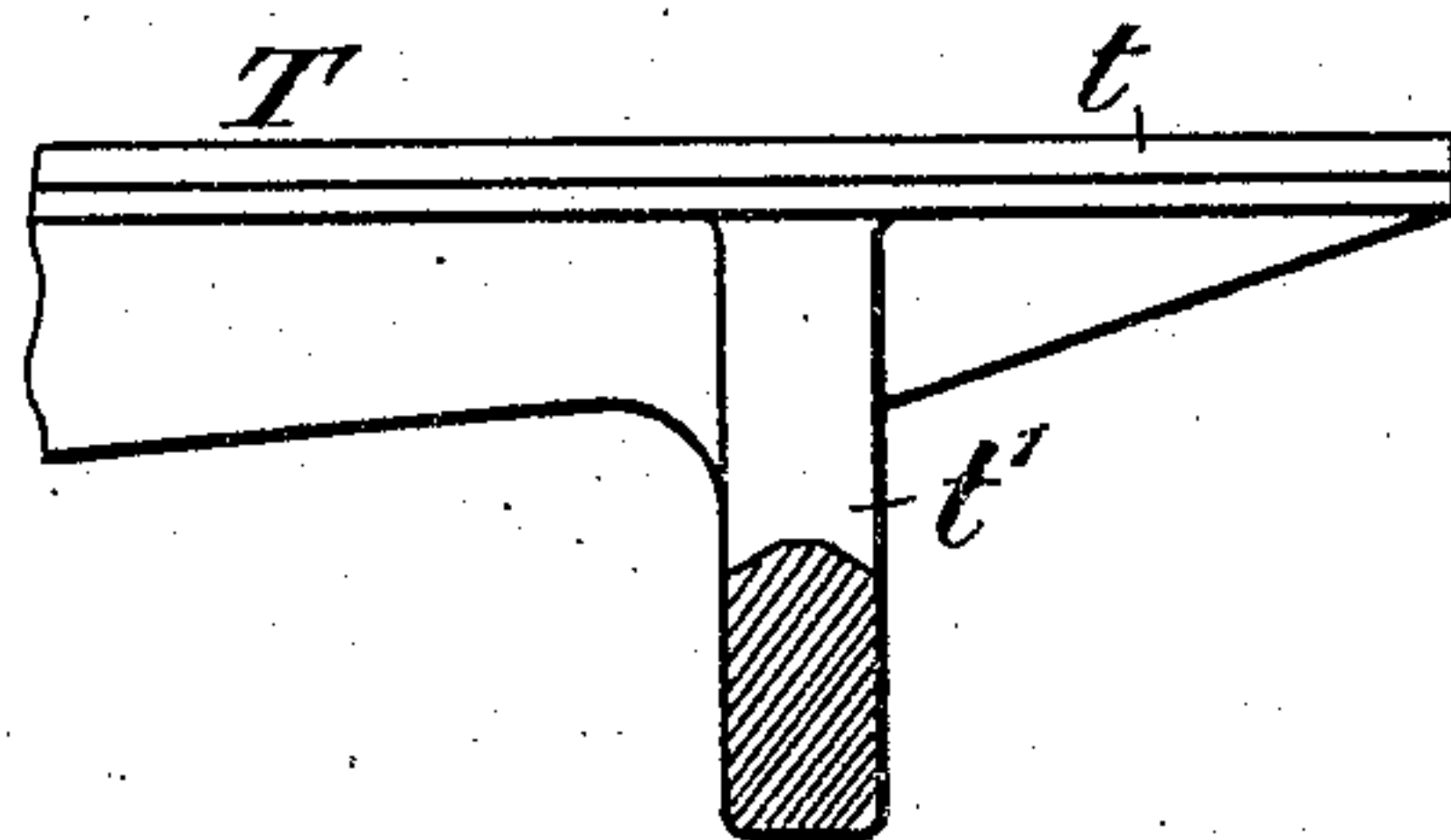


Fig. 13.

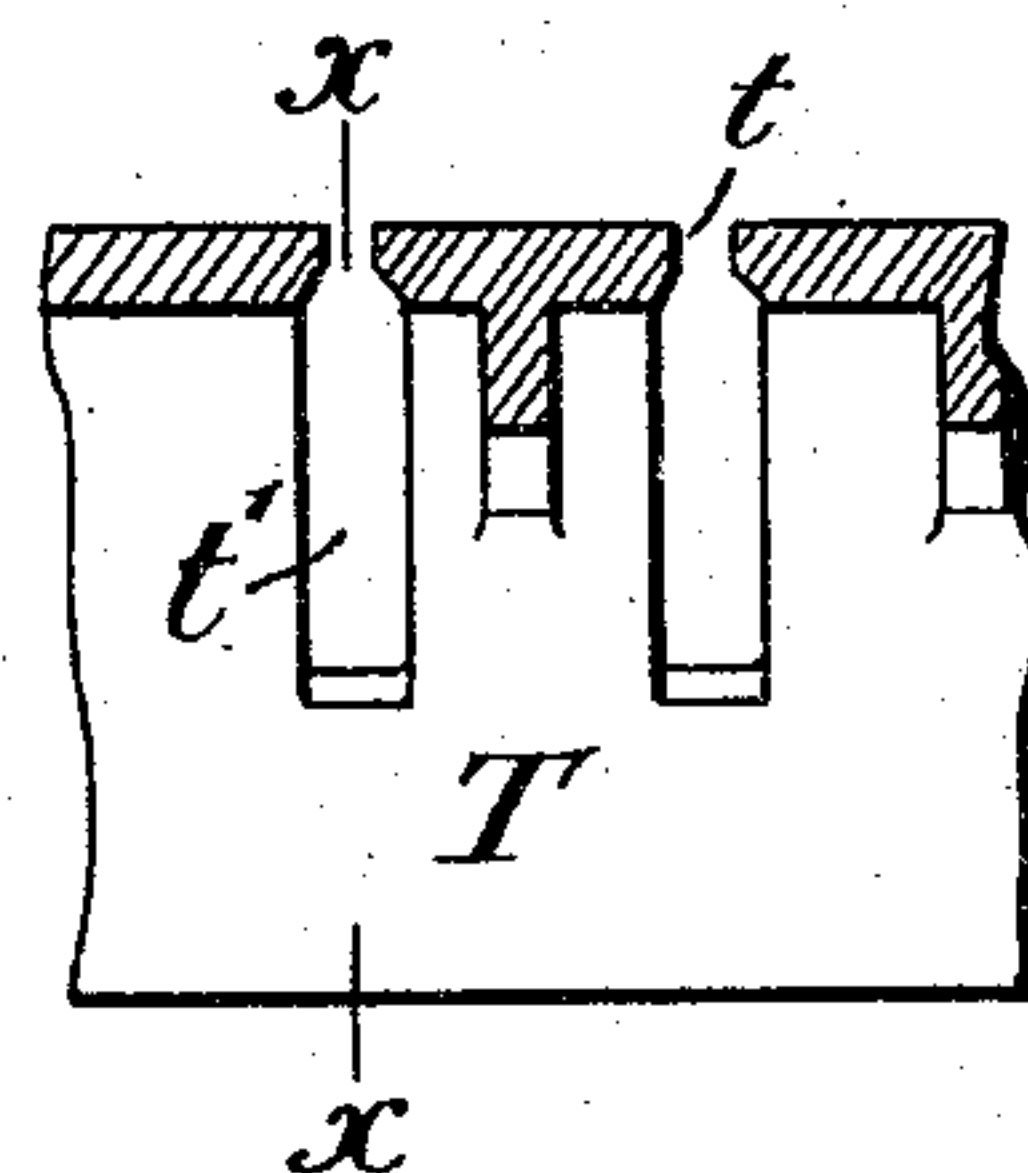


Fig. 14.

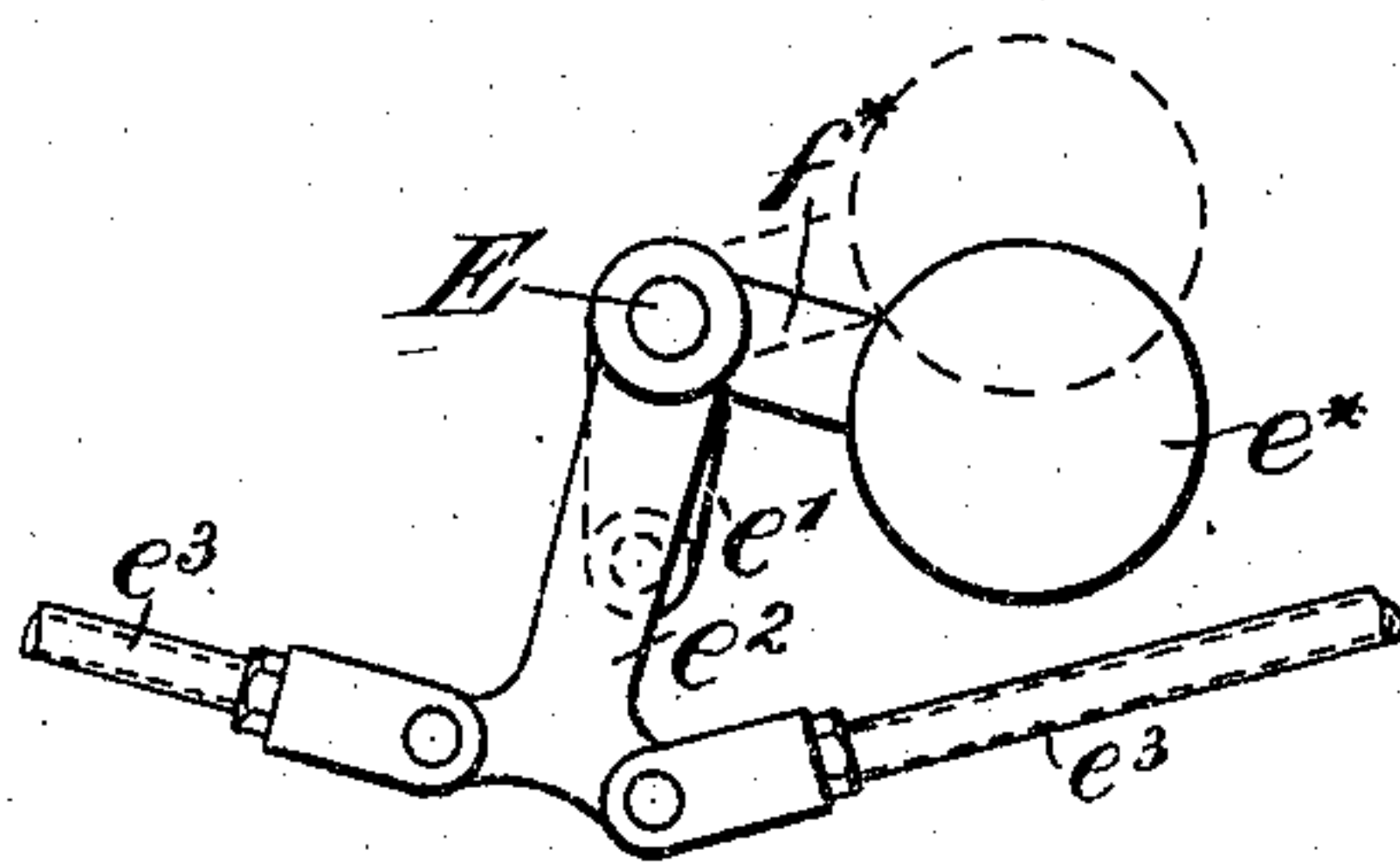


Fig. 15.

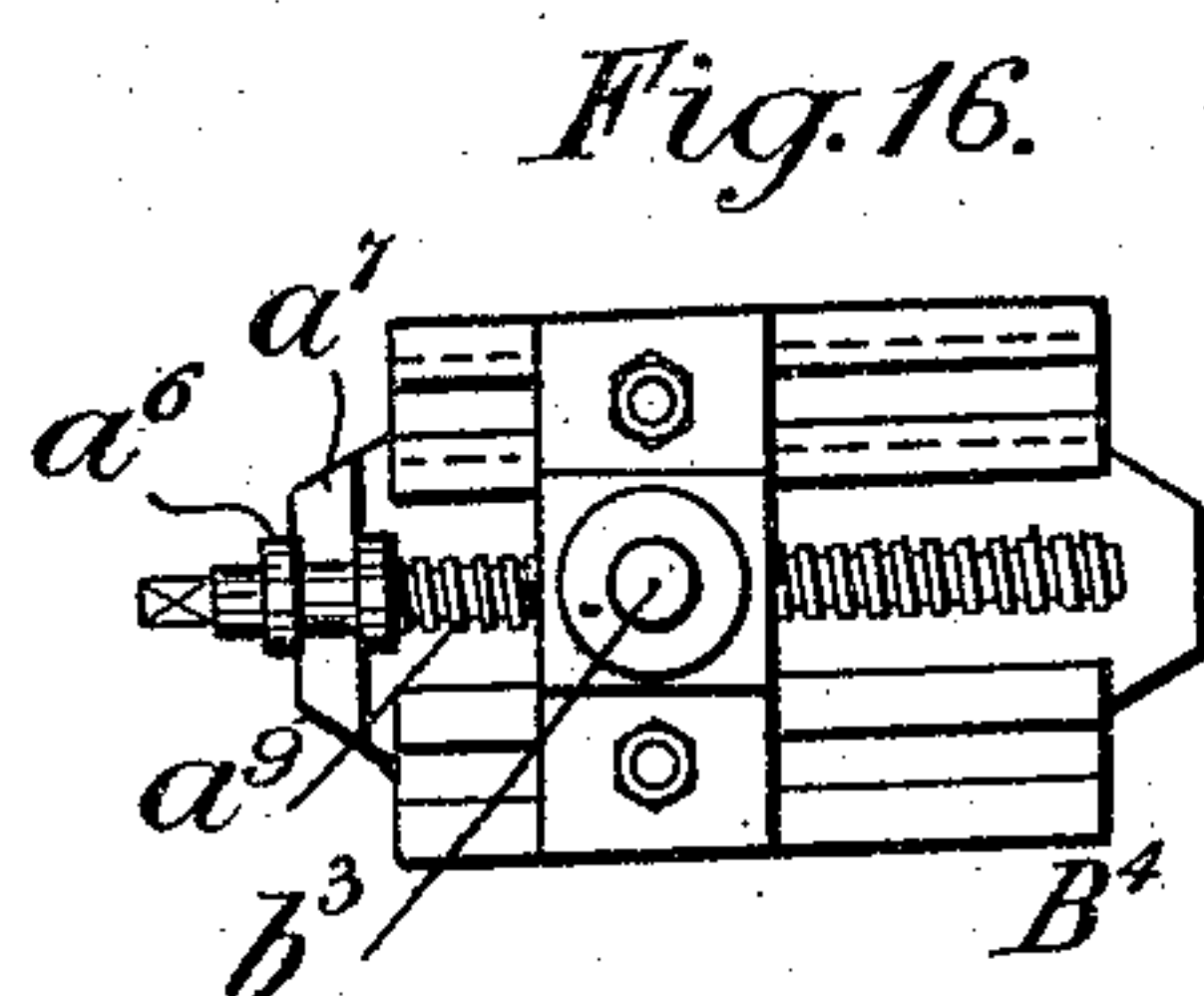


Fig. 16.

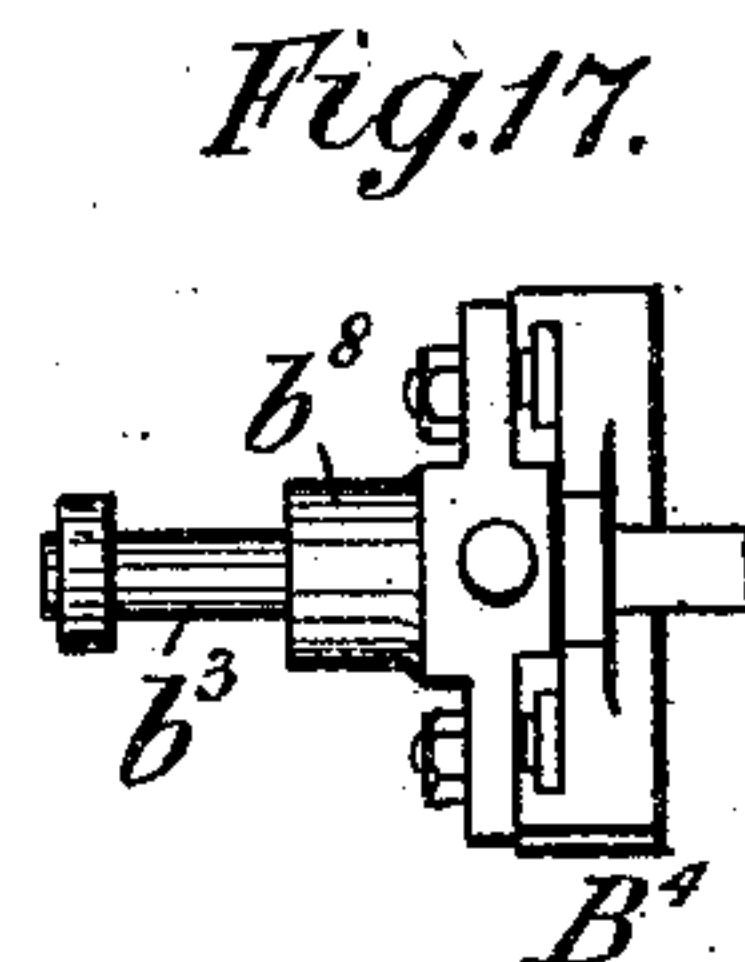


Fig. 17.

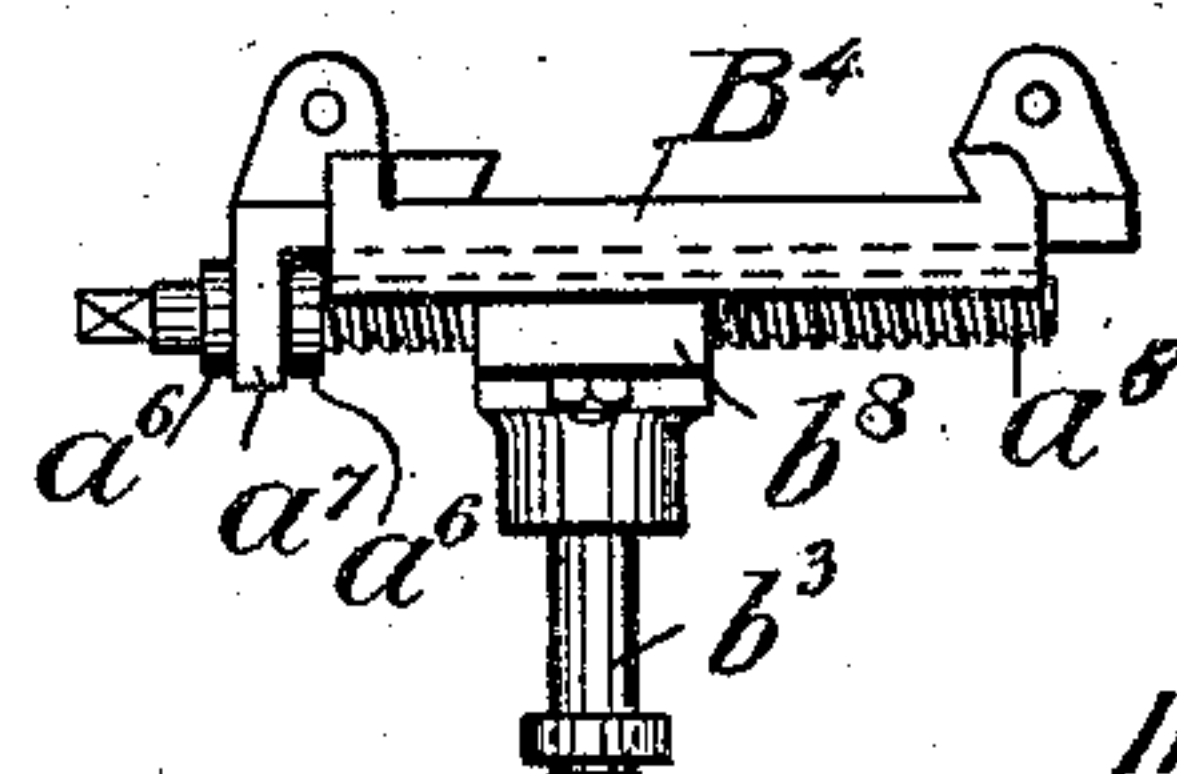


Fig. 18.

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APPLICATION FILED NOV. 29, 1902.

8 SHEETS—SHEET 8.

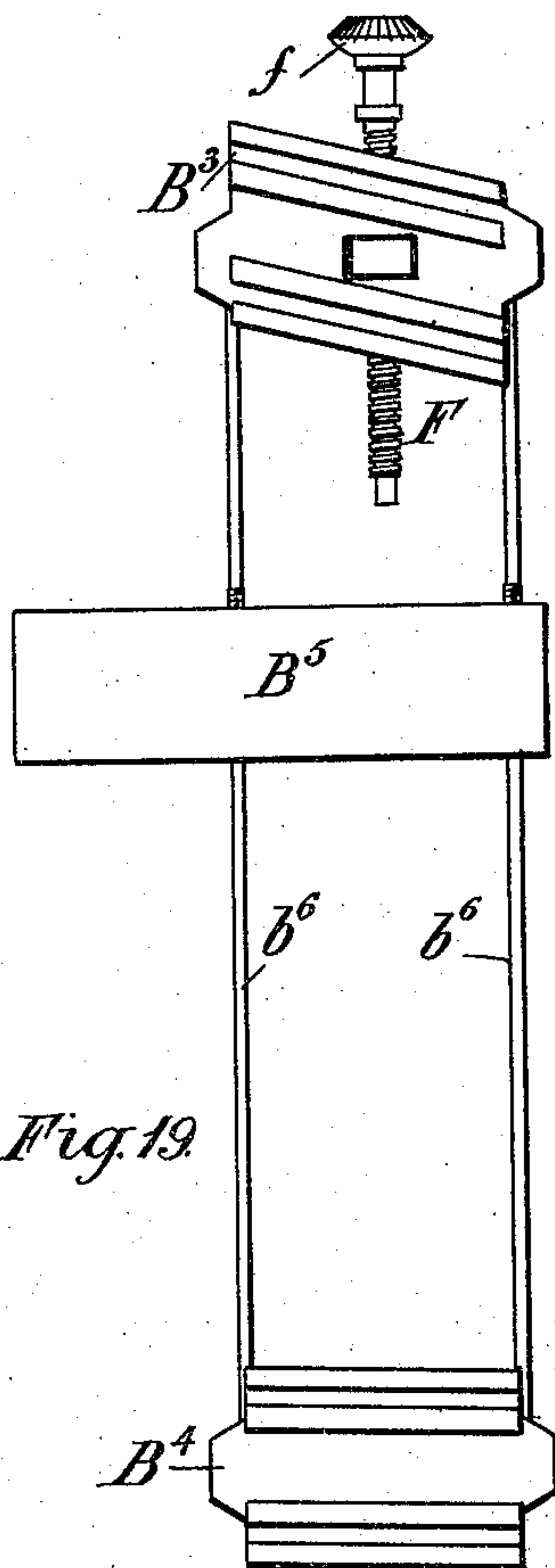


Fig. 19.

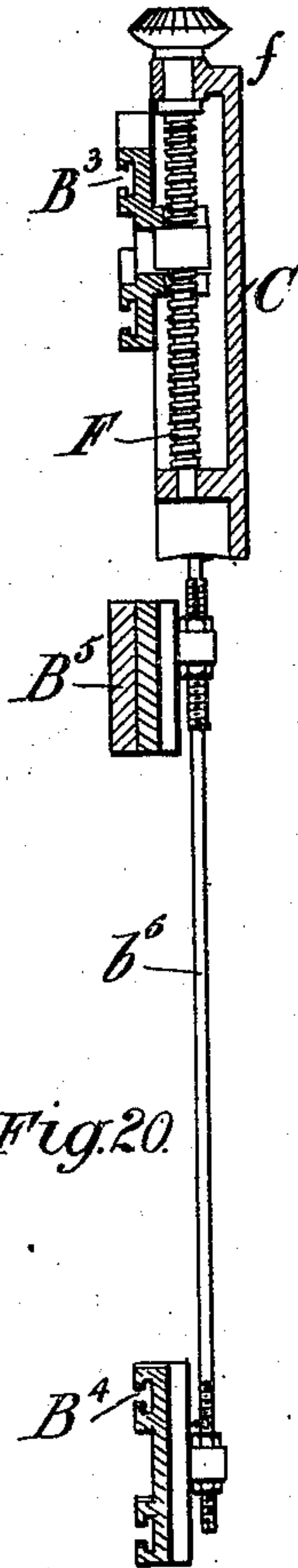


Fig. 20.

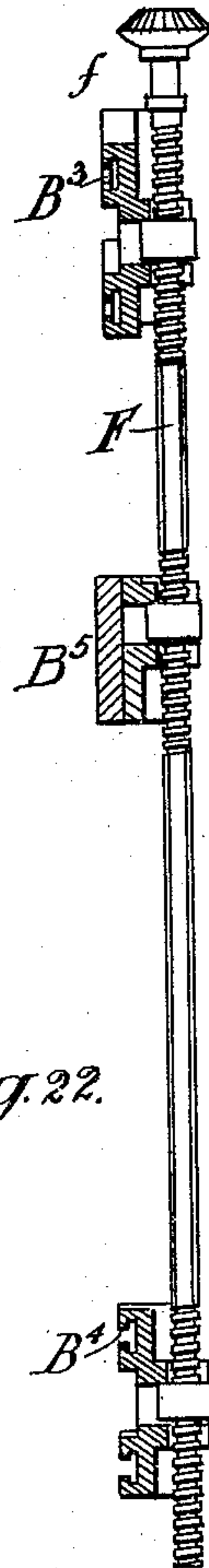


Fig. 22.

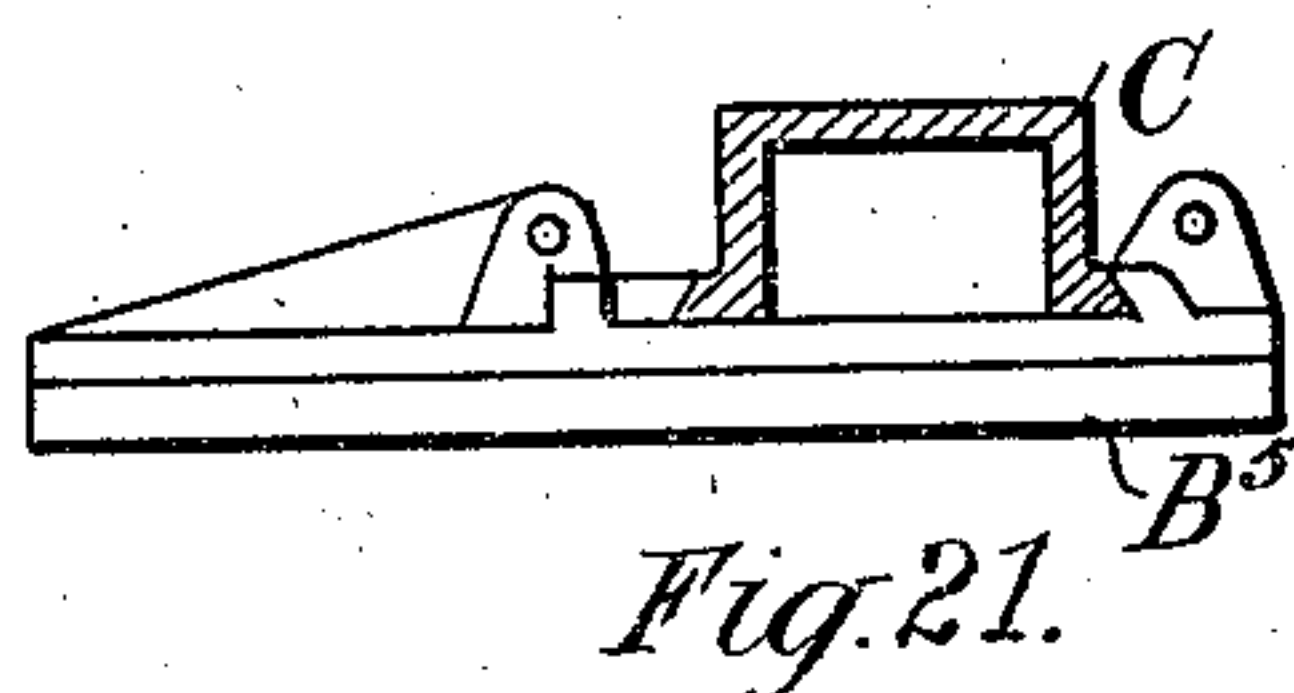


Fig. 21.

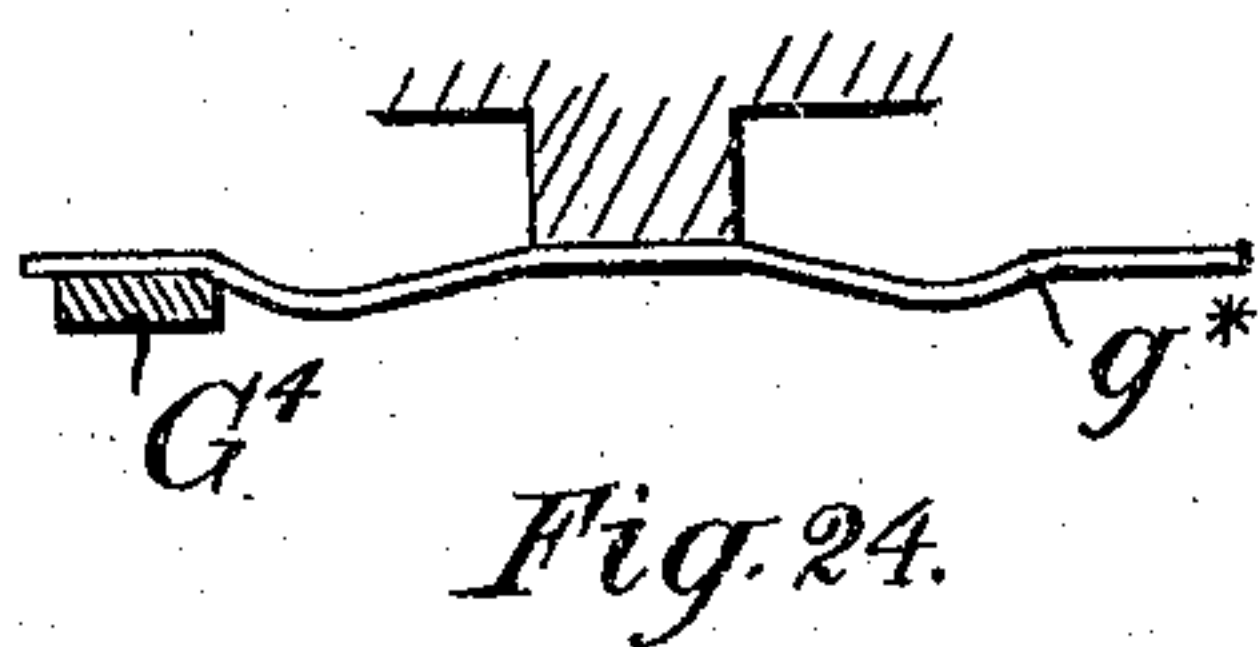


Fig. 24.

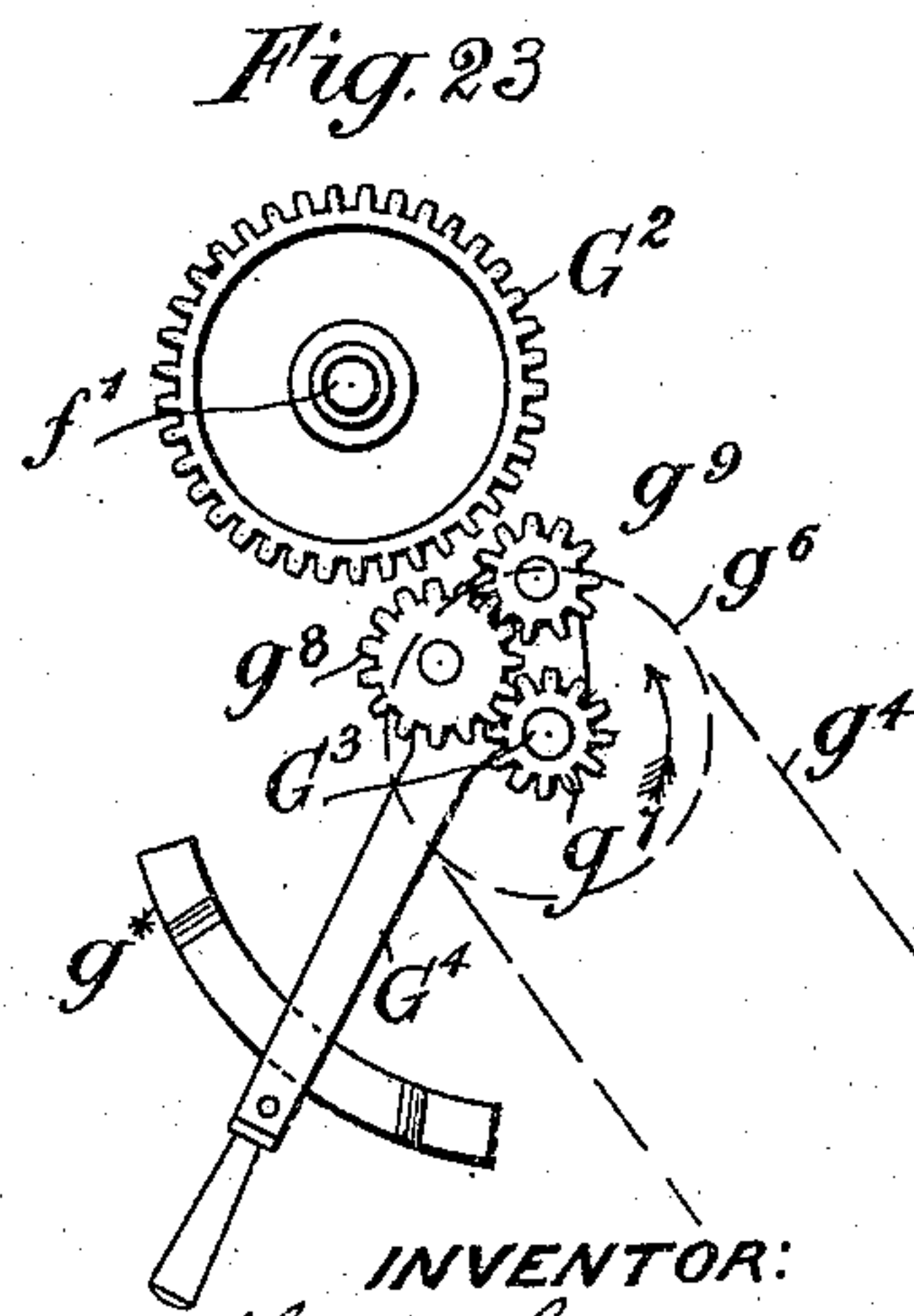


Fig. 23.

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# UNITED STATES PATENT OFFICE.

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APPARATUS FOR CUTTING OR SAWING SLATE, STONE, METAL, WOOD, OR OTHER MATERIALS.

SPECIFICATION forming part of Letters Patent No. 785,175, dated March 21, 1905.

Application filed November 29, 1902. Serial No. 133,272.

*To all whom it may concern:*

Be it known that I, CHARLES LANDALE, a subject of the King of Great Britain and Ireland, residing at 234 Oxford road, Basford Park, Stoke-upon-Trent, in the county of Stafford, England, have invented a new and useful Improved Apparatus for Cutting or Sawing Slate, Stone, Metal, Wood, or other Materials, of which the following is a specification.

This invention relates to apparatus particularly applicable for employment in cutting or sawing stone, but which may be used in sawing other materials—such as slate, wood, or metal—the objects being to render the motion of the saw-frame more effective, to lessen the wear of the saws by effecting their release from their work during the return stroke, and to provide for cutting in an upward direction.

In apparatus of the kind above referred to the saws or cutters are usually mounted in a frame which is arranged between the uprights or main framing of the machine and to which a reciprocative movement of a pendulous nature is imparted, the saw-frame being, moreover, fed upwardly as the work of cutting proceeds. According to one mode of working the saw-frame is suspended by means of rods which depend from transverse shafts, these being mounted in blocks which work in vertical guideways and receive motion from screw-spindles driven from overhead gearing. According to another arrangement it has been proposed to suspend the frame from the transverse shafts by means of a cross-head, whereof the extremities are connected with the saw-frame by crossed levers or links. In the former of these arrangements the mode of suspension of the saw-frame admits of cutting taking place only when the crank is above and below the axis of the shaft, the saws or cutters being lifted away from their work at each forward and backward movement of the frame. This mode of working involves considerable wear and tear of the cutters. According to the alternative arrangement a positive horizontal movement of the saw-frame is obtained whereby the saws operate during the whole of their stroke; but it is open to the objection that insufficient provision is made for the ingress of sand and water below the cutters.

In the accompanying drawings, Figure 1 is a side elevation of a sawing-machine adapted for effecting the objects of my invention. Fig. 2 is an end elevation, and Fig. 3 a plan corresponding with Fig. 1. Fig. 4 is a side elevation with the columns removed to show the link mechanism, and Fig. 5 a longitudinal section through the center of the machine. Figs. 6, 7, 8, and 9 are enlarged views illustrating part of the mechanism for lifting and lowering the saw-frame and the saws to or from the cut with a view to obviating unnecessary wear of the saws. Fig. 10 is a view of a modified arrangement of the cross-head and links. Figs. 11 and 12 are enlarged detail views of the means used for preventing the raising or lowering of the saws before the end of the stroke is reached. Figs. 13 and 14 are views, on a larger scale, of a portion of the table, Fig. 13 being a section on the line  $x\ x$  in Fig. 14. Fig. 15 is a detail view of a modification in the table raising and lowering apparatus. Figs. 16, 17, 18, 19, 20, and 21 are detail views of the saddles or blocks and their connections. Fig. 22 is a view of a modified arrangement of the said saddles or blocks. Figs. 23 and 24 are detail views of the feeding mechanism.

In cutting apparatus constructed according to my improved method the saw-frame A is mounted on supports  $a\ a$  and suspended from cross-heads B, connected by links  $B' B^2$  to saddles  $B^3 B^4$ , carried by the frame C of the machine, the arrangement being such that while one portion of the cutter A' is cutting the other portion is moved out of the cut, as hereinafter more fully described. By these means the "bite" of the cutter is increased, while the ingress of sand and water supplied in the usual manner to the cut is facilitated. At the same time the machine is rendered available for the employment of toothed saws or cutters. The saws A' are secured in the end portions  $a^5 a^5$  of the frame A by the usual means. The end portions  $a^5 a^5$  are mounted in end supports  $a\ a$ , connected by longitudinal members  $a' a'$  and tension-rods  $a^2 a^2$ . This construction insures the sides of the frame being in such a position as not to hamper the attendant in the exercise of his duties, as is frequently the case with the frames as ordi-



narily arranged. The table T, whereon the material to be cut is placed, is of such a construction that the saw may be entirely below the upper surface of the table when not cutting, the table being formed with longitudinal slots  $t$ , which enlarge into recesses  $t'$  in the cross-girders of the table, as shown in Figs. 13 and 14.

According to one mode of carrying out my invention a cross-head B is mounted on an eccentric stud or pin  $b$ , carried in lugs  $b'$ , formed or provided on the saw-frame A and connected by rods or links  $B^1 B^2$  with saddles or blocks  $B^3 B^4$ , arranged to slide vertically in the uprights C, as shown in Figs. 19, 20, and 21. The connecting-rods  $B^1 B^2$  are attached at the respective ends of the cross-heads. The rods  $B^1$ , which extend above the frame, may be attached, as shown, to the inner ends thereof, while the rods  $B^2$ , which extend below the said frame, may be attached to the outer ends of the cross-heads, as shown. The parts may be so arranged that when the apparatus is out of use the cross-head lies parallel, while the links or rods are at right angles thereto, as shown in Figs. 8 and 10. Upon a reciprocating motion being imparted to the frame A by means of the ordinary crank and the connecting-rod D the frame will move horizontally. The connecting rod or rods, if more than one be employed, may be attached to the frame, as shown, or to any other convenient part thereof. The points of attachment from which the links supporting the cross-heads are suspended are preferably of an adjustable character, such as pin  $b^3$ , (shown in detail in Figs. 16, 17, and 18,) so that by turning the links  $B^1 B^2$  about the pivoting-center of the cross-head B or by moving the outer centers  $b^2 b^3$  of the upper and lower links or rods  $B^1 B^2$  at each end of the frame A in respectively opposite directions the movement of the frame may be varied. As the saw-frame A is reciprocated the ends  $B^1 B^2$  will be vibrated on their pivots  $b^2 b^3$  and the saddles B angularly advanced, with the effect that the forward end of the leading saddles will be depressed, while the forward end of the rear saddles will be raised. A rocking movement in conjunction with a horizontal motion may thus be imparted to the saw-frame, one end of the latter being lowered, while the other end is raised. The ingress of water and sand to the cut is hereby permitted. Provision may be made for varying the extent of the rocking movement during the working of the apparatus by means of a spindle  $a^9$ , engaging in a screwed hole in the carriers  $b^7 b^8$ , the spindle being held from longitudinal movement by the shoulders  $a^6 a^6$ , bearing against the slotted flange  $a^7$  on the blocks  $B^4 B^5$ , and a squared end being provided on the spindle for the reception of a key whereby it may be rotated by hand.

The linkwork may, as stated above, be so

proportioned as to yield a parallel, and so maintain a straight-line, motion of the saws. By turning the linkwork about its center the points of suspension may still be guided in a straight line, but one which will be at an angle with the horizontal, and whereby two or more blows will be imparted to the material being operated on instead of the one blow obtained by suspending the frame by means of a single rod. In the example illustrated the linkwork has been devised with the object of affording a curved path to the pivot  $b$ , so that the movements of the saws are such that at different points in their movement their position is tangential to a circle of large radius. The link  $B^1$  is free to move about its pivot or connection  $b^2$ , the link  $B^2$  being free to move about its pivot  $b^3$ . The connections  $b^4 b^5$  of the links  $B^1 B^2$  with the cross-head B are also free joints. The pivot  $b$  in the cross-head B forms the point of support of the saw-frame A, and although this point of support in the arrangement illustrated is situated between the connections  $b^4 b^5$  this position is not essential. The pivots or connections  $b^2 b^3$  are carried in the saddles or blocks  $B^3 B^4$ , the latter adapted to be moved vertically by means of screwed spindles F, as hereinafter described, affording means whereby the saws may be fed up to the work or otherwise.  $B^5 B^5$  are guides or saddles which serve to guide the frame A, and thus maintain a parallel motion of the saws.  $b^6 b^6$  are screwed rods which connect the upper and lower saddles and the frame-guides and which admit of their adjustment relatively to each other, as will readily be seen on referring to Fig. 1. The lateral adjustment of the pivots  $b^2 b^3$  may be effected by moving the carriers  $b^7 b^8$  along their respective blocks  $B^3 B^4$ .

In adapting the apparatus for employment with toothed saws cutting in one direction—such as in the case of sawing slate, soft stone, &c.—and with a view to avoiding unnecessary wear of the saw-teeth I utilize the to-and-fro or thrusting-and-pulling movements of the connecting rod or rods D for lifting and lowering the saws to or from the cut and so effecting the release of the saw during the return stroke. The thrust rod or rods D of the saw-frame is or are connected with a lever D', pivoted in the end of the saw-frame A, the lever being capable of a limited vibratory movement. The mechanism may be arranged in a similar manner to that illustrated in Figs. 1, 2, and 3 and hereinafter described.

In sawing certain descriptions of materials I prefer to mount and to operate the saw-frame substantially as illustrated, so that the cutting is effected upwardly through the material, the waste material freeing itself from the saw on its release from the cut during the return stroke. When so working, the mechanism is preferably arranged in the following manner: The vibratory lever D' is pivoted at



$d$  in the saw-frame A, its vibratory movement being limited by the bolt  $d'$ , hinged to the lever at  $d^2$ . The head of the bolt  $d'$  is formed in such a manner that the abutments  $a^3 a^4$  in the said frame serve, respectively, to control its motion in the inward and outward position. The abutments may be provided with resilient buffers, such as the spring  $a^*$ , (shown in Fig. 11,) so as to absorb any shock arising from the contact therewith of the head of the bolt. In order to prevent the raising or lowering of the saw-frame before it arrives at the end of the cutting or return stroke, a catch  $d^3$  is provided. This catch is operated by means of a bell-crank lever  $d^4$ , whereof the forked arm  $d^5$  embraces the outer end of the catch  $d^3$ . A rod  $d^7$  is connected at its one end with the lever  $d^4$ , while its opposite end is supported in a bracket  $d^{10}$  and carries a roller  $d^6$ , so arranged as to engage an incline or contact surface  $d^8$  upon the saw-frame nearing the end of its return stroke. The rod  $d^7$  is preferably made adjustable by means of a coupling  $d^9$ . By these means the bell-crank lever  $d^4$  effects the raising of the catch  $d^3$ , thus releasing the bolt  $d'$  and rendering the lever  $D'$  free to vibrate and to effect the raising or lowering of the saw-frame. The lever  $D'$  is connected with the shaft E by means of the rod  $e$  and lever  $e'$ , the latter being keyed to the shaft E. To this latter is also keyed the levers  $e^2 e^2$ , which are connected with the link-motion by means of the rods  $e^3 e^3$  and levers  $e^4 e^4$ . The levers  $e^4 e^4$  carry the sheaves  $e^5 e^5$ , which operate the pins  $b b$ , whereby the saw-frame is held suspended, these pins being arranged eccentrically in the sheaves, so that upon the levers  $e^4$  being vibrated a rectilinear movement, in conjunction with a pendulous motion, is imparted to the saw-frame. Should the weight of the frame and its connections be such that the lifting thereof is rendered difficult, the shaft E may be provided with means for assisting in the raising of the frame, such as the weight  $e^*$  at the end of the lever  $f^*$ , secured to the said shaft E, as shown in Fig. 15.

The saws are fed up to the work by means of the screw-spindles F F, working in lugs in the saddles  $B^3 B^3$  and taking a bearing at its lower end on the frame C, as shown in Fig. 20, or the spindles may work in both the saddles  $B^3 B^4$  and in the guide  $B^5$ , as shown in Fig. 22. To the spindles F F are keyed bevel-wheels  $f$ , which mesh with bevel-wheels  $f^0$ , keyed to the shafts  $f' f^3$ , the shaft  $f'$  being driven in the manner hereinafter described and the shaft  $f^3$  driven from the shaft  $f'$  by means of bevel-gearing  $f^x f^{xx}$  at each end of a shaft  $f^2$ , as is clearly shown in Fig. 3. The shaft G is rotated by the pulley  $G^7$ . A crank-disk  $g$  on the shaft G conveys motion, by means of the rod  $g'$ , to a radial arm  $g^2$ , furnished with a weight or spring-controlled pawl  $g^3$ , which engages with the teeth

of a spur-wheel  $G^2$ , keyed on the shaft  $f'$ . This shaft  $f'$  actuates through the bevel-gearing  $f f^0 f^x f^{xx}$  and the respective shafts  $f' f^2 f^3$  the screw-spindles F F, and thereby raises or lowers the saddles  $B^3 B^4 B^5$ . When it is desired to rapidly raise or lower the saw-frame—as, for instance, when the saws are not cutting—motion is transmitted from the shaft G to the shaft  $f'$  by means of a band  $g^4$  and pulleys  $g^5 g^6$ , the pulley  $g^6$  being keyed to a shaft  $G^3$ . Upon the latter is keyed a spur-pinion  $g^7$ , in mesh with another spur-pinion  $g^8$ , the latter meshing with the spur-pinion  $g^9$ . The spur-pinions  $g^8 g^9$  are mounted in a lever  $G^4$ , fulcrumed on the frame C of the machine. By disengaging the pawl  $g^3$  and moving the lever  $G^4$  so as to bring the one or the other of the spur-pinions  $g^8 g^9$  into gear with the spur-wheel  $G^2$  the shaft  $f'$  may be rapidly rotated, with the result that the saw-frame will be rapidly raised or lowered, according to which of the spur-pinions  $g^8 g^9$  be put into mesh with the spur-wheel  $G^2$ . In this type of machine only a shallow cut is contemplated, and it is therefore desirable that the attendant hold the lever during the time the rapid raising or lowering gear is in operation. Holding means, such as the spring-catch  $g^*$ , as shown in Figs. 23 and 24, may, however, be provided, so that in the event of any obstruction being met with the pinion  $g^8$  or  $g^9$  will be immediately thrown out of gear.

By cutting in an upward direction the waste material quickly disengages itself from the saws, the teeth of which have the usual "set," and the detached portions will fall between the saw and the sides of the saw-draft, thus avoiding the tendency hitherto experienced of the saws riding or rolling on the waste material.

Although for the purpose of illustrating my invention I have selected a machine provided with toothed saws arranged to cut in an upward direction and adapted for sawing slate, it will be apparent that the machine may be employed with equally advantageous results in sawing hard stone wherein the cutters are formed as soft-iron plates, the cutting being effected by washing sand or other abrading material into the cut. The improved machine insures a more effective stroke of the saw, which throughout its stroke is acting upon some portion of the stone, a keener bite resulting. The alternate lifting of each end of the saws enables the sand and water to more readily enter the cut. Moreover, the steadiness with which the operation of the machine is effected renders the use of toothed saws practicable—an advantage readily appreciated in the art to which the invention pertains.

Instead of the saddles or guides being constructed as illustrated the rods may be dispensed with and the screw-spindles be arranged to work in nuts formed or provided on the saddles or guides. The releasing-gear



for the bolt and the lever D' may be modified in various ways without departing from the spirit of the invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for cutting or sawing slate, stone, metal, wood and other materials, the combination of a table for supporting the material, a saw-frame provided with one or more  
10 saws or cutters, cross-heads suspended between saddles by means of links for carrying said saw-frame, uprights carrying said saddles with screw-spindles working in said saddles and whereby the saws are fed to the work,  
15 and means for reciprocating the saw-frame, substantially as herein described.

2. In a machine for cutting or sawing slate, stone, metal, wood and other materials, the combination of a saw-frame provided with  
20 one or more cutters, cross-heads suspended between saddles by means of links, pivots eccentrically mounted in said cross-heads for carrying the saw-frame, a lever pivotally mounted on the saw-frame and connected with  
25 a thrust-rod, rods and levers connecting said pivotally-mounted lever with the eccentrically-mounted pivots, and means for releasing the pivotally-mounted lever, at the end of the cutting stroke, whereby said lever is vibrated  
30 by the thrust-rod and the eccentrically-mounted pivots rotated to remove the saw or saws from the cut during the return stroke, substantially as herein described.

3. In a machine for cutting or sawing slate,  
35 stone, metal, wood and other materials, the combination with a saw-frame provided with

one or more saws or cutters, adapted to cut in an upward direction, cross-heads and links supporting the frame and means for removing the cutters from the cut during a portion  
40 of their stroke, of a table for carrying the material to be operated on formed with longitudinal slots.

4. In a machine for cutting or sawing slate, stone, metal, wood and other materials, the  
45 herein-described means for preventing the saw-frame from being raised or lowered before it reaches the end of its stroke, said means comprising a lever pivotally mounted on the saw-frame and connected with a thrust-  
50 rod, a bolt connected with said lever, a catch for engaging the bolt, inclined planes on the main frame, and means for operating said catch from the inclined planes at the end of  
55 each stroke.

5. In a machine for cutting or sawing slate, stone, metal, wood and other materials the combination with vertically-movable saddles or blocks, of a saw-frame provided with one  
60 or more saws, cross-heads supporting the saw-frame, two links pivoted to each cross-head, and holders adjustable in a substantially horizontal direction in the saddles for supporting the other ends of the said links.

In testimony whereof I have signed my name  
65 to this specification in the presence of two subscribing witnesses.

CHARLES LANDALE.

Witnesses:

HENRY ROBERT KING,  
HENRY MAURICE HAYNES.