

No. 720,031.

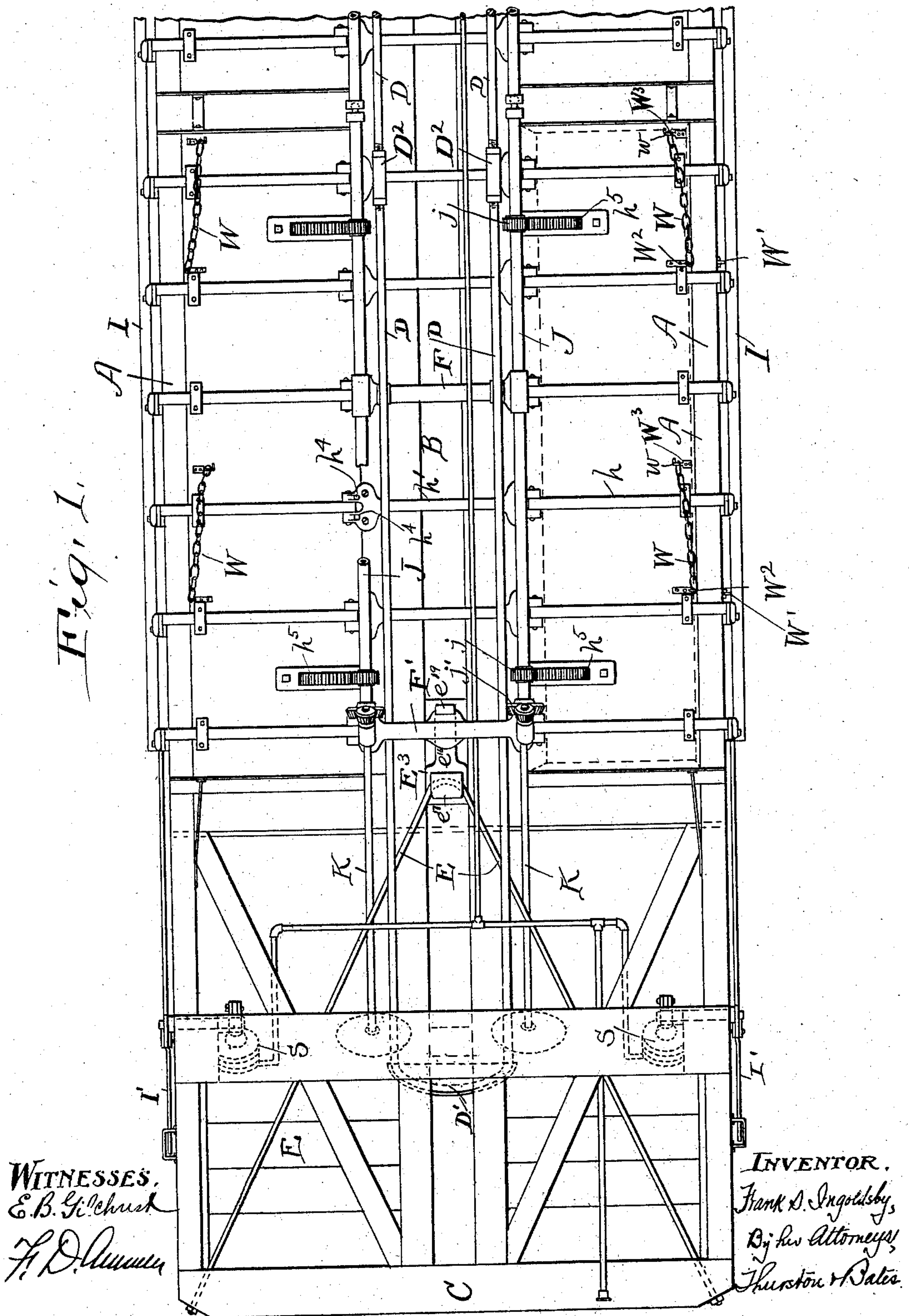
PATENTED FEB. 10, 1903.

F. S. INGOLDSBY.
DUMP CAR.

APPLICATION FILED DEC. 22, 1900.

NO MODEL.

8 SHEETS—SHEET 1.

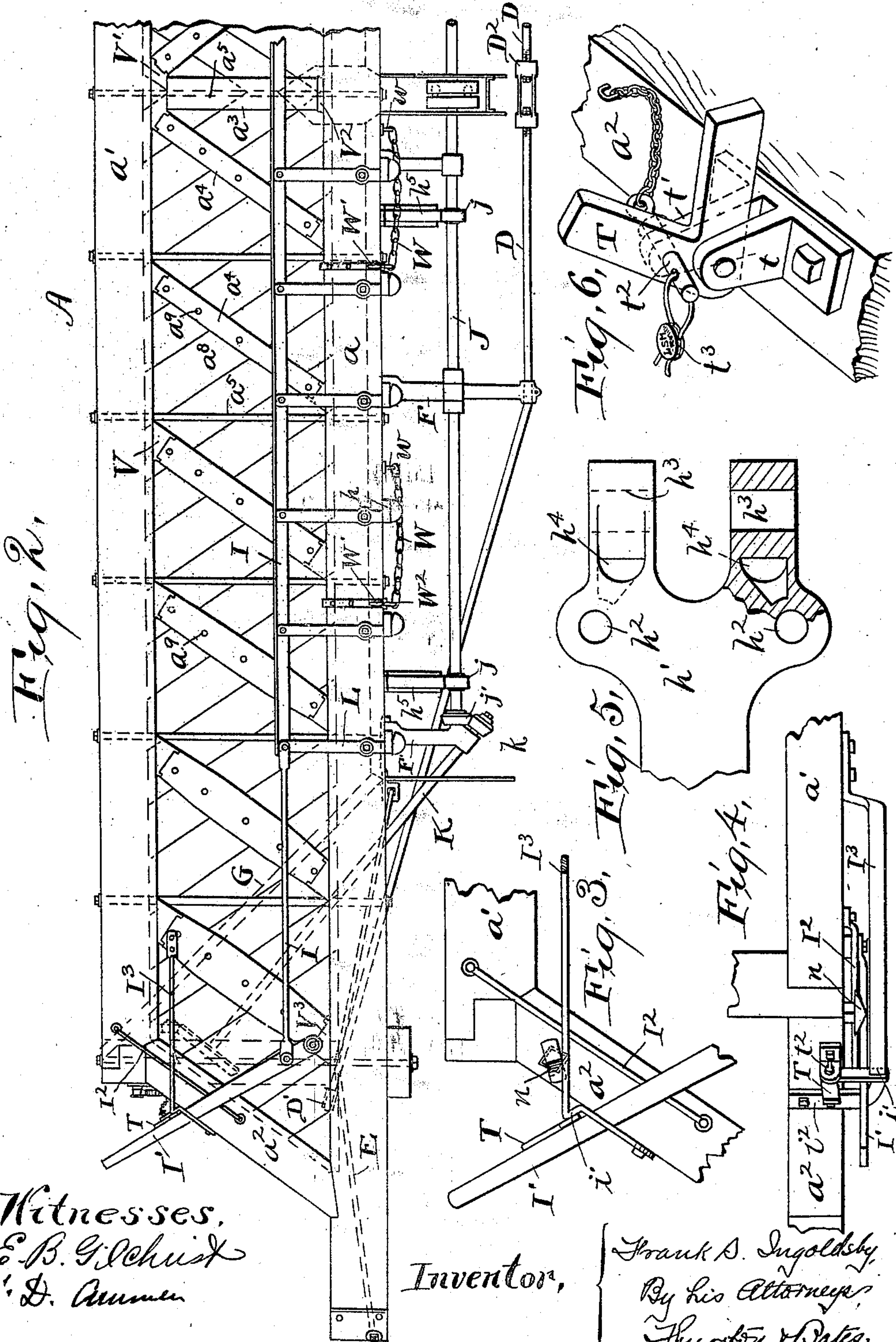


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8 SHEETS—SHEET 2.



Witnesses,
E. B. Gilchrist
D. Ammer

Inventor,

Frank S. Ingolsby
By his Attorneys,
Thurston & Bates

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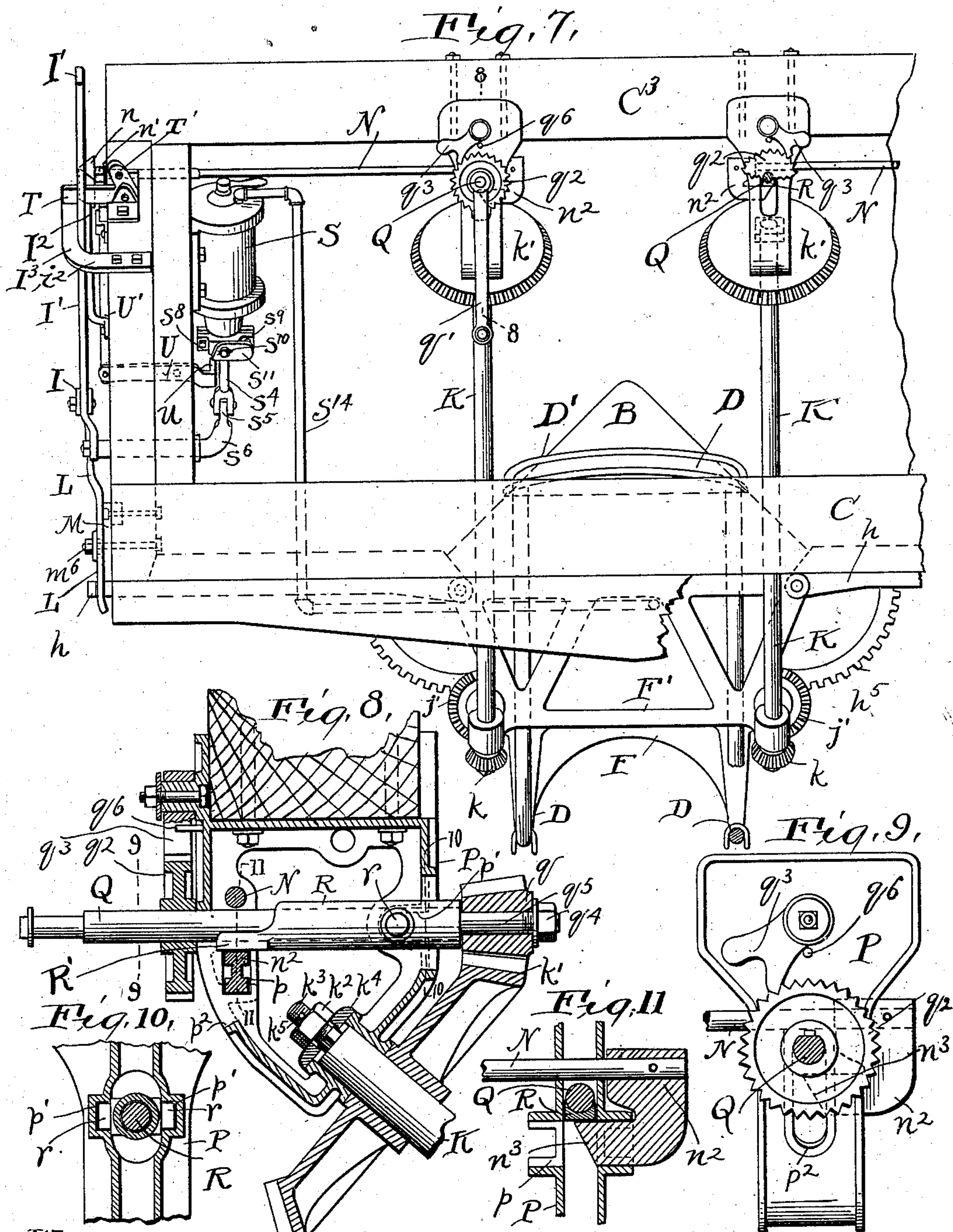
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8 SHEETS—SHEET 3.



WITNESSES.
E. B. Gilchrist
H. D. Ammen

INVENTOR

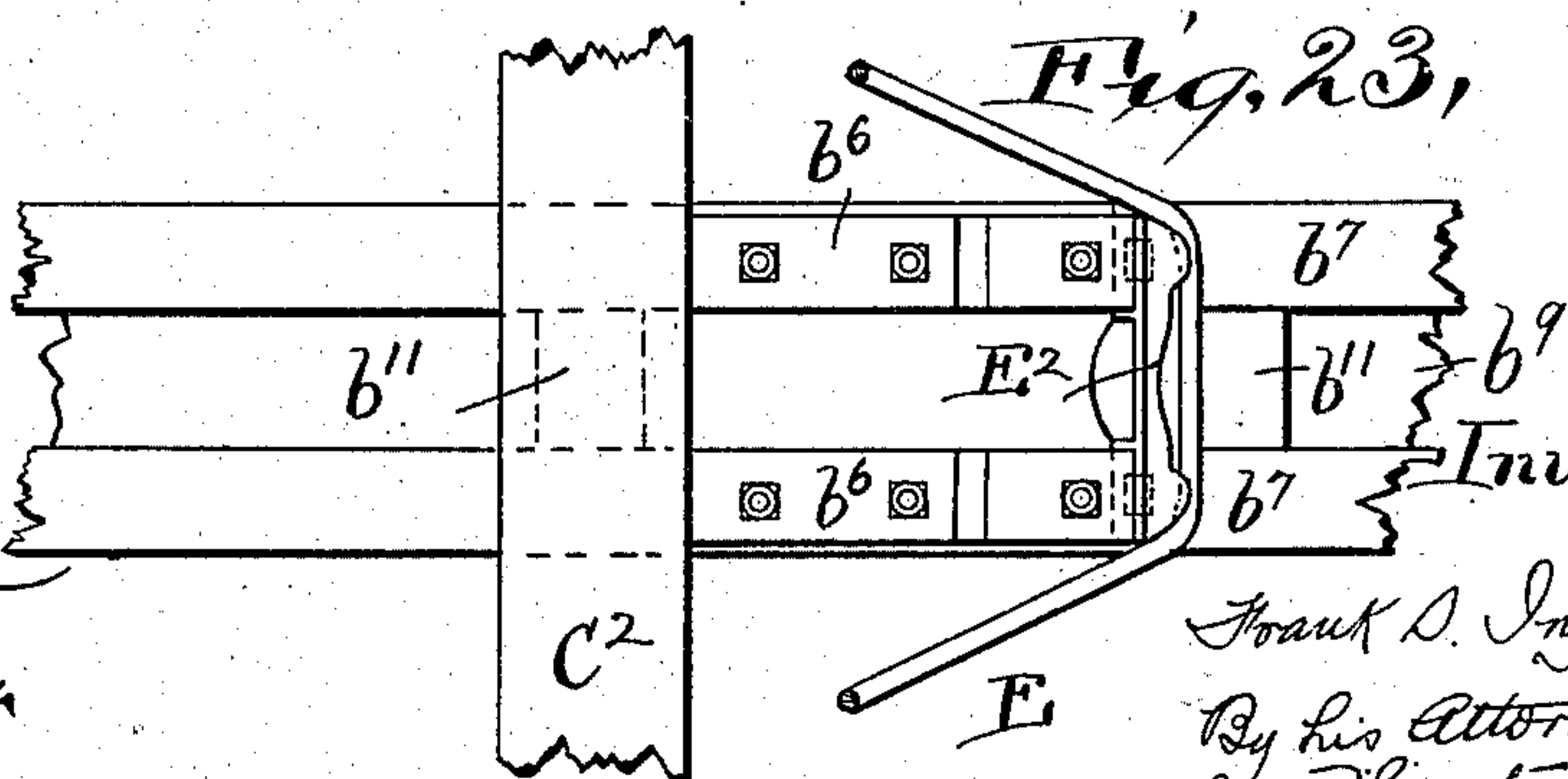
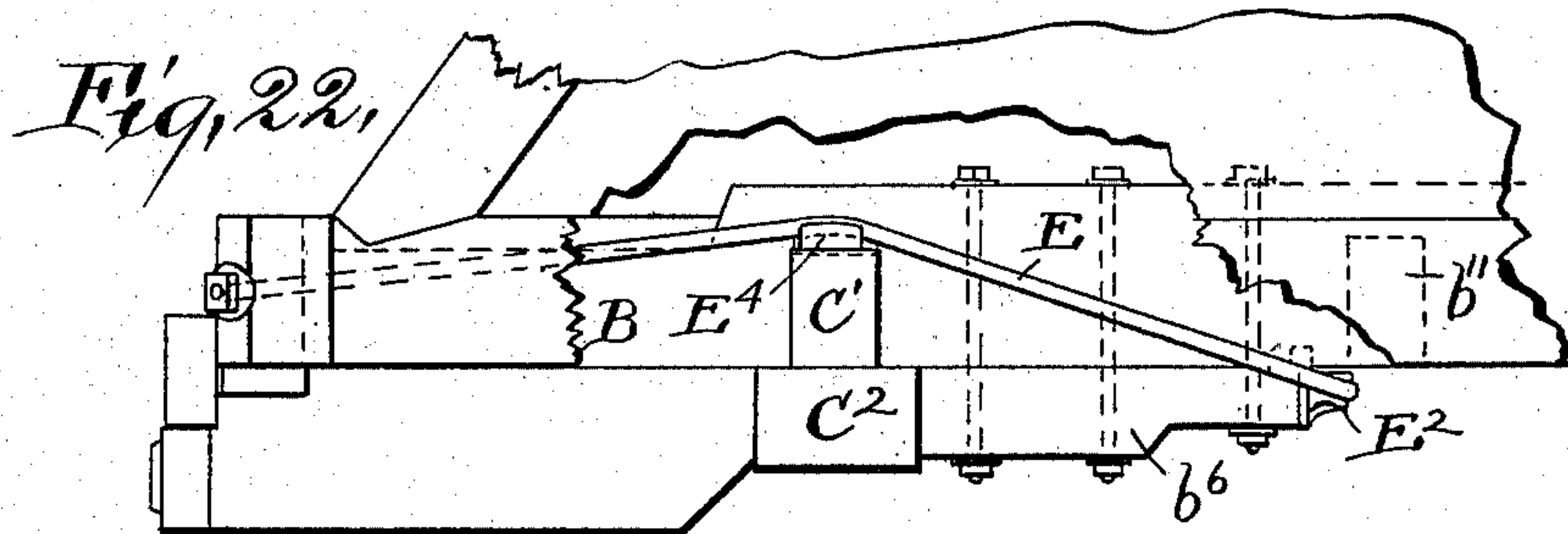
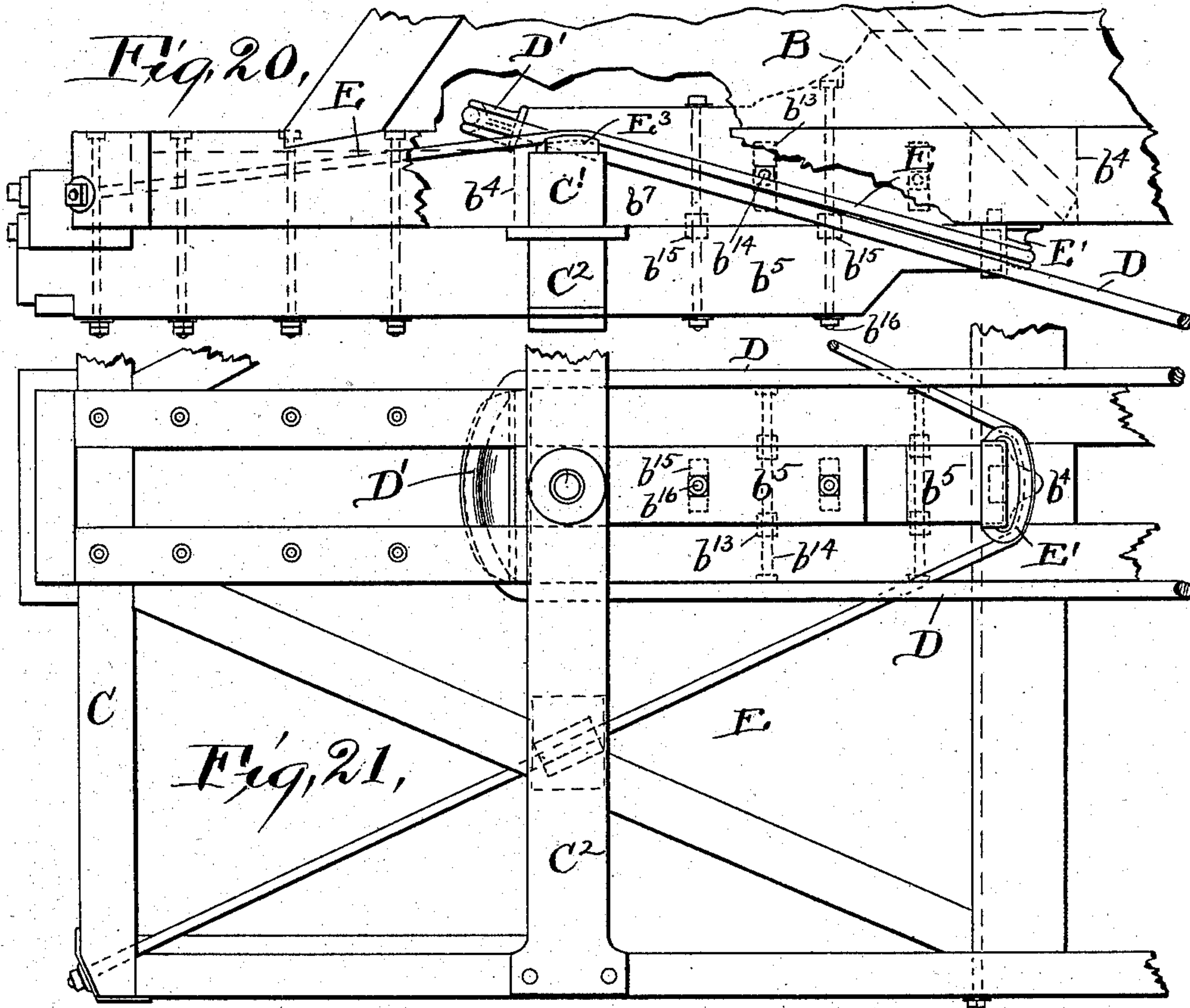
INVENTOR { Frank S. Ingoldby,
By Thurston & Bates,
attys

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8 SHEETS—SHEET 5.



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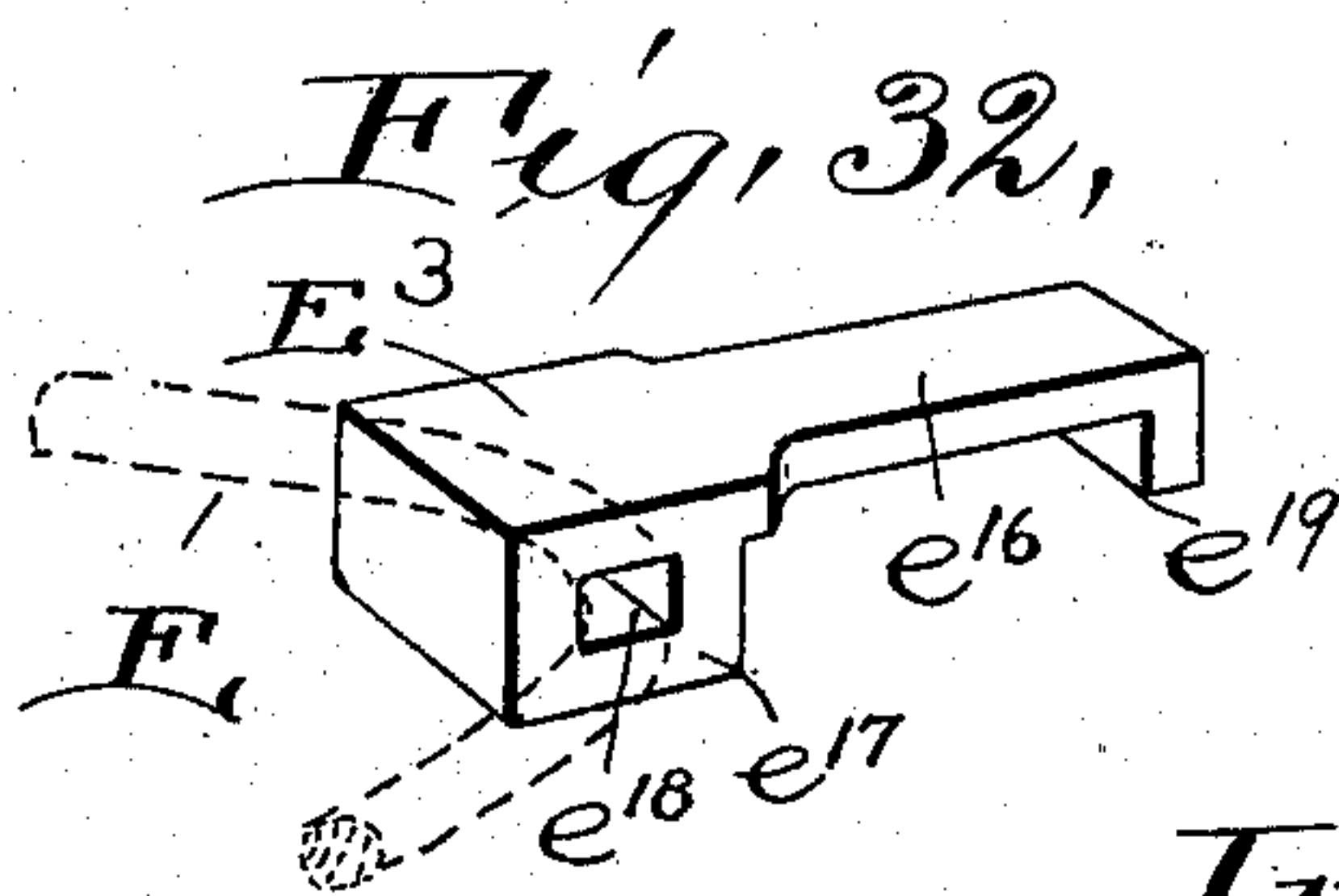
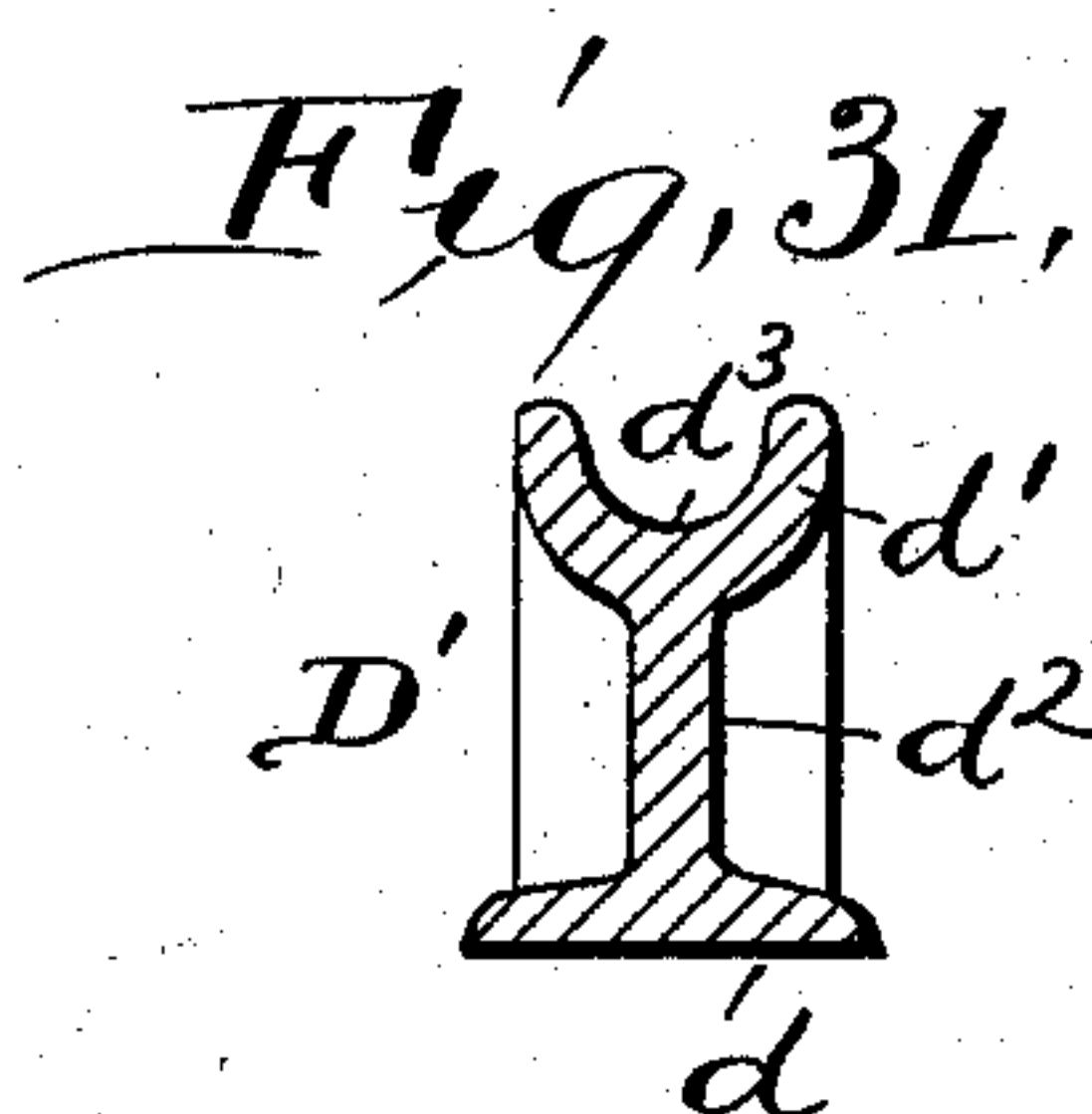
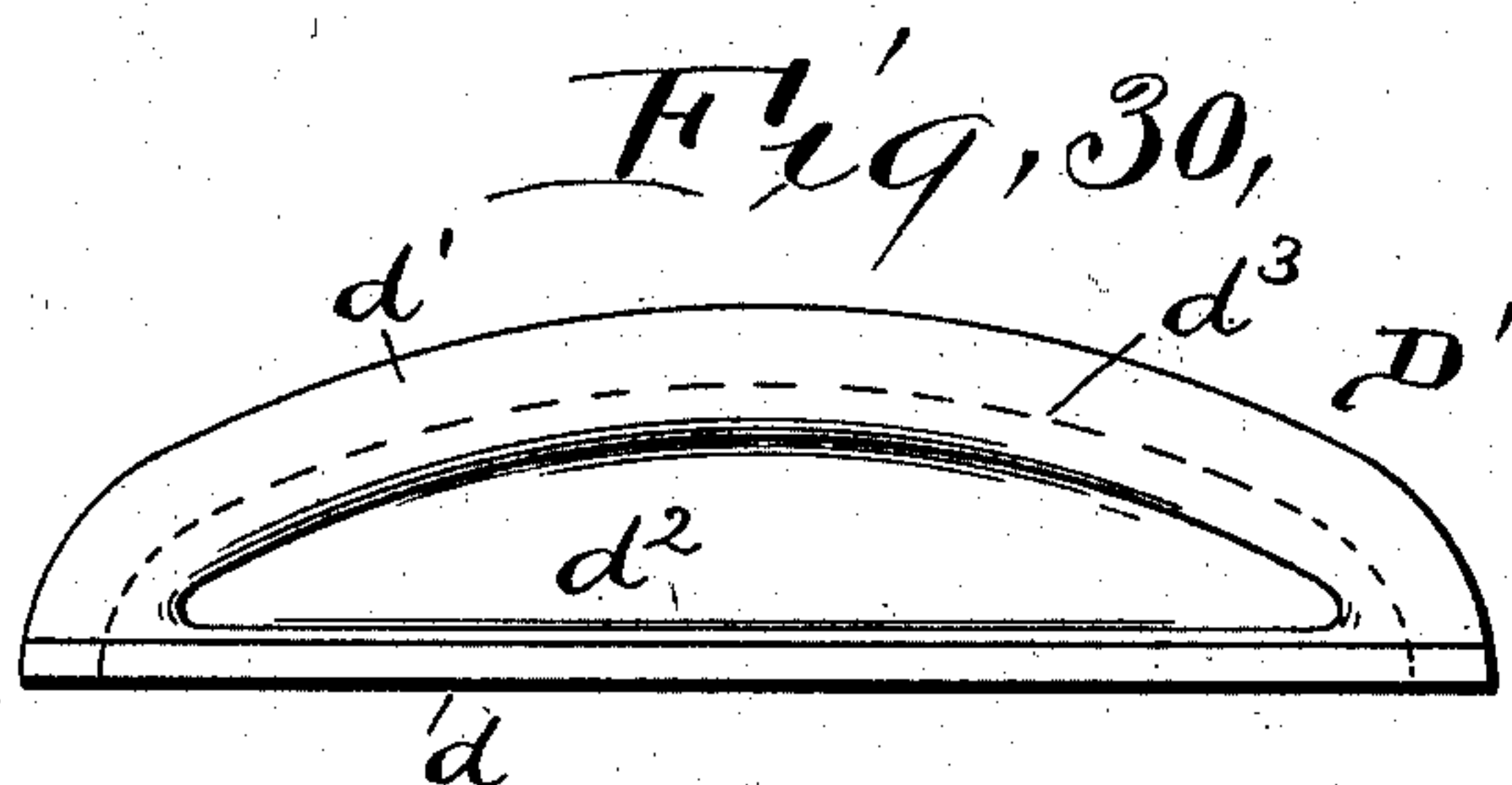
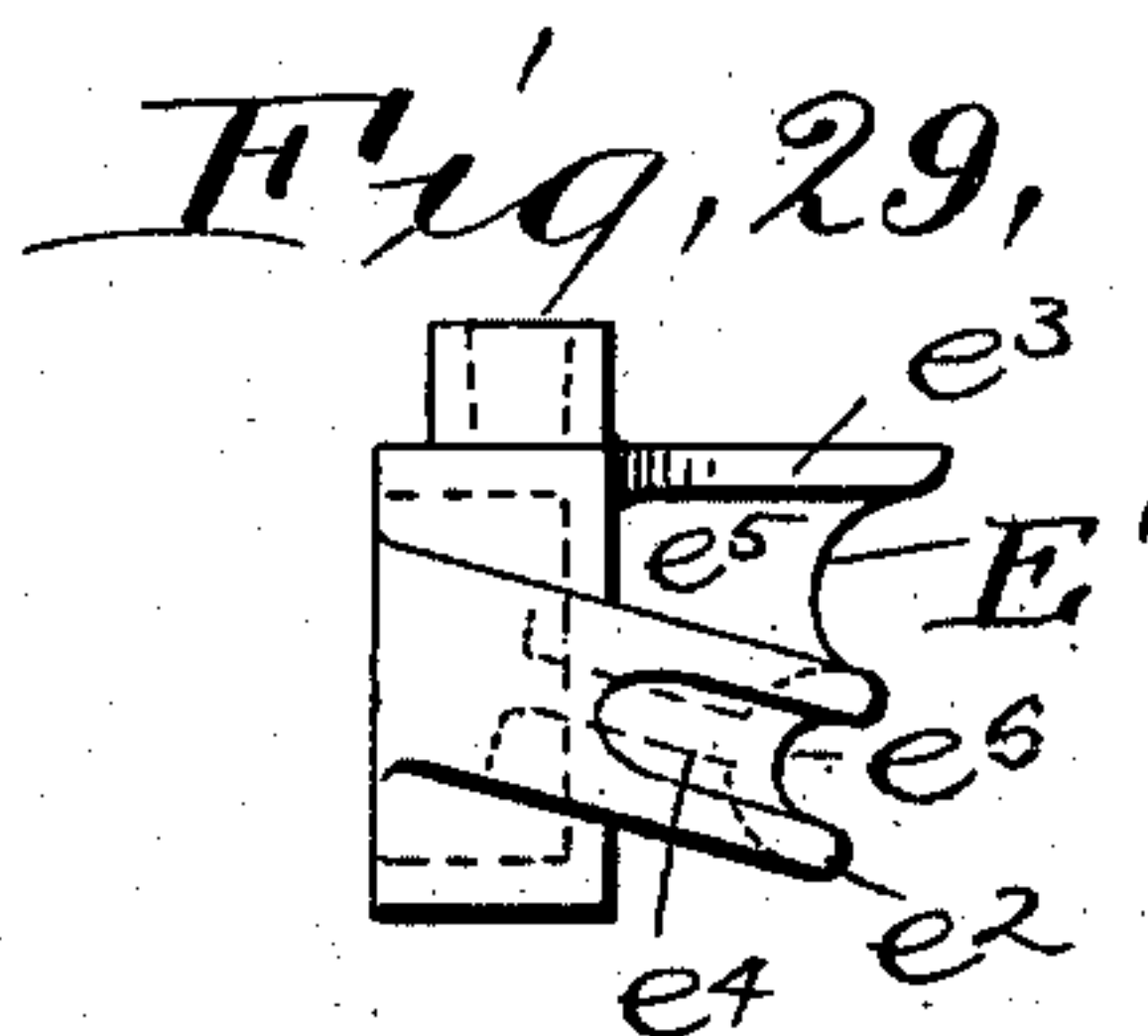
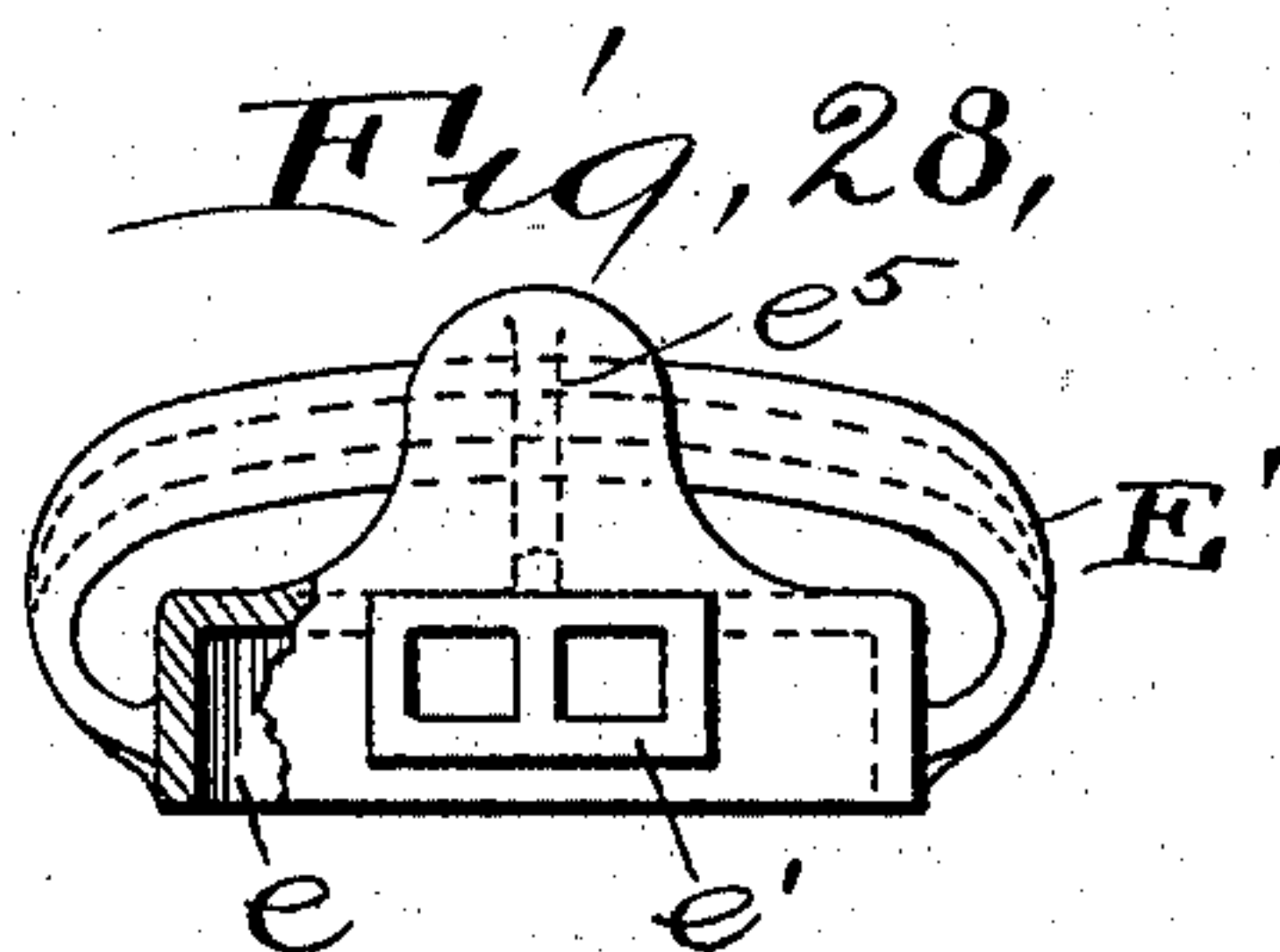
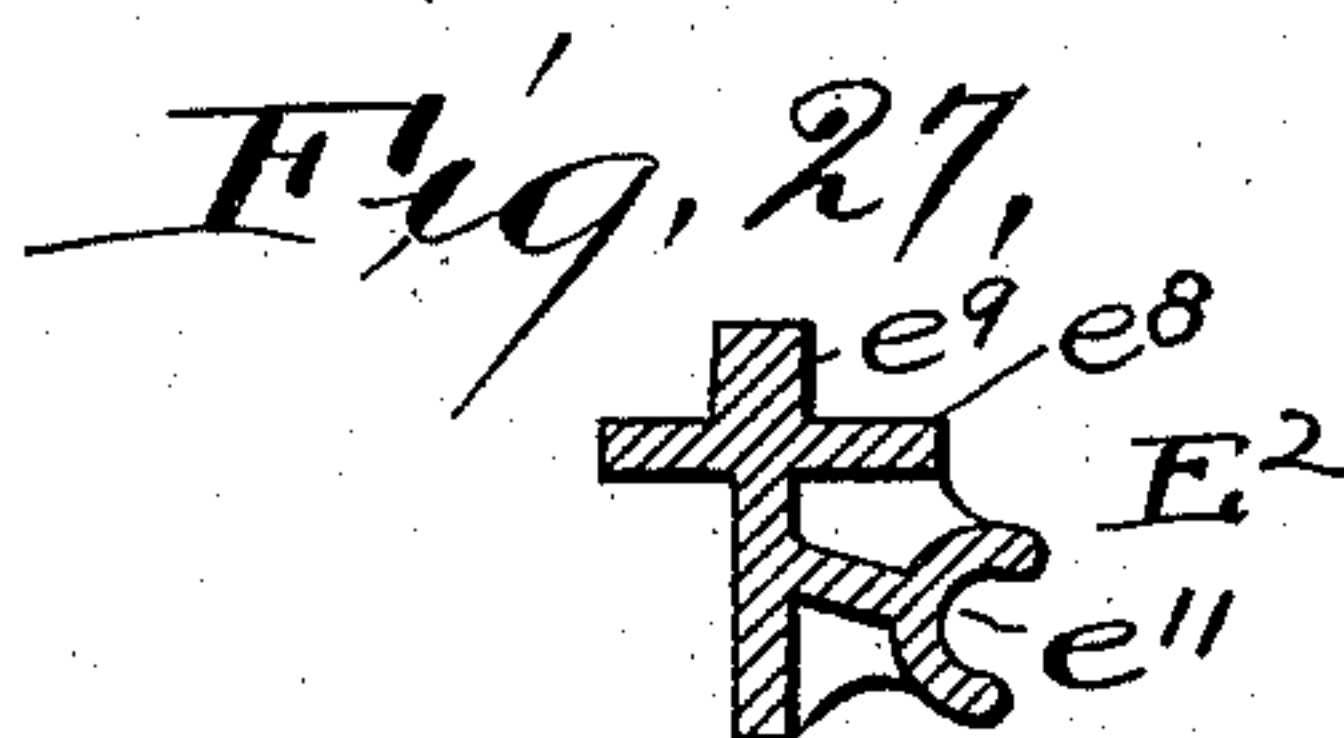
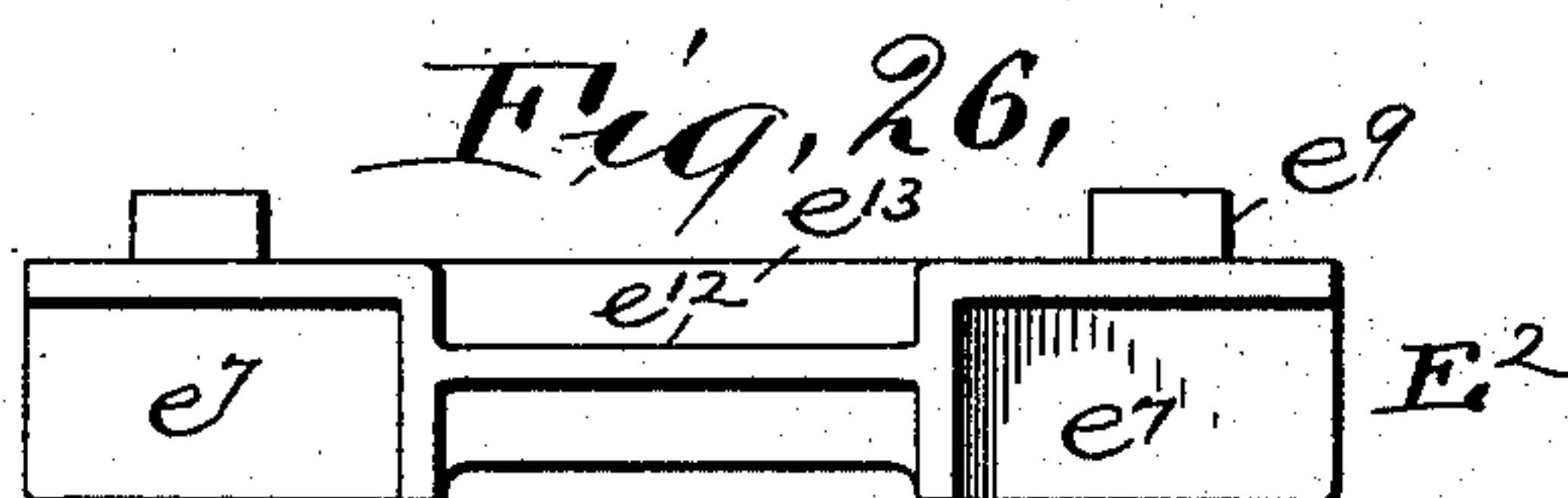
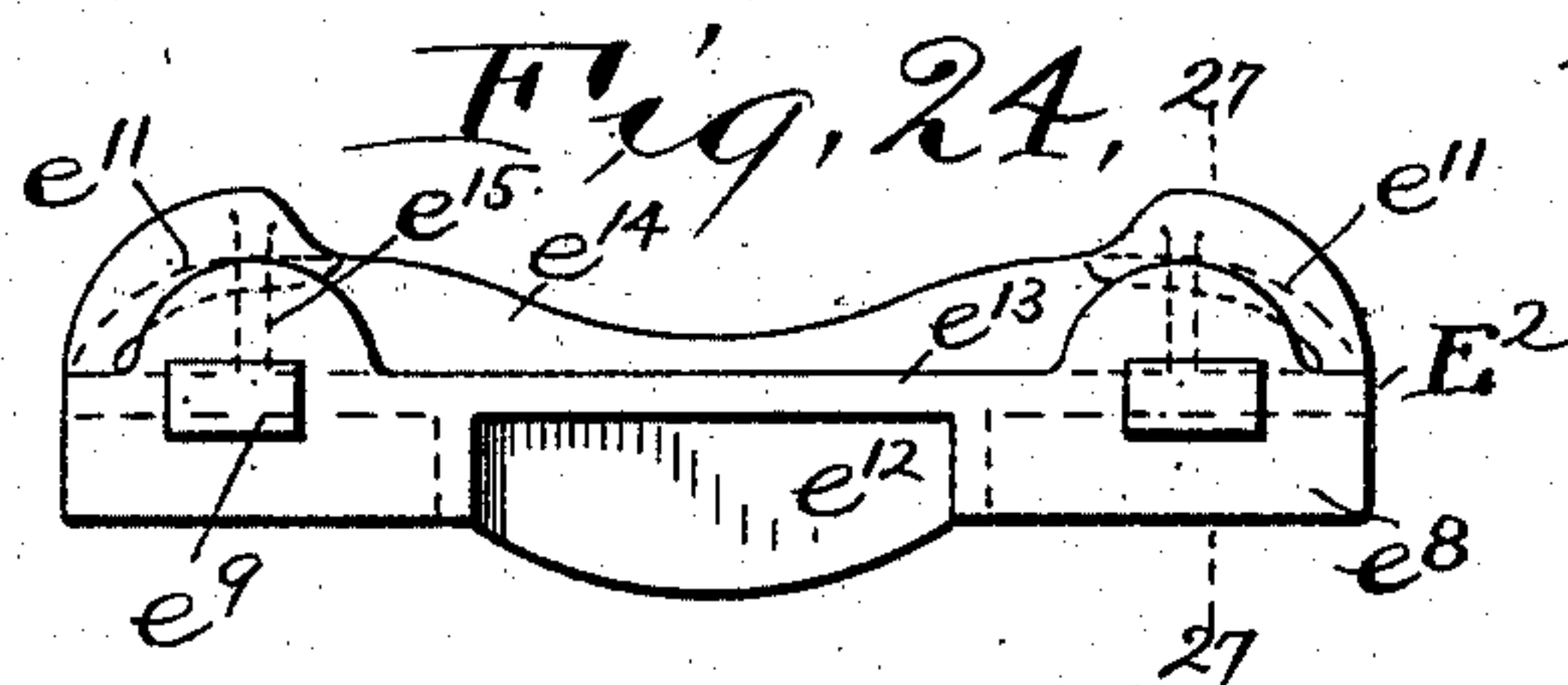
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8 SHEETS—SHEET 6.



Witnesses
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NO MODEL.

8 SHEETS—SHEET 7.

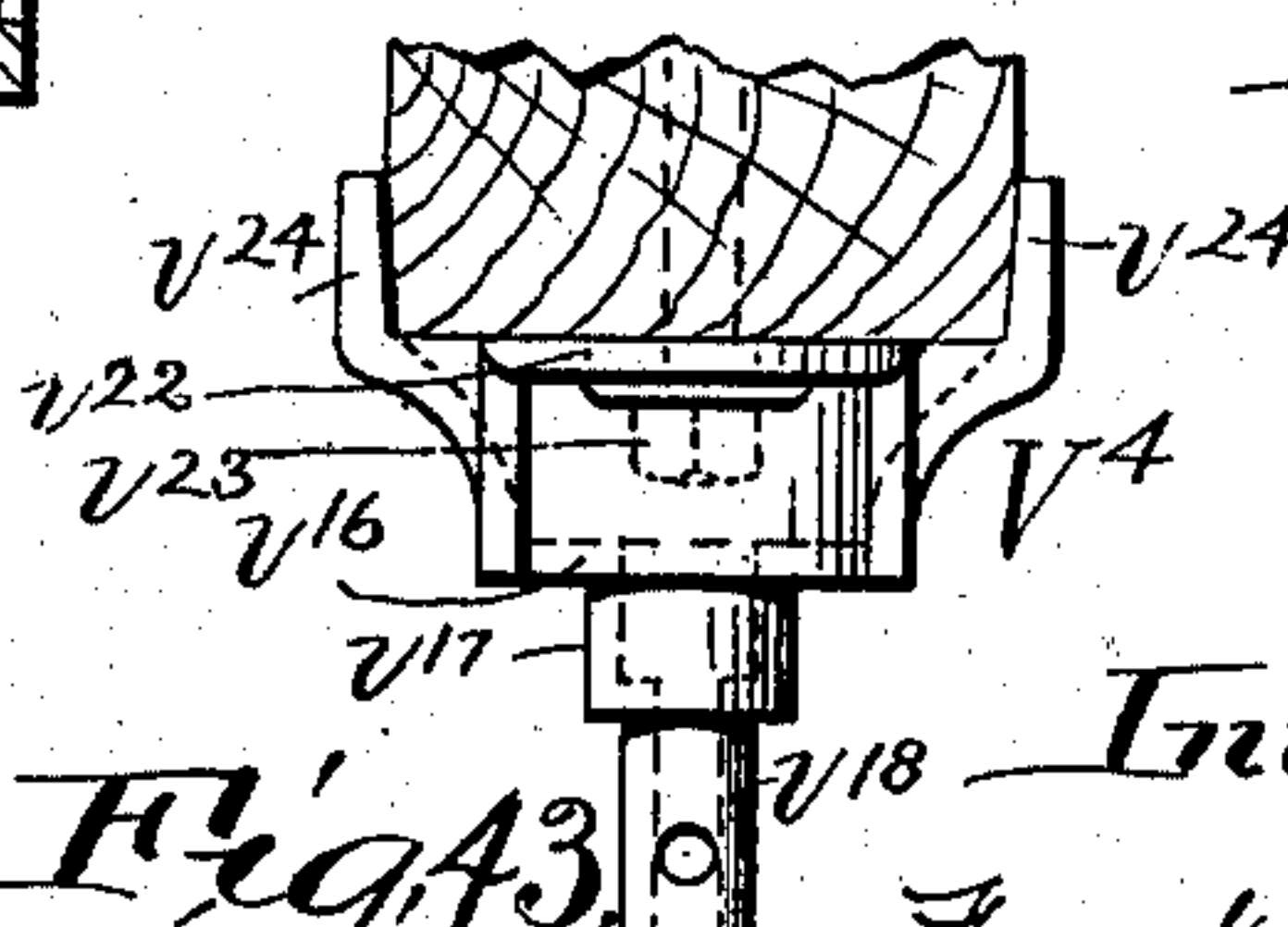
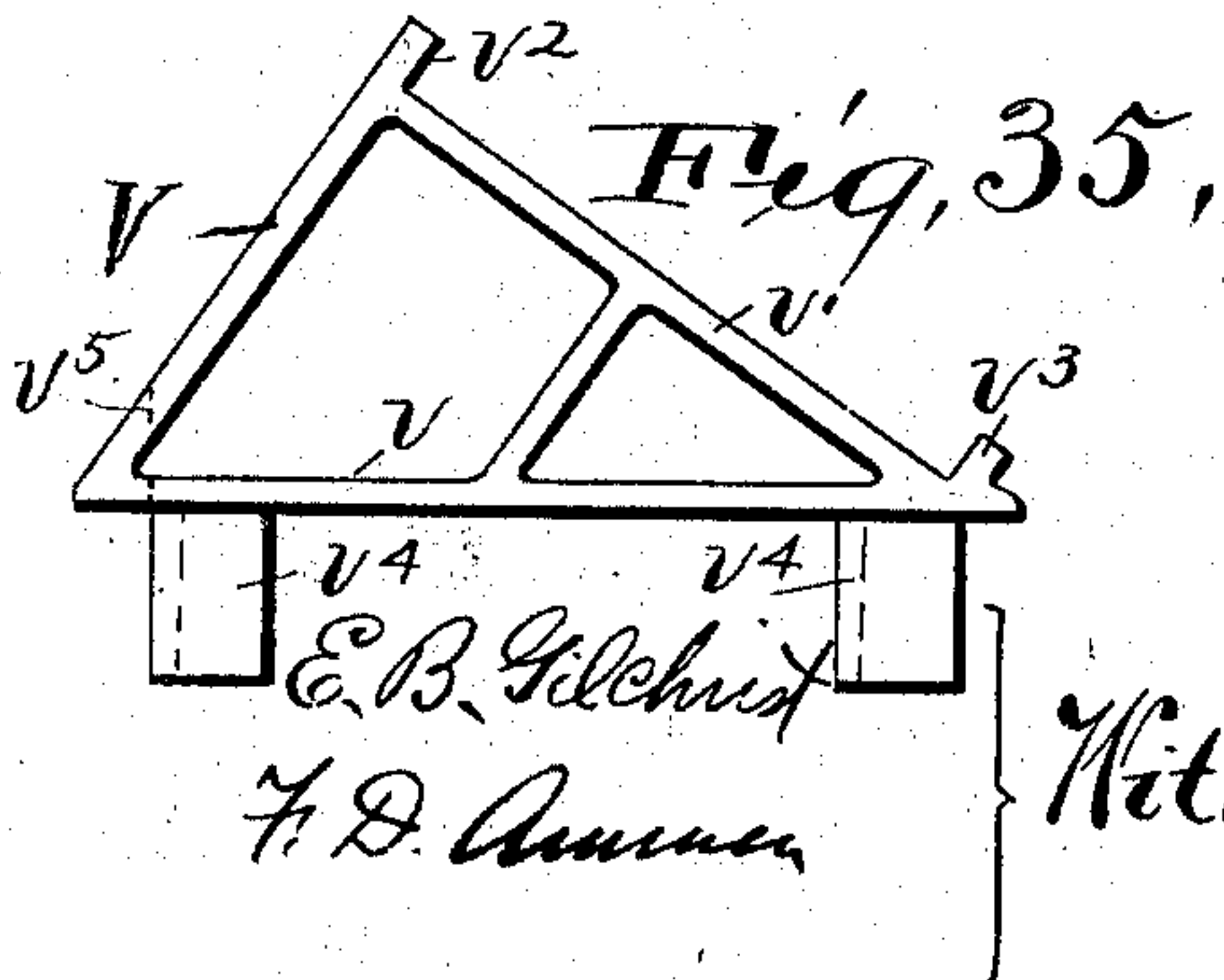
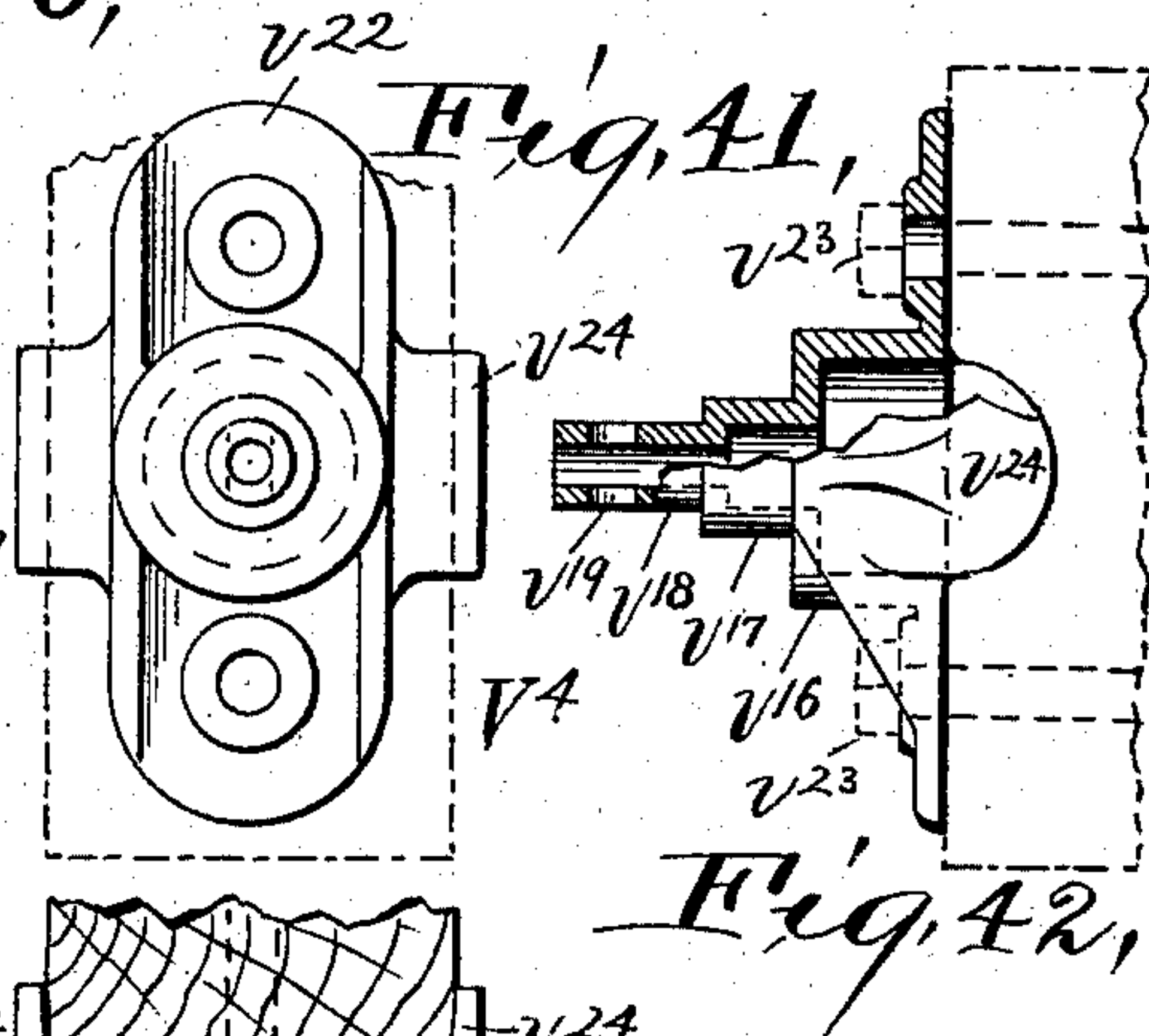
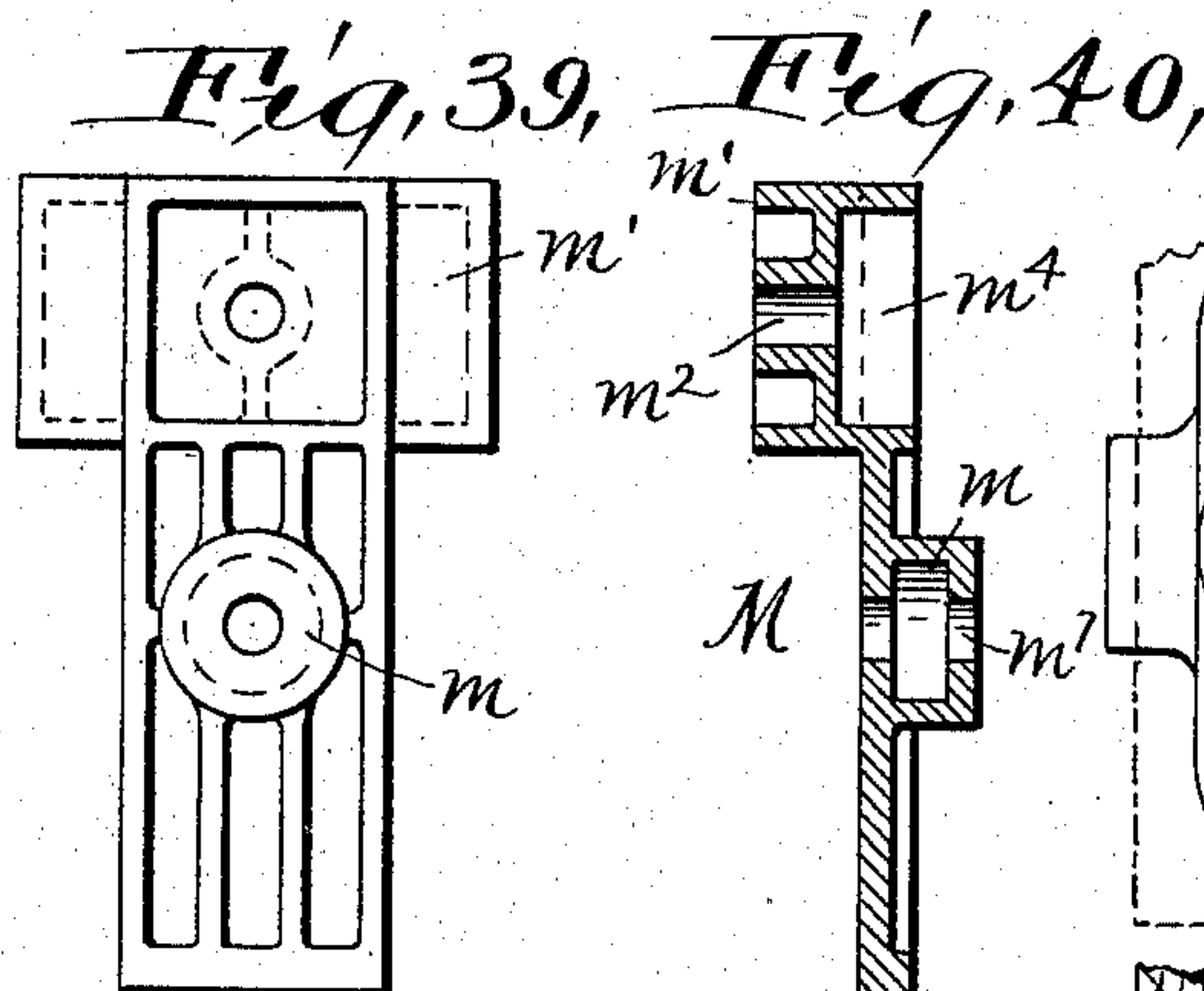
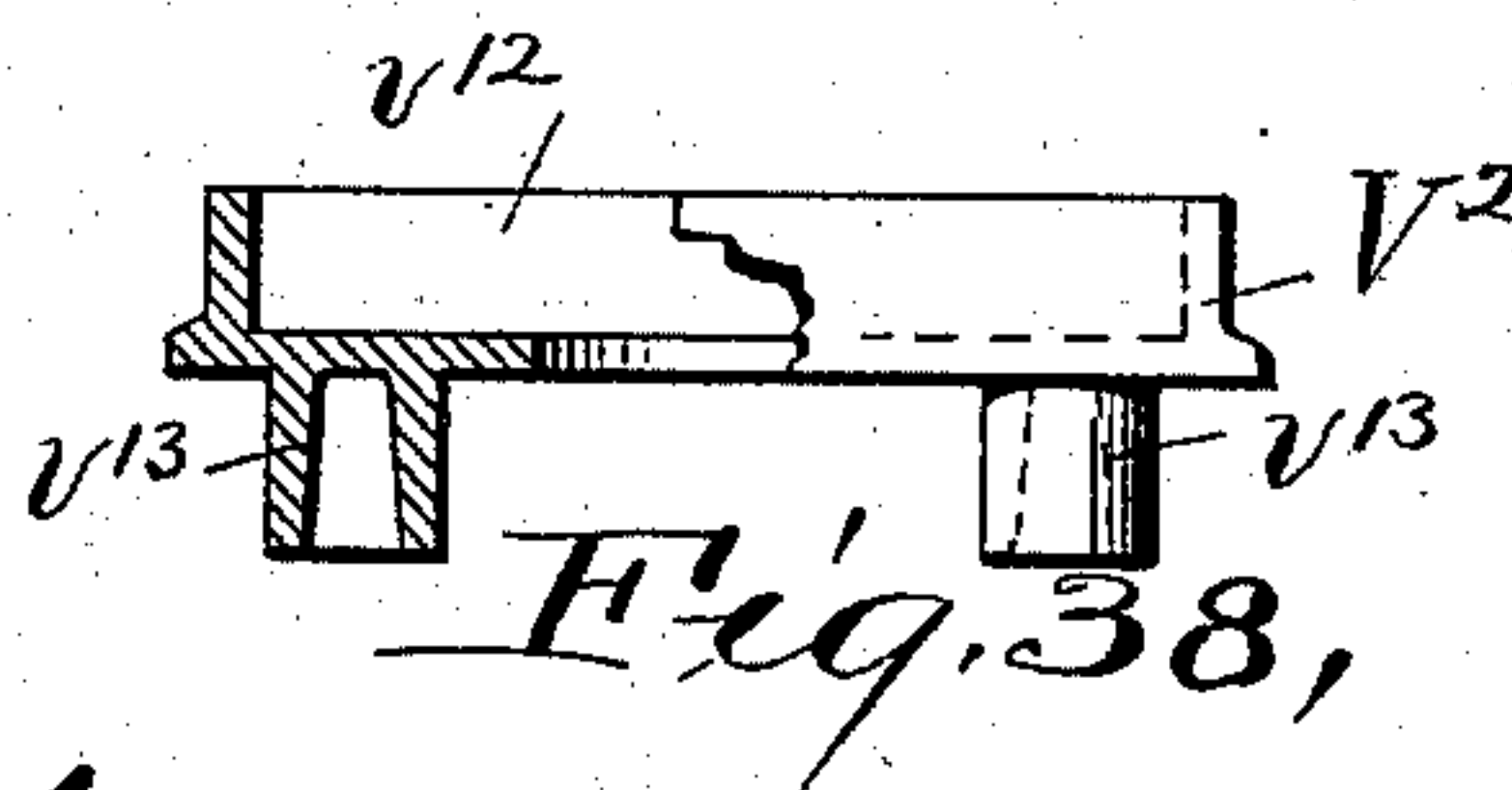
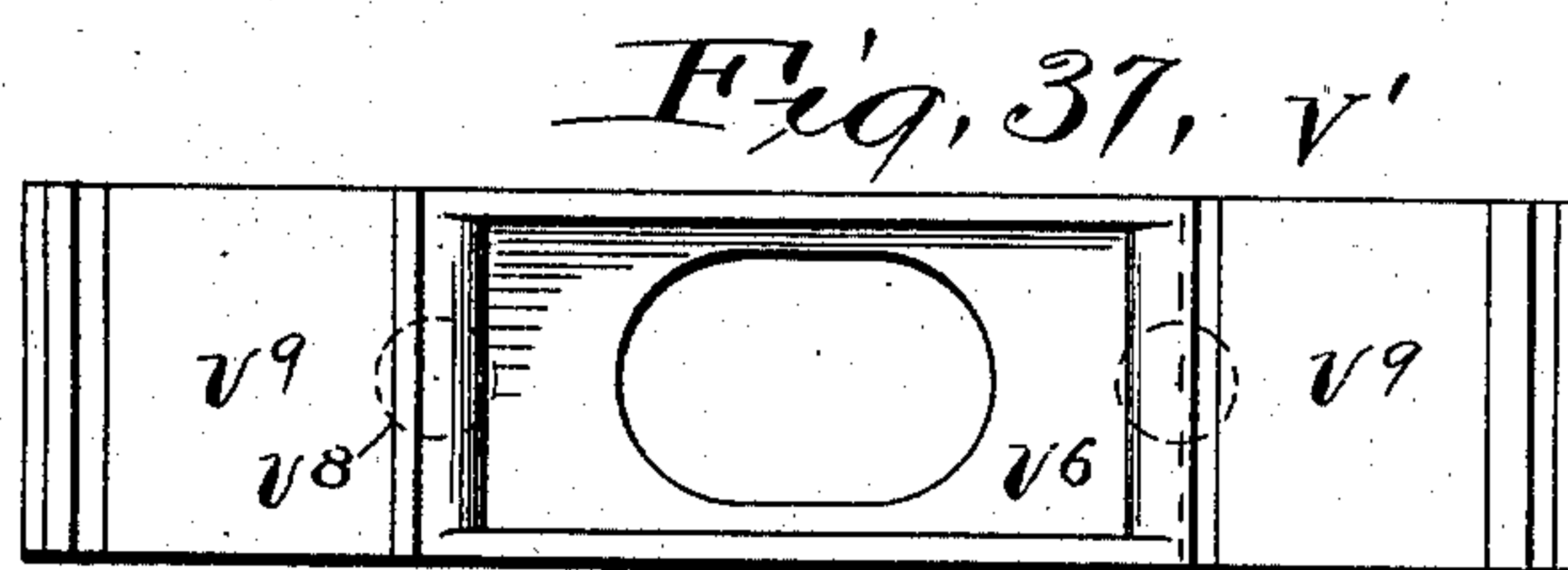
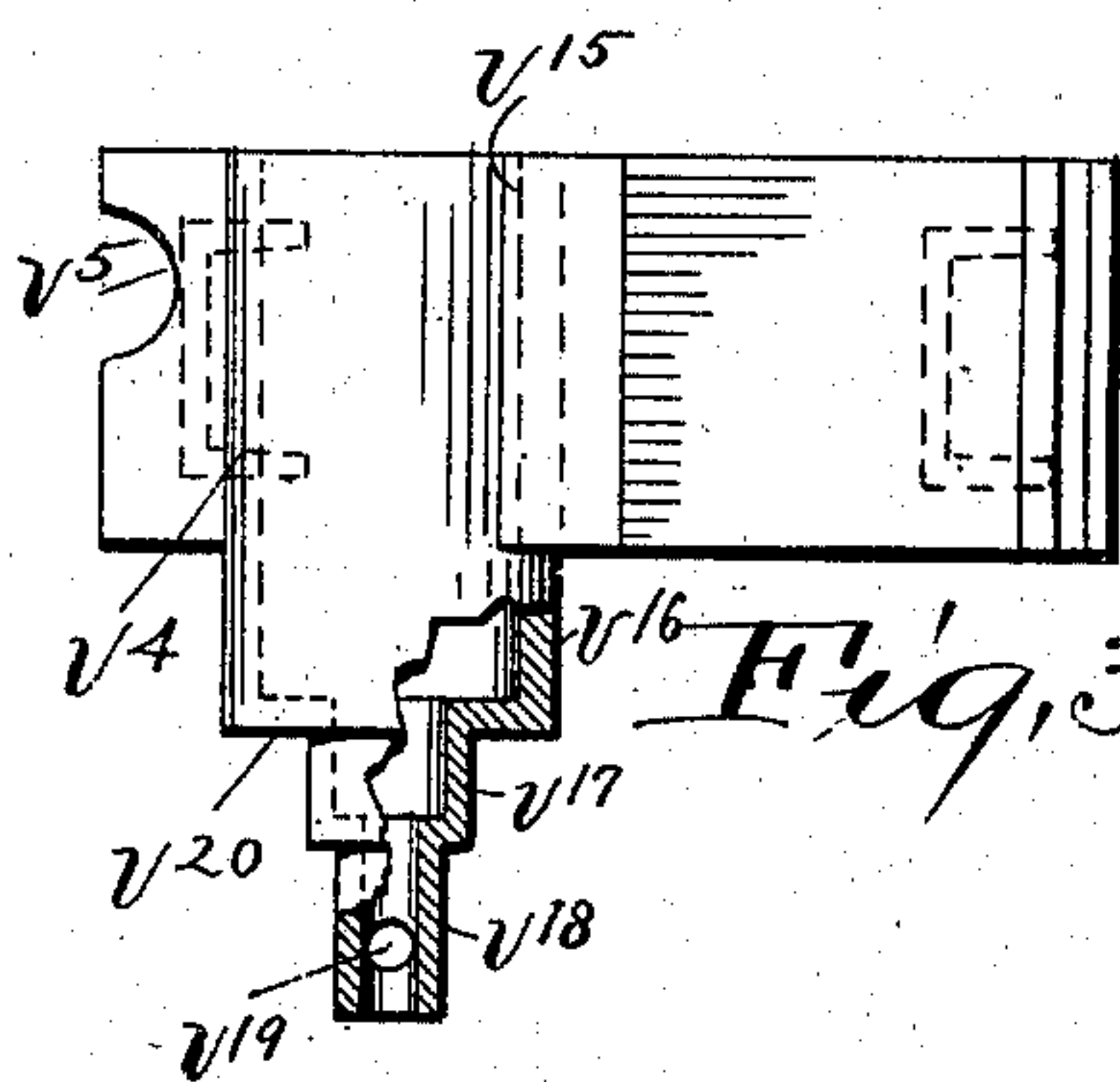
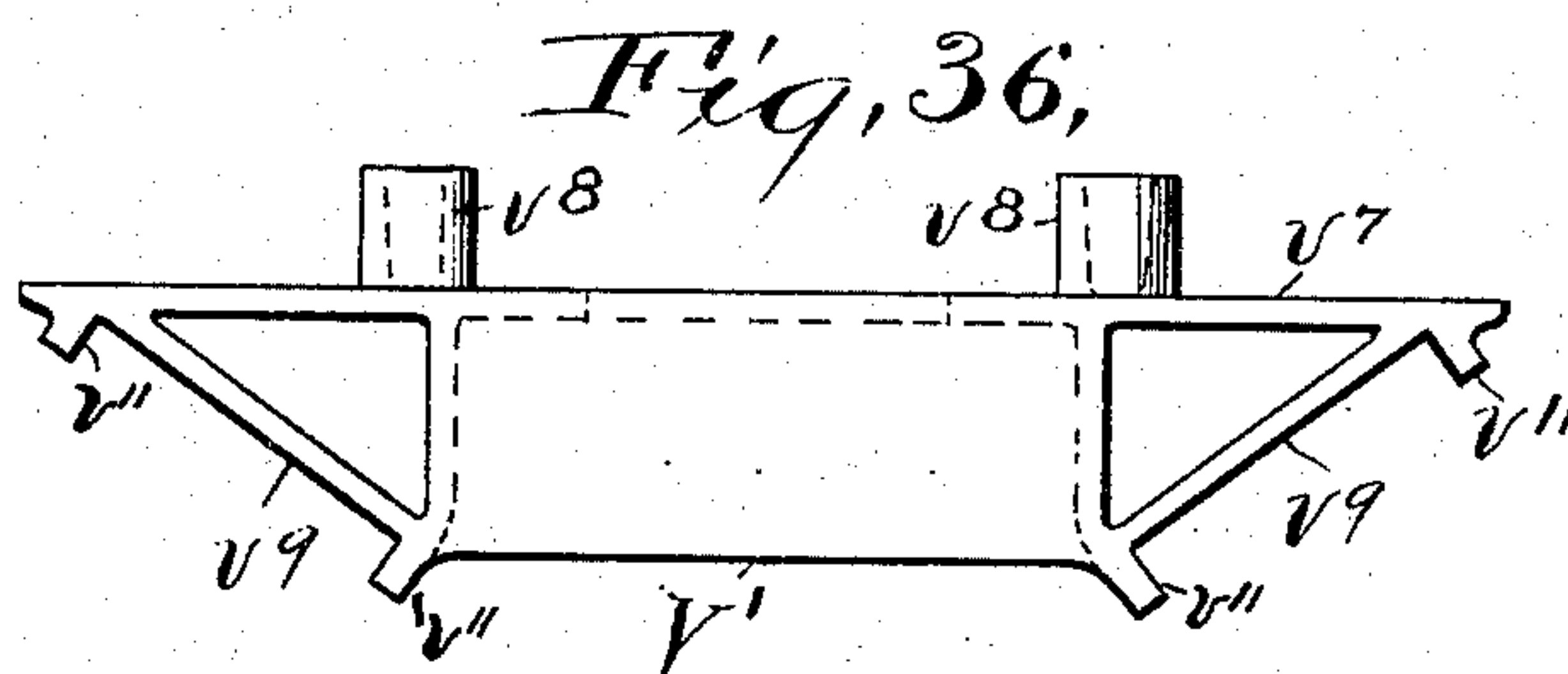
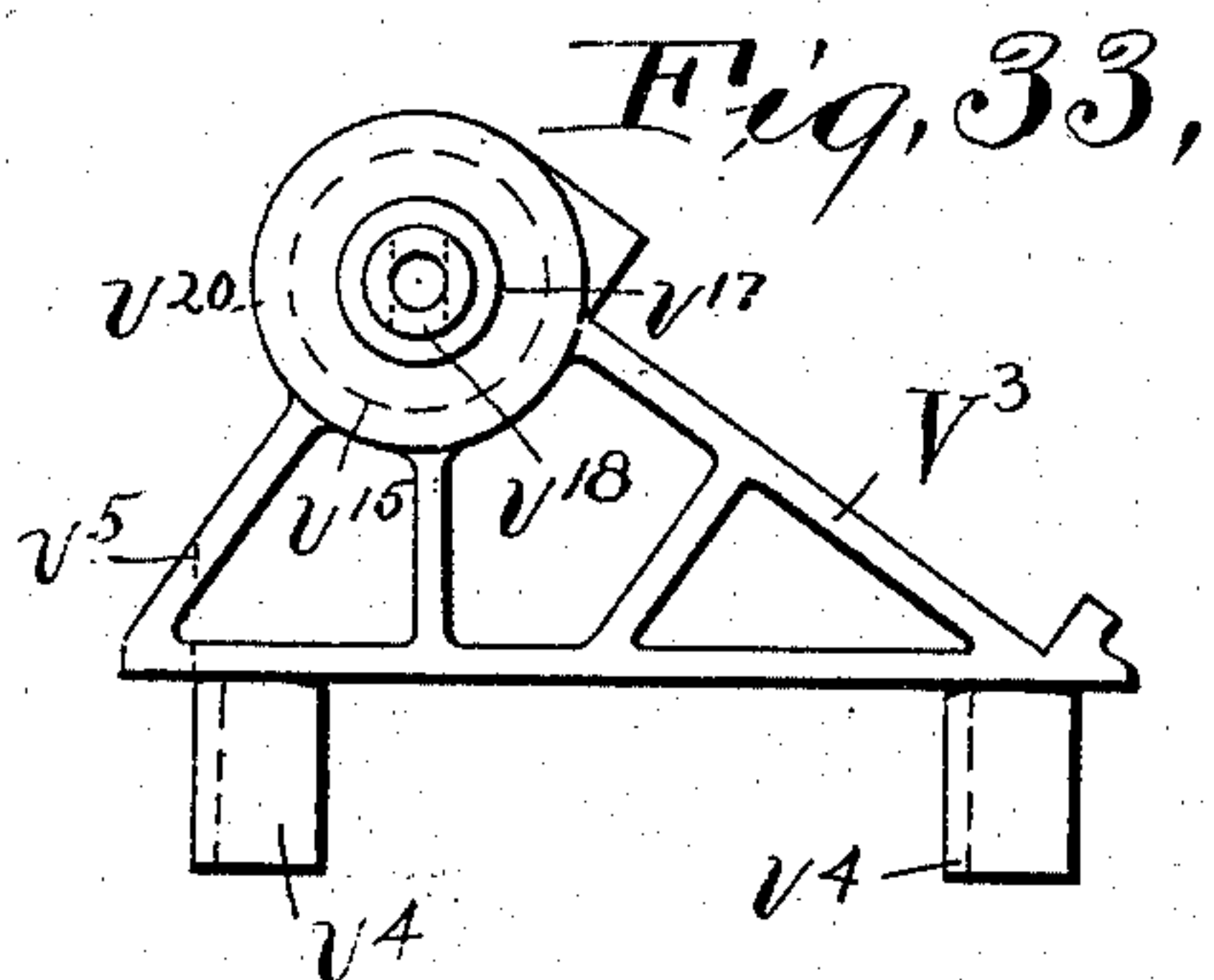


Fig. 43, Inventor,
Frank S. Ingoldsby,
By his Attorneys,
Thurston & Bates.

E. B. Gilchrist
F. D. Ammer } Witnesses

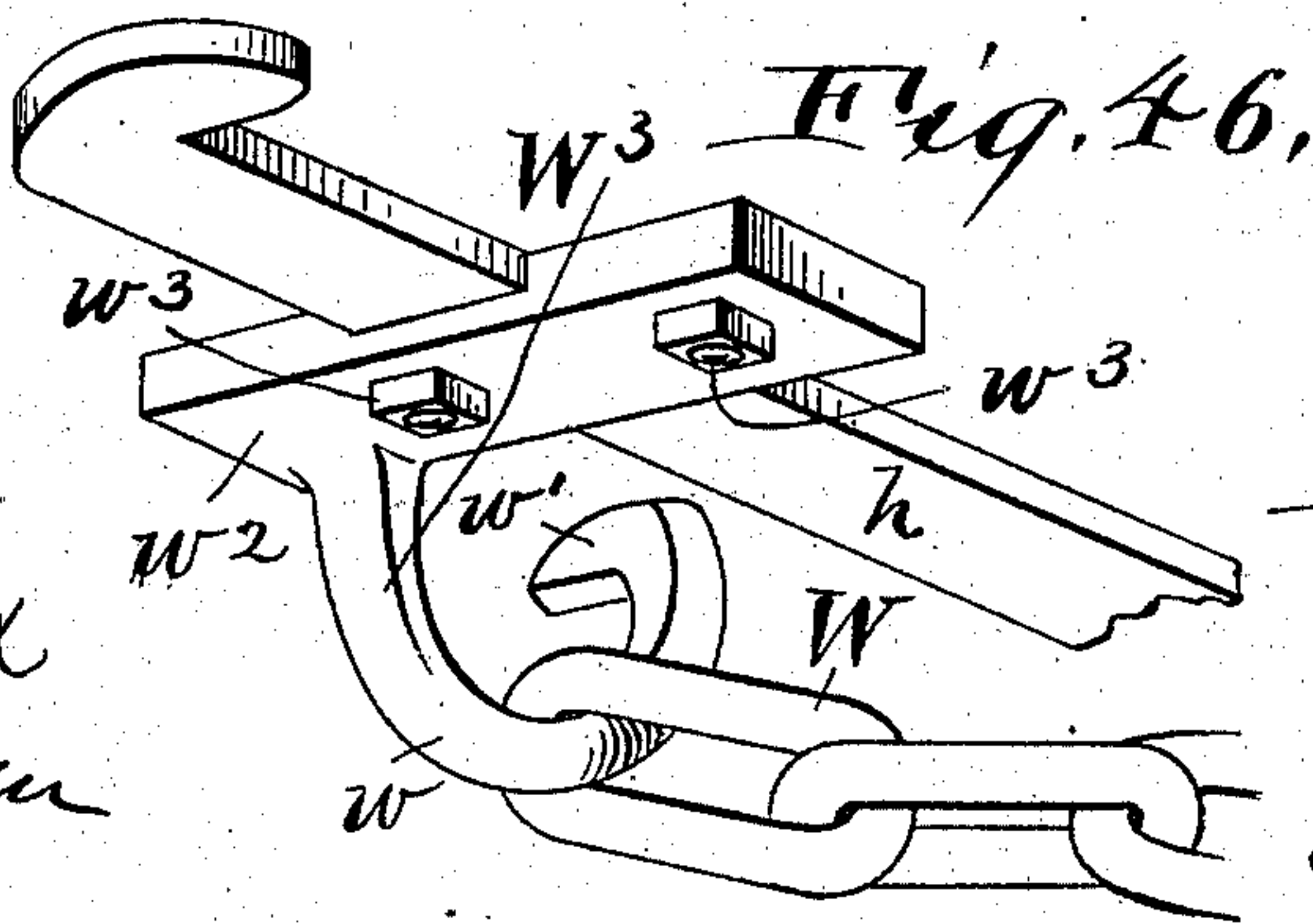
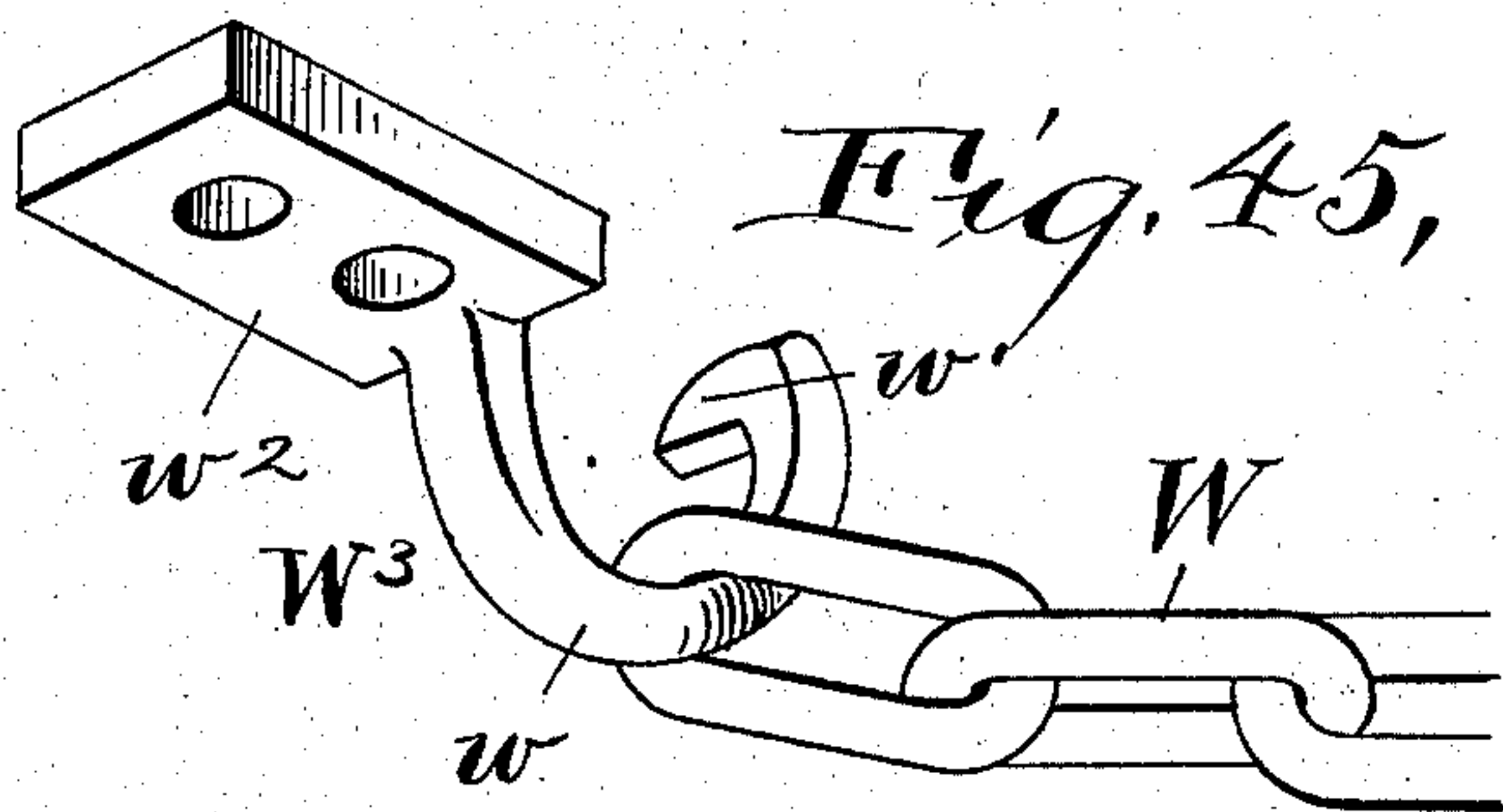
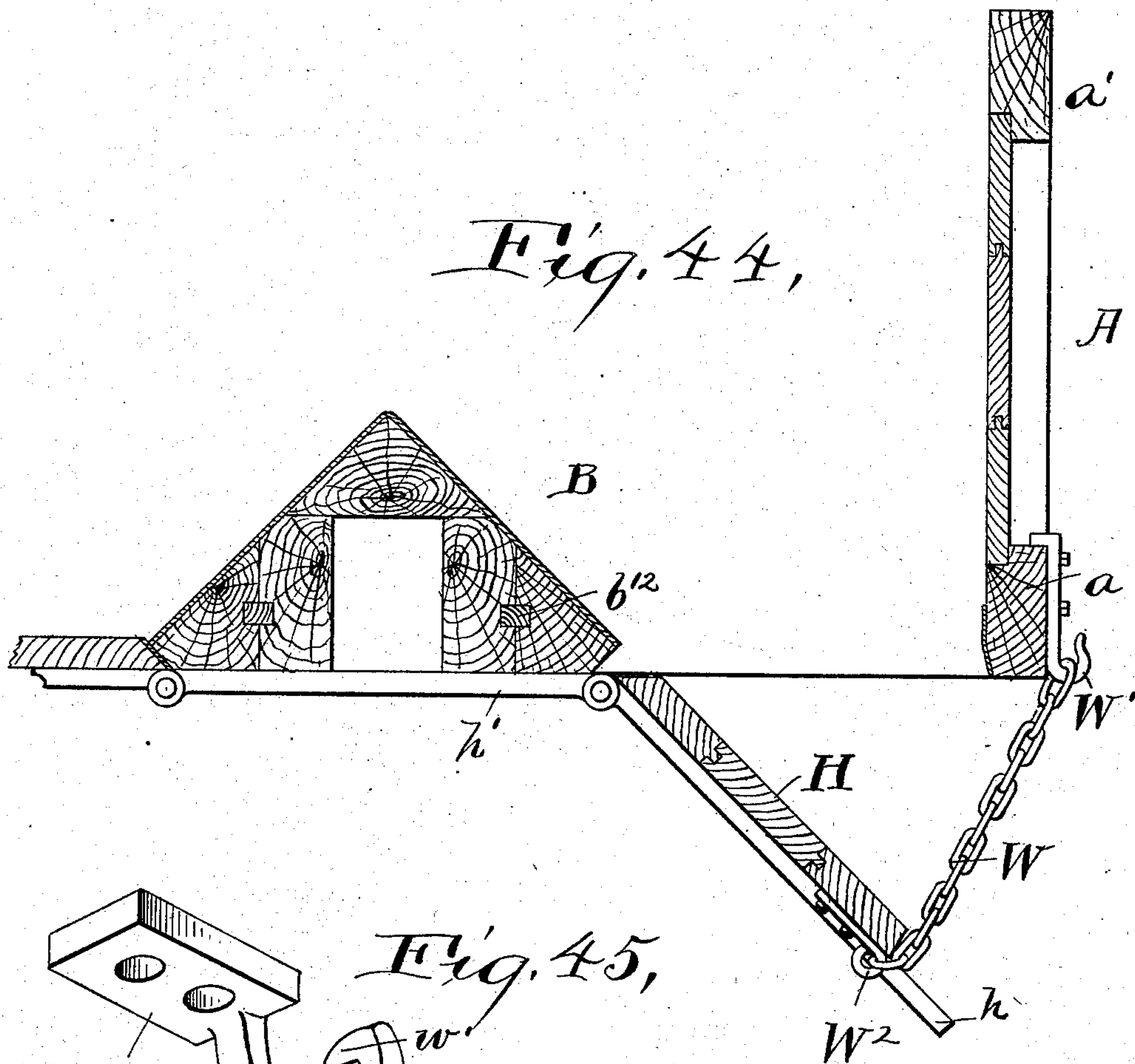
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DUMP CAR.

APPLICATION FILED DEC. 22, 1900.

NO MODEL.

8 SHEETS—SHEET 8.



Witnesses,
E. B. Gilchrist
H. D. Ammer

Inventor,
Frank S. Ingolsby,
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

FRANK S. INGOLDSBY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE
INGOLDSBY AUTOMATIC CAR COMPANY, OF ST. LOUIS, MISSOURI,
A CORPORATION OF WEST VIRGINIA.

DUMP-CAR.

SPECIFICATION forming part of Letters Patent No. 720,031, dated February 10, 1903.

Application filed December 22, 1900. Serial No. 40,745. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. INGOLDSBY, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Dump-Cars, (Case B,) of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

10 My invention relates to dump-cars of the general class shown in my prior patents, No. 613,279 and No. 632,650, issued, respectively, November 1, 1898, and September 5, 1899.

15 The present invention is concerned particularly with the trussing of the sides and bottom of such car and the angle-blocks used in such trussing, with the arrangement for supporting the interlocking levers which hold these drop-doors closed, with the door-raising 20 mechanism for disengaging it, with the air operating mechanism, with means for allowing a hand-operated car to be easily changed to an air-operated one, and with means for securing the chains which limit the drop of 25 the dumping-doors.

The object of the invention is to endow these features with cheapness of construction and simplicity and efficiency of operation, enhancing the convenience and capabilities 30 of the car and reducing to a minimum any liability to get out of order.

The drawings clearly illustrate my invention.

35 Figure 1 is a bottom plan of my improved car, a little more than half being shown, and Fig. 2 is a side elevation thereof, these two figures being on the same scale. Figs. 3 and 4 are respectively a side elevation and a plan of a portion of the car at the upper left-hand 40 corner of Fig. 2. Fig. 5 is a fragmentary detail in plan, partly sectional, of one of the hinge members secured to the central beam and appearing in Fig. 1. Fig. 6 is a perspective view of the locking and sealing device. Fig. 7 is an end view of the car. Fig. 45 8 is a vertical section through the elevating mechanism, being on the line 8 8 of Fig. 7; and Fig. 9 is an enlarged face view of the elevating ratchet and pawl shown in Fig. 7, 50 being a vertical section on the line 9 9 of Fig.

8. Figs. 10 and 11 are vertical sections on the lines 10 10 and 11 11, respectively, of Fig. 8. Fig. 12 is a side elevation of the end portion of the car when employing an air dumping mechanism. Fig. 13 is a transverse section 55 through the side of the car, showing the air-cylinder and its connection with the operating-lever and the bar-lock, being substantially on the line 13 13 of Fig. 12. Fig. 14 is a section at right angles to Fig. 13, being on 60 the line 14 14 of Figs. 12 and 13 and showing particularly the clip and pawl carried by the air piston-rod. Fig. 15 is a side elevation of such clip sectioned through the toe of the pawl and its pivot-bolt, and Fig. 16 is a perspective 65 view of the pawl. Figs. 17 and 18 are respectively an end view and a substantially horizontal section of the releasing-rod head and its housing. Fig. 19 is a transverse section of the car. Figs. 20 to 23, inclusive, 70 illustrate the tie-rods for trussing the under side of the car and the method of carrying the same, Fig. 20 being a fragmentary side elevation and 21 a similar bottom plan of the arrangement I use in large cars, and Figs. 22 75 and 23 being similar views showing the arrangement for supporting the bend of the V tie-rod or corner bracing-rods which I prefer to use in smaller-size cars. Figs. 24 to 31, inclusive, show in detail the brackets or saddles for 80 carrying the truss-rods illustrated in the preceding four figures, Fig. 24 being a plan, 25 an end view, 26 a side elevation, and 27 a vertical section on the line 27 27 of Fig. 24, of the saddles shown in Figs. 22 and 23. Fig. 28 85 is a side elevation of the saddle for the V tie-rod shown in Figs. 20 and 21, and Fig. 29 is an end view thereof. Fig. 30 is substantially a plan of the saddle for receiving the bend of the U tie-rod trussing the central beam, and Fig. 31 is a transverse section 90 thereof. Fig. 32 is another form of the saddle for receiving the bend of the V tie-rod which I may use in smaller-size cars. Figs. 33 and 34 are respectively a side elevation 95 and a plan of the angle-block employed to receive the thrust of the struts in the side trussing of the car and for journaling the operating-lever. Fig. 35 is a side elevation of the angle-block normally used for the ends 100

of the general side struts. Figs. 36 and 37 are respectively a side elevation and a bottom plan of the double angle-block which forms the seat for the upper end of the diagonal struts and the center-post at the center of the car sides. Fig. 38 is a side elevation, partly sectional, of the casting for receiving the lower end of this center-post. Figs. 39 and 40 are respectively a side elevation and a vertical section of the castings which carry the locking-levers. Figs. 41, 42, and 43 are respectively a face view, a side elevation, partly sectional, and an end view of a casting forming the journal for the operating-lever where the latter is not carried directly by an angle-block. Fig. 44 is a section of the car, showing the chains used for limiting the amount of drop of the dumping-doors. Figs. 45 and 46 are perspective views, looking upward, of two forms of a barbed hook adapted to be secured to the door for carrying the free end of the chain when not in use.

The above-described drawings show my invention as embodied in a dump-car of the general type described and claimed in my prior patents hereinbefore referred to. Such type in its preferable form may be briefly described as comprehending a car having trussed sides, a suitably-trussed longitudinal central beam, dumping-doors between the central beam, and sides hinged at the central beam and swinging downward to discharge the load downwardly or outwardly, as may be desired, and interlocking hooks carried by the sides of the car engaging with hooks projecting from the doors to hold the latter in place, and a hand or power operated lever to move the hooks to disengage the doors, and suitable mechanism to elevate the doors after they are dropped.

Referring now to the parts by letters, A represents the sides of the car, and B a longitudinal beam extending centrally of the car and framed into the end members C thereof. This central beam is preferably built up, as shown in Fig. 19, of five longitudinal beams, b^1 , b^2 , b^3 , b^4 , and b^5 , with longitudinal tongue-strips b^{12} , producing a general triangular cross-section and leaving a central opening b and being covered by suitable sheathing b' . Suitable U-bolts b^2 pass over the upper surface of this beam and extend through it and secure to the beam-hinge members h' or strut members F beneath it.

In recesses in the lower edge of the members F bear longitudinal tie-rods D. There are two of these tie-rods to a car, each being shaped in U form and being supported at its bend by a saddle D', which rests on the upper surface of the beam, the four meeting ends of the U-rods being connected by two turnbuckles D². The saddle on which this tie-rod D rests is shown in position in Figs. 2, 7, 12, 20, and 21 and in detail in Figs. 30 and 31. It is of the shape shown, having a flat base d , a semi-elliptical peripheral edge d' , having a correspondingly-shaped groove d^2

therein, and a web d^2 between the peripheral edge and the base. The longitudinal beam B is cut down near its end, as illustrated most clearly in Fig. 20, forming a step b^3 at right angles to the direction of the rods D near their ends, and this step forms a seat for the base of the saddle D'.

The corners of the car are braced by a V-shaped tie-rod E, which extends through the corners diagonally toward the central beam, where it passes around a suitable bracket or saddle. Between the corners and central beam this tie-rod passes upward over a suitable pad or saddle E⁴, resting on the cross-beam C' of the car, and thence downward and inward about one of the saddles E', E², or E³, according to which is employed.

In the largest style of cars, as illustrated particularly in Figs. 20 and 21, I make the beam B solid near the bolster-beam by placing between the members b^7 b^7 of the beam B a long filling-block b^4 , and against the lower surface of this I bolt the extension-beam b^5 , which abuts at one end against the bolster-beam C², which supports the beam C'. Metal timber-keys B¹³ and cross-bolts b^{14} , passing through them, secure the filling-block b^4 to the beams b^7 , and other keys b^{15} and bolts b^{16} secure the extension-beam to the filling-block. The other end of the extension-beam b^5 carries the saddle E'. This saddle is shown in detail in Figs. 28 and 29. It has a pocket e to receive the end of the beam b^5 and an upwardly-extending lug e' to enter the filling-block b^4 , the pockets and lugs cooperating to retain the saddle in place before the tie-rod is put on. This saddle carries a semi-elliptical peripheral wall e^2 , in which is a corresponding groove e^6 . This wall is connected with the wall of the pocket and with the plate e^3 , which bears against the lower side of the filling-block by webs e^4 e^5 . The tie-rod occupies the groove e^6 , and its tension is in the plane of that groove, whereupon it draws both against the filling-block b^4 and the end of the extension-beam b^3 , against each of which the saddle is firmly seated.

In the smaller-size cars I do not fill the opening b of the central beam with a filling-block, but bolt extension-beams b^6 directly to the lower beams b^7 b^7 of the central beam, as shown in Figs. 22 and 23, and these extension-beams receive a saddle E² of the form shown in Figs. 24 to 27. This bracket has recesses or open-sided pockets e^7 for receiving the end of the beams b^6 , has top plates e^8 and lugs e^9 , carried thereby, for bearing against and taking into the beams b^7 , has projections carrying curved grooves e^{11} at the two corners, and has suitable webs (designated e^{12} to e^{15}) for connecting the various parts mentioned.

It is sometimes sufficient to use in place of either of the saddles just described the saddle or bracket E³. (Shown in Figs. 1 and 32.) This bracket may be a malleable casting or of other material, consisting of a plate e^{16} ,

having its end extending downwardly and parallel with the plate and then upwardly, as at e^{17} , to form a tubular opening e^{18} , and at the other end a downwardly-projecting flange e^{19} .

5 This bracket fits over the upper end of the hinge member F' , as shown in Fig. 1, and the flange e^{19} bears against the edge of the top plate thereof, while the tubular opening e^{18} receives the bend of the V-rod E .

10 The material ordinarily carried in a dump-car (coal or ore, for example) tends to slide outward upon itself, exerting a strong outward pressure on the sides of the car. I have devised the sides of my car in a very peculiar
15 manner, so that outward strains on the sides of the car due to this pressure shall be counteracted by an inward strain caused by the weight of the load. This will appear from the following: Each side of the car consists of a
20 truss of the general type known as the "Howe" truss, but having an essential difference, herein pointed out. This truss has a lower chord a and an upper chord consisting of a horizontal beam a' and diagonal end mem-
25 bers a^2 , diagonal struts a^4 , parallel with these end members, being at opposite inclinations on the opposite sides of the center and increasing in width successively toward the ends, and the tie-rods a^5 , connecting the two
30 chords. Such is the general Howe truss. It places the lower chord in tension and the upper chord in compression. Now as compression tends to bend or distort anything along the line of least resistance I take advantage
35 of this law and form such line along the lower inner edge of the upper chord by rabbeting it at this point, as shown most clearly at a^6 in Fig. 19. This gives the upper chord a tendency to bend inward. To increase this tend-
40 ency of the top chord to bend inward, I place the strut members a^4 at the outer portion of the beam $a a'$, and the tie-rods a^5 are nearer the outside than the inside edge of these beams. The rabbeted edge a^6 and a corresponding
45 edge a^7 along the upper inner edge of the lower beam form seats for the reception of the ends of the diagonal counters a^8 . These counters are secured at their ends to the upper and lower chord and at the center of the car to
50 the central vertical post a^3 and intermediately of their ends to the strut members a^4 . They equalize the strain due to unequal loading. The lower chord being always in tension, the rabbet cut therein in no way varies
55 its operation.

Now while the heavier the load the greater the outward pressure on the sides of the car, it will be seen from the above description that with my truss the greater is the inward
60 bend caused by the greater compression on the top chord, and hence the two may counteract each other. Moreover, as stated, the rabbet a^6 performs the double function of weakening the upper chord at this point and
65 of forming a seat for the counters, and the counters perform the double function of relieving the strain from unequal loading and

forming barriers preventing the material of the load from passing out through the sides of the car. These features are important constituents of my invention. 70

In order to properly abut the struts a^4 against the upper and lower chord, I seat each end of the struts on angle-blocks facing at a proper angle to the chords, so that they may
75 lie firmly against the chords and against the struts. These angle-blocks V are for the most part of the type shown in Fig. 35. They consist of the base-plate v , adapted to rest on the chord, the plate v' at an angle thereto, 80
adapted to receive the end of the strut, flanges v^2 and v^3 at the ends of the plate v' and adapted to interlock with rabbeted edges in the strut, limiting the movement of the latter and preventing water from passing under it, and
85 lugs v^4 , extending from the plate v at right angles thereto and adapted to enter the chord and hold the block in place. These lugs v^4 are made, as shown in the drawings, to hold the angle-block against shifting in any direc-
90 tion and also to prevent weakening the chord by cutting clear across it with the lugs extending only part way across the angle-block. The wood of the chord between the two lugs
95 is connected with the rest of the chord by fibers, not only at the base of the supposed portion, but at each of its sides.

Some of the angle-blocks have partly-circular recesses v^5 to allow the passage of a tie-rod a^5 , the recess being indicated in dotted
100 lines in Fig. 5, but appearing in full in Fig. 34, which shows an angle-block similar in this respect.

The angle-block V is so shaped that it can be very conveniently made of malleable iron. 105
It is strong. It retains its place on the chord. Its flanges v^2 v^3 prevent water which drains down the strut from passing under the end of it, and they limit the movement of the strut member, but do not prevent its movement in
110 a plane at right angles to the side of the truss. The strut member is normally prevented from this latter movement by the bolts a^9 , which secure it to the counters; but if any strut member should be injured it may be easily
115 removed and a new one put in place simply by removing the bolts a^9 , without disrupting the car.

At the center of the car side the center-post a^3 , which forms a convenient abutment to
120 which to secure the ends of the counters at that point, is seated at its upper end in a pocket v^6 in the double angle-block V' . This angle-block has an upper face v^7 , adapted to lie against the upper chord and carrying lugs
125 v^8 , adapted to extend thereinto, while on its lower side it has the two diagonal faces v^9 for receiving the diagonal strut members a^4 , extending in different directions, and at each end of each face v^9 is a limiting-flange v^{11} .
130 The lower end of the central post seats in a pocket v^{12} in the block V^2 , which carries on its lower side lugs v^{13} , adapted to extend into the lower chord. These blocks are thus held

in place with reference to the chords first by the lugs which enter them and then by the strut members and the center-post, which co-operate with them to hold them in place.

5. The central tie-rod a^5 passes through openings in the blocks V' and V^2 , occupying a groove or recess in the rear side of the central post.

At each end of the car is an inclined floor G , and within the space defined by the lower edge of these floors and by the sides of the car and the central beam are trap-doors H , which have a beveled engagement with these surrounding parts. These doors are pivoted to the central beam by means of straps h , secured to their under sides, some of which take between bifurcated ends of straps h' on the under side of the central beam and others of which take directly into the struts F , which have similar bifurcated upper corners. This bifurcated end of the strap h' or corner of the casting F is shown on an enlarged scale in Fig. 5. By means of two holes h^2 it is secured to the central beam, and by means of alined openings h^3 it receives the hinged pintle.

To prevent the material carried from plugging the hinge during the dumping operation and interfering with the closing of the trap-doors, I provide openings h^4 in the bifurcated arms, which allow such material to drop out of the way, thus leaving the crevice between the central beam and the trap-doors perfectly clean at the end of the dumping operation, whereby the door may be raised without injury, and thus overcome one of the difficulties which I have found has sometimes attended this method of dumping.

The doors H are raised by substantially the same method shown in my prior patents referred to—namely, on the under side of the doors are segmental racks h^5 , with which mesh pinions j , carried on the shaft J , which is suitably journaled in the struts F and carries at its end the beveled gear j' , which meshes with a beveled pinion k on the diagonal shaft K . At the upper end of this shaft is the bevel-gear k' , which is adapted to be rotated by a suitable disengageable windlass mechanism hereinafter explained. Thus when the windlass mechanism is in engagement the doors may be elevated, and when out of engagement they may drop by gravity, rotating idly the shafts J and K , and when so dropped the load is dumped.

The doors are normally held from descending by hooks L , pivoted to the sides of the car and having beveled hooked ends, which engage the correspondingly-hooked ends of the straps h . These hooks L are all connected at their upper ends by the longitudinal link I , which is connected with the operating-lever I' , whereby when this lever is thrown the hooks L are forced out of engagement with the straps h and the door is allowed to drop by gravity. Inasmuch as these hooks L support half the weight on the trap-doors, there is a heavy strain on their pivots, and in

order to avoid actually carrying metal straps at the sides of the car from their pivots and taking over the top chord, as is shown in my prior patents referred to, (which with a side truss requires intermediate filling-blocks,) I have now devised a bracket adapted to distribute the strain to the lower chord, wherefore it is carried to the upper chord by the tie-rods. This bracket (designated M) is shown most clearly in Figs. 19, 39, and 40. It has on its outer side a projecting boss m , on which the hook is fulcrumed, and on its inner side, near its upper end, it carries another boss or extension m' , which is seated in a recess in the lower chord a of the car side. An opening m^2 through this latter boss provides means whereby it is secured to this chord by a bolt m^3 , and a recess m^4 in the bracket allows the head of the bolt or nut to be out of the way of the hook L , while the hook is guided by rubbing against the side of the bracket. The hook is held onto the bracket by a nut and washer m^5 on the end of the bolt m^6 , which projects through the lower chord and through an opening m^7 in the center of the boss m .

The brackets are preferably cored out, as shown in Figs. 39 and 40, for lightness and to allow them to be properly malleableized. The boss m' is elongated longitudinally of the beam m , in which it seats, so that the weight upon the bracket may be well distributed to the beam, and, as stated, this strain in turn is carried by the tie-rods a^5 to the upper chord. The bracket M extends below the journal-boss m to the lower end of the beam a , forming a continuous rubbing-plate for the hook, relieving the latter from bending strain.

In order to prevent the accidental discharge of the load while in transit, as well as to prevent any tampering with it, I provide a lock which prevents throwing the lever I' . This "bar-lock," as I term it, consists of a dog T , preferably of the form shown in Figs. 6, 7, and 13, adapted to either stand in front of the lever I' or be turned backward away from the path thereof. This bar-lock has two arms at an angle of about sixty degrees to each other, and it is pivotally supported at their junction in a housing t , secured to the frame of the car. When one arm of the lock is in horizontal position, the other arm acts as weight on the same side of its pivot, tending to hold it in place against accidental displacement. When desired, the bar-lock may be turned back by hand, (or by the operation of the air-cylinder, as hereinafter explained,) and it then remains disengaged until returned in front of the lever I' . The housing t has one of its standards t' extending up higher than the pivot of the bar-lock, and through this housing is a hole which is adapted to aline with a hole in the bar-lock. When the bar-lock is in locking position, a padlock may be passed through these alined holes, locking the car against dumping, or, as I prefer, a locking-pin t^2 , Fig. 6, may be passed through the holes and through this pin a seal t^3 of

usual form applied. This perfectly seals the car, preventing it being dumped without breaking the seal.

When it is desired to dump the car, the lever I' is thrown forward (the bar-lock T being turned back) to the right in Fig. 2, thus causing the hooks to release the doors, and in order that the doors when they are thus thrown down shall not hurt anybody by rapidly rotating the elevating-crank of the windlass mechanism I provide means for disengaging such windlass automatically when the lever is thrown. This is accomplished by the following mechanism: The upper end of the diagonal shaft K is journaled in a bracket P , which is secured to the upper cross-beam c^3 of the car, and the bevel-gear k' on that shaft meshes with a beveled pinion q on the shaft Q , which is journaled in the sleeve R , which has projecting from it integral trunnions r , taking into recesses p' in the bracket. The nose of a catch n^2 lies normally beneath this sleeve R , holding the same in a substantially horizontal position and maintaining the pinion q in engagement with the gear k' . In this position a crank q' , attached to the shaft Q , is adapted to rotate the shaft, thus rotating the shafts K and J in winding up the doors. The shaft K is held against longitudinal displacement by a nut k^2 , which screws onto the reduced end k^3 thereof and bears against the interposed washer k^4 , which lies above a portion of the bracket P and has a square hole taking around a square shank, wherefore it turns with the rod. Thus a simple removal of this nut k^2 (which is ordinarily prevented by the linchpin k^5) allows the shaft K to be drawn out from the bottom. On the shaft Q is a ratchet-wheel q^2 , with which engages a weighted pawl q^3 , pivoted to the bracket P , whereby as the doors are being wound up the parts will not run down if the pressure is removed from the crank.

The catch n^2 is made in the form shown in Fig. 11 and is secured to the end of the rod N which is slidable through an opening in the bracket P . On the other end of this rod is a double-beveled head n , Figs. 17 and 18, having a squared shank n' , occupying a squared bushing n^4 , set into the frame of the car with the angle, as n^6 , uppermost, so that material cannot lodge on the shank. The rod is pressed outward by a spring n^5 between its head and the base of the recess which the bushing occupies. When the lever I' is thrown to release or lock the doors, its inner face engages the beveled head n , forcing it inward and forcing the catch n^2 from beneath the sleeve R , allowing the shaft Q to swing downward by gravity, thus releasing the engagement of the pinion q and the shaft k' before the doors begin to drop. A pin q^6 prevents the pawl q^3 from swinging downward into the way of the ratchet when the latter has dropped.

Figs. 2, 3, and 4 show a very convenient arrangement of guide-iron I have devised for

confining the operating-lever in its path as it passes and forces inward the beveled head n . This guide-iron is designated I^3 . It is a flat bar secured at its end to one of the struts and twisted to have the lever bear along its narrow edge, the other end of the iron being bent around, as at i' , and secured to the end member a^2 of the car side. This makes a very stiff guide for the lever, preventing it bending outward as it encounters the resistance of the sloping head n . To provide a shoulder for the engagement of the forward side of the bar-lock T , the guide-iron I^3 is kinked, as at i , as shown. The guide-iron then has when in place a substantially horizontal portion, then a portion inclining parallel with the lever in its normal position, and then a portion inclining parallel with the edge of the end beam a^2 . The inner edge of the lever is guided by an ordinary grab-iron I^2 , which may be secured, as shown, to the end member and the upper chord.

The pinion q is secured on the shaft Q by the nut q^4 screwing onto the reduced end q^5 of that shaft, so that the removal of this nut allows the pinion to be drawn off. The trunnions r on the sleeve R take into the recesses p' in the bracket, which are open to the rear, as shown in dotted lines in Fig. 8. Normally these trunnions are retained at the forward end of the recess in any position of the shaft by reason of the forward edge p^2 of the bracket P being curved on the axis of the trunnion (in its normal position) as a center, wherefore the ratchet-wheel q^2 , constantly engaging with the forward edge of the bracket, acts as a stop and keeps the trunnions in place. When, however, the pinion q is removed, the shaft Q may be drawn forward out of the sleeve, whereupon the sleeve may be drawn backward out of the bracket. By extending the sleeve R so that the catch n^2 engages with it instead of directly with the shaft Q all tendency of the shaft Q to displace by its rotation the catch n^2 is avoided.

It is frequently desirable to dump the car by means of compressed air, and this is accomplished as follows; reference being had particularly to Figs. 7 and 12 to 16, inclusive: A cylinder s is suitably secured to each side of the car beneath the inclined floor G and has leading to its upper end a pipe s^{14} , adapted to convey compressed air thereto. Within the cylinder is a piston-head s' , from which extends a tubular piston-rod s^2 , which is surrounded by a spring s^3 , acting to elevate the piston. Within this tubular piston-rod is a rod s^4 , secured at its lower end to a rock-arm s^5 , which is secured to or is the turned-over end of the same rock-shaft s^6 to which the operating-lever I' is secured, wherefore the piston may operate the latter. Before the air can throw the operating-lever, however, it is necessary to release the bar-lock T . This I accomplish by the movement of the tubular piston-rod s^2 before the piston engages the rod s^4 , there being sufficient play for this purpose.

Thus clamped to the lower end of the tubular rod s^2 by bolts s^7 are the two clips s^8 and s^9 , and to the latter of these is pivoted by the bolt s^{10} the pawl s^{11} . This pawl has a toe s^{12} , occupying an arc-shaped recess s^{13} in the clip s^9 , and the pawl is extended on the other side of its pivot, counterweighting it and causing it to normally stand with its end over the projecting end u of a pivoted lever U , which extends through the frame of the car, being pivoted to a bushing u' set therein, and has its other end joined to the slidable rod U' , which lies just beneath the lock-bar T . Now when the piston-head begins to move by reason of the compressed air being let into the cylinder the first part of the movement causes the pawl s^{11} to engage the lever U , and this raises the bar-lock T , whereupon the other end thereof (being tipped beyond the pivot) swings it back out of the way, thus releasing the lever I' . After this is accomplished the piston-head in its continued movement engages the rod s^4 and rocks the shaft s^6 , and thereby throws the lever I' forward, releasing the trap-doors. When the air is released from the cylinder, the piston returns by reason of the spring s^3 and the pawl s^{11} slides over the end of the lever U , the toe s^{12} swinging in the recess s^{13} , and the opposite end of the latter preventing the pawl swinging so far that it will not return by gravity.

In practice cars may be built in the first instance to operate simply with the hand-dump—that is, with the only means of throwing the hooks L being the lever I' —thus making, of course, a cheaper car than where the air dump device is employed; but as it will frequently become desirable to thereafter alter these cars to have the air dumping arrangement I have devised a method of so journaling the hand-lever that such alteration may be made with the least expense and inconvenience. This, which is one of the features of the present invention, I will now describe, referring particularly to Figs. 7, 12, 13, 33, 34, 41, 42, and 43.

In the hand-dump car the lever I' is thrown from its upper end and is fulcrumed freely at its lower end at some suitable point. In some cars this fulcrum most conveniently comes at the upper corner of the angle-block V^3 , which is located at the lower end of the first strut a^4 . In this case I form the casting V^3 with a cylindrical wall V^{15} extending through it and projecting on the front side thereof, as shown at v^{16} . Beyond the projection v^{16} is the reduced cylindrical projection v^{17} , leaving the shoulder v^{20} , and beyond the projection v^{17} is the still further reduced projection v^{18} . The operating-lever I' is fulcrumed freely on the projection v^{17} , the shoulder v^{20} holding it the proper distance from the side of the car and the projection v^{18} receiving a washer against its shoulder and a linchpin through the hole v^{19} for holding the lever in place.

When the car is so shaped that the pivot of

the lever I' does not naturally come in the line of one of the struts, I provide a special bracket V^4 for fulcruming the lever, as shown in Figs. 41, 42, 43. In this case a suitable distance-block v^{21} separates the bracket from the counters. This bracket includes a base-plate v^{22} , and bolts v^{23} pass through the base-plate and the block, clamping the bracket to the counters. Wings v^{24} are formed on each side of the base-plate and extend on the opposite sides of the block v^{21} , preventing the latter splitting. On the outside of the base-plate are cylindrical projections v^{16} v^{17} v^{18} and the hole v^{19} for a linchpin, the same as in the bracket V^3 .

The above-described castings form very cheap and convenient fulcrums for the hand-lever I' . Now when an air-dump is used it is necessary to secure the lever rigidly at its pivot to a rock-shaft instead of fulcruming it loosely, the rock-shaft s^6 being shown clearly in Figs. 7, 12, and 13. To make the change in the brackets V^3 or V^4 from a hand-dump to an air-dump system, all that is necessary is to cut through the shoulder v^{20} , thereby removing the projections v^{18} and v^{17} . This and the simple boring of a hole through the beams or blocks back of the casting continuing and tubular opening forms a very convenient and satisfactory bearing for the rock-shaft s^6 . No disruption of the car is required, and the change can be made at any car-shop with the ordinary tools.

In building railway embankments or for other purposes it is frequently desirable to discharge the load at the sides of the car. The angle of this discharge varies with circumstances. To provide for this, I secure to the under sides of the car-doors chains W , which are adapted to hook onto hooks W' , secured to the lower chords, the angle of the door being varied according to which link the hook takes into. The hook is secured to the door preferably by a strap W^2 , bolted to it.

When it is intended to have the doors swing entirely downward to discharge the load between the rails, it is desirable that the free ends of the chains be held on the under sides of the doors out of the way, and that is a convenient place to normally hold them unless especially hooked onto the hooks W' . For carrying the free ends of the chains in such manner that they will not jolt loose with the running of the car I provide barbed hooks W^3 , secured to the under side of the door. These hooks are shown in detail in one form in Fig. 45 and in another form in Fig. 46. In either event they are secured to the under side of the dumping-doors, with their free end pointing toward the center of the car, so that as the doors drop the chains will slide toward the secured end of the hook and not toward the free end. The hooks, moreover, have at the free end a barb on the opposite side from the direction in which the chain pulls, so that the weight of the chain will keep it against the shank of the hook and prevent

it passing off the same until it is drawn comparatively taut and lifted over the barb. In the preferable form the hook has a curved shank w , a barb w' at the free end thereof, and at the other end a suitable plate w^2 , by which it is secured to the car. As shown in Fig. 45, this plate is bolted to the car at any convenient intermediate point. In the form shown in Fig. 46 the plate is consolidated with the strap which takes over the hooked member h , secured to the door. A U-bolt or staple may conveniently be passed through the door, have its ends passed through this plate, and nuts w^3 screwed onto them, whereby this staple at once retains the hooked bar and the barbed hook.

Having described my invention, I claim—

1. A car having trussed sides, which truss consists of upper and lower chords, struts between them, and tie-rods connecting them, said struts and tie-rods being nearer the outer sides of the chords than the inner sides, and counters on the inner sides of said struts and tie-rods which are set into rabbeted edges in said chords, substantially as described.

2. A car having trussed sides, the trusses including a lower chord and an upper chord and diagonal struts between the two, and diagonal counters in an opposite direction to the struts for relieving the strain due to unequal loading, the lower inner edge of the upper chord being rabbeted and the counters occupying such rabbeted edge, substantially as described.

3. A car having its sides trussed, the truss consisting of a lower chord and an upper chord, diagonal struts between the chords, the upper inner edge of the lower chord and the lower inner edge of the upper chord being rabbeted, and diagonal counters terminating in said rabbeted edges and extending crosswise of the struts and being secured to them, substantially as described.

4. In a car, in combination, a beam of general triangular cross-section and built up of individual beams, two of substantially rectangular cross-section and three of substantially triangular cross-section, said individual beams being arranged substantially as shown whereby the uppermost individual beam is bridged across the two rectangular beams, and an inclined upper surface is presented with a longitudinal recess opening downward whereby strength and lightness are obtained, and longitudinal tongue-strips bonding the rectangular beams to the outermost triangular ones, substantially as described.

5. In a car, in combination, a longitudinal beam, struts beneath the same, a pair of saddles seated on said beam near the opposite ends thereof, U-shaped tie-rods seated in said saddles at their bent part and extending beneath said struts and there held together, substantially as described.

6. In a car, in combination, a longitudinal beam, struts beneath the same, a pair of saddles seated on said beam near the opposite

ends thereof, U-shaped tie-rods seated on said saddles at their bent part and extending beneath said struts, turnbuckles securing the meeting ends of the tie-rods together, said longitudinal beam being reduced in height to make a shoulder at right angles to the tie-rods at that point, and said saddles including a base and a curved groove, said base seating on said shoulder, substantially as described.

7. In a car, the combination with suitable bottom-framing of a V-shaped tie-rod extending from the corners of the car to the central line thereof, and a saddle secured to the framing at such center line, and having a recess for the reception of said tie-rod at its bend, substantially as described.

8. In a car, the combination with a central longitudinal beam, a saddle on the underside thereof, and a V-shaped tie-rod extending from the corners of the car over suitable supports and then diagonally downward around said saddle, substantially as described.

9. In a car, in combination, a central longitudinal beam, extension-beams held on the under side thereof, saddles bearing against said extension-beams, and V-shaped tie-rods extending from the corners of the car to the central line thereof and occupying said saddles, substantially as described.

10. In a car, the combination with a central longitudinal beam and a transverse bolster-beam of a V-shaped tie-rod extending from the corners of the car upward above the bolster-beam over suitable pads supported thereby and then diagonally downward beneath the central beam, and a saddle beneath the central beam in which said tie-rod seats, substantially as described.

11. In a car, in combination, a central longitudinal beam, an extension-beam beneath the same, a saddle beneath the central beam having a pocket which said extension-beam occupies, and a tie-rod extending from the corners of the car and occupying said saddle, substantially as described.

12. In a car, in combination, a longitudinal beam, an extension-beam beneath the same, a saddle beneath said longitudinal beam and bearing upward against it, and longitudinally against the end of the extension-beam, said saddle having a pocket for receiving said end of the extension-beam, and an upwardly-extending lug for locking it to the longitudinal beam, and a tie-rod occupying said saddle, substantially as described.

13. In a car, in combination, a longitudinal beam having intermediately of its edges on its lower side a recess opening downward, a pair of extension-beams secured to the longitudinal beam on its under side on opposite sides of said recess, a saddle beneath said longitudinal beam extending across said recess and bearing upward against the beam and longitudinally against the ends of said extension-beams, said saddle being recessed to receive said extension-beams and carrying a pair of upwardly-extending lugs for locking

it to the longitudinal beam, and a tie-rod occupying said saddle, substantially as described.

14. A saddle for trussing a car having a pocket for receiving the end of a beam, a lug for extending into another beam, and a groove for receiving the tie-rod, all of said parts being at an angle to each other, substantially as described.

15. A saddle for trussing a car which includes a base-plate, a lug extending upward therefrom, a wall extending downward from the base-plate, vertical flanges forming a pocket with said wall, suitable webs carrying a groove on the opposite side of the pocket and beneath said base-plate, substantially as described.

16. An angle-block having two faces at an angle to each other, parallel flanges carried by one of said faces transversely thereof, the space between said parallel flanges being open on the front side, substantially as described.

17. In a car, in combination, the upper and lower chords of a side truss, diagonal struts between them, and angle-blocks seating against said chords and receiving the ends of said struts, said angle-blocks having transverse parallel end flanges unconnected on the front side, and the edges of said struts being rabbeted to receive said flanges, substantially as described.

18. In a car, in combination, the upper and lower beams of a side truss, brackets secured to these beams and having faces at an angle thereto, the faces of two cooperating brackets on the two beams being parallel, and diagonal struts having their ends at right angles to their sides seating on said brackets, there being flanges crosswise of the car and unconnected in front on the edges of the faces of said brackets for holding the ends of the struts, substantially as described.

19. In a car, in combination, a trussed side including an upper and lower beam, a central post, a bracket receiving the end of said central post and bearing against one of said beams, a pair of diagonal struts extending at opposite inclinations and seating against said bracket, and a tie-rod passing through the two beams, the bracket and the central post, substantially as described.

20. A bracket consisting of a plate having on one side a retaining-boss and on the opposite side a journal-boss, and a recess in said latter side opposite the retaining-boss, substantially as described.

21. In a dump-car, in combination, hinged doors having projecting straps, pivoted levers having hooked ends adapted to engage said straps to lock the door, and plates having bosses taking into the side beam of the car on one side and bosses on the other side on which said levers are journaled, substantially as described.

22. In a car having its sides trussed with an upper and a lower chord and struts between

them, and tie-rods connecting them, the combination of a trap-door for closing the bottom of the car, straps carried by said door, and interlocking levers carried by the lower chord of a truss for engaging the same, and brackets having two oppositely-extended bosses on one of which the lever is journaled and the other of which is seated in the lower chord, whereby the weight on the locking-lever is eventually carried to the upper chord, substantially as described.

23. In a car, in combination, a side beam, plates along the outside of this beam having bosses taking thereinto, bolts passing through said bosses and securing the plate to the beam, a boss on the outer side of the plate, a lever journaled on said boss, a bolt extending through this boss and securing the lever to the boss, substantially as described.

24. In a car, in combination, the side beam, the plate *M* seated thereon, said plate having on one side a boss *m'* taking into a recess in the side of the beam, there being a countersunk opening *m* in the outer side of the plate opposite said boss, a bolt passing through said boss and beam and having its head or nut lying in said countersunk opening, a boss *m* on the outer side of said plate, and a lever journaled on said boss and guided against the side of the plate, substantially as described.

25. A bracket for journaling a lever to a car side consisting of a plate *M*, a cylindrical boss *m* on the front side thereof, the plate extending downward below such boss, a boss *m'* on the opposite side of the plate above the boss *m*, said boss *m'* being elongated transversely of the bracket, and there being a bolt-hole through each of said bosses, substantially as described.

26. In the door-operating mechanism of a dump-car, the combination of a shaft, a movable sleeve on which said shaft is journaled, and a catch engaging with the sleeve and limiting its movement without interfering with the rotation of the shaft, substantially as described.

27. In the door-operating mechanism of a dump-car, the combination of a sleeve having trunnions extending into slotted recesses, a shaft within the sleeve, means for retaining the trunnions within said recesses, substantially as described.

28. In the door-operating mechanism of a dump-car, the combination of a suitably-supported bracket, a sleeve having trunnions taking into recesses therein which have openings in them, a shaft occupying said sleeve, and means preventing the withdrawal of said trunnions from the recesses and said shaft from said sleeve, substantially as described.

29. In a dump-car, in combination, a suitably-supported bracket, a sleeve having trunnions taking into recesses therein which have openings into them, a shaft occupying said sleeve, said bracket having an edge curved on the axis of the trunnion when in place as a center, a stop on said shaft engaging with

said curved face and thus locking the trunnions in the recesses, and mechanism operated by said shaft, substantially as described.

30. In a dump-car, the combination, with a bracket having recesses open at their rear ends, of a sleeve carrying trunnions extending into said recesses, a shaft occupying said sleeve and carrying at its rear end a removable pinion which bears against the end of the sleeve, said shaft carrying near its forward end a suitable stop engaging on the operative position with said bracket, and mechanism operated by the rotation of said pinion, substantially as described.

31. In a dump-car, a bracket, a sleeve carrying integral trunnions and taking into recesses in said bracket, a catch extending through an opening in said bracket, and adapted to engage said sleeve and support the same without interfering with the rotation of a shaft within the sleeve, in combination with such shaft and means for preventing the longitudinal shifting of the shaft relative both to the bracket and to the sleeve whereby the latter is held in place, substantially as described.

32. In a dump-car, in combination, a pivoted lever, a push-rod having a head adapted to project from within a recess across the path of said lever whereby the lever in passing said head may move the push-rod, the shank of said push-rod which extends from the recess being angular and being placed with an angle uppermost so that material may not lodge thereon, substantially as described.

33. In a dump-car, in combination, a lever, and a push-rod, said lever being adapted in its movement to engage said push-rod, said push-rod having a head beveled on its face in opposite directions and having a shank of definitive form preventing the turning of the head, a correspondingly-shaped recess carried by the car which said shank occupies, and a spring surrounding the push-rod between the head and the opposite side of said recess, substantially as described.

34. In a dump-car, in combination, dumping-doors, a lever and a push-rod, said push-rod having a head adapted to be engaged by said lever, being formed substantially as shown having a double beveled face and a squared shank with a recess therein, a square boxing carried by the frame of the car in a recess therein, said shank engaging with said boxing, and a spring surrounding said rod within the recess in the shank of the head and within the recess in the car-frame, substantially as described.

35. In a dump-car, in combination, a pivoted pawl, a toe and a recess carried by the pawl and the part to which it is pivoted, mechanism which the pawl may engage and operate to throw a lock, and other mechanism operated by a continuous movement of the pawl-carrying mechanism for operating mechanism, released by such thrown lock, substantially as described.

36. In a dump-car, in combination, releasing mechanism, a latch for preventing the operation of the releasing mechanism, a throw-out mechanism for disengaging the latch, mechanism adapted to operate the releasing mechanism, a pawl carried by said last-mentioned mechanism and adapted to operate the throw-out mechanism before the actuation of the releasing mechanism begins, said pawl being pivoted and carrying a lug extending movably into a recess, whereby the movement of the pawl is limited, substantially as described.

37. In a dump-car, in combination, releasing mechanism, a latch for preventing the operation thereof, a throw-out mechanism for disengaging the latch, a pivoted pawl operated by the releasing mechanism and adapted to operate the throw-out mechanism before the effective movement of the releasing mechanism begins, said pawl and the part to which it is pivoted carrying a lug and a cooperating recess, and said pawl having its other end extended in the form of a weight to bring it back into operative position, substantially as described.

38. In a dump-car, an air-cylinder, piston mechanism therefor, a clip suitably clamped thereto, a pawl pivoted to the clip, said pawl being counterweighted on one side of its pivot and having an inwardly-projecting toe on the other side, there being a recess in the clip which said toe may occupy, one end of said recess holding the pawl substantially horizontally and the other end of the recess limiting its movement and preventing its counterweighted end swinging over beyond the vertical plane through its pivot, combined with releasing mechanism actuated by said pawl, substantially as described.

39. In a dump-car, in combination, dumping mechanism, a lever for operating it, and a bracket forming a fulcrum for said lever, said bracket carrying a tubular recess adapted to form a journal for a rock-shaft to be substituted for the fulcrum, substantially as described.

40. In a dump-car, in combination, a lever, a bracket carried by the car, a projection carried by said bracket and having a hollow cylindrical interior, a smaller cylindrical projection carried at the end of the projection first mentioned whereby a shoulder is left between them, said lever being fulcrumed on said smaller projection and against said shoulder, substantially as described.

41. In a dump-car, in combination, a bracket having a hollow cylindrical projection v^{16} , a smaller cylindrical projection v^{17} at the end thereof, and a still smaller projection v^{18} at the end of the projection v^{17} , a lever fulcrumed on said projection v^{17} and bearing against the shoulder between it and the projection v^{16} and held in place by means taking

onto the projection v^{18} , substantially as described.

42. A bracket adapted to fulcrum a lever in a dump-car or journal a rock-shaft therefor, consisting of a suitable base and concentric projections v^{16} v^{17} and v^{18} each progressively smaller, said projection v^{17} having a cylindrical exterior and said projection v^{16} having a cylindrical interior, substantially as described.

43. A bracket for fulcruming a lever in a dump-car consisting of a base-plate v^{22} , a projection v^{16} having a hollow cylindrical interior, wings v^{24} carried at the edges of the base-plate opposite the cylindrical projection, substantially as described.

44. In a dump-car, in combination, a lever, a bar-lock adapted to stand in the path of the lever, a guide-iron for guiding said lever in its movement which consists of a bar adapted to be secured at one end to the car side and bent to form a shoulder adapted to be engaged by said lock and bent again to be secured to the end of the car, said bar being twisted to bring its narrow edge against one side of said lever, substantially as described.

45. The combination of a car side having an inclined end, of a lever pivoted at said side and having its upper end swinging near the upper end of said side, a guard-iron secured to the side of the car and extending substantially horizontally until near said lever in its extreme position and then bending downward substantially parallel with such position of the lever and then bending substantially parallel with the end of the car and bending around the lever and being secured to such end, and a lock carried by the end of the car and adapted to lie between the lever and the shoulder formed by said bend of the guard-iron which is parallel with the lever, substantially as described.

46. In a dump-car, in combination, a dumping-door, a chain secured thereto, means carried by the car for receiving the free end of the chain, and a hook carried on the under side of said door for receiving the free end of the chain when not in use, substantially as described.

47. In a dump-car, in combination, a hinged dumping-door, a chain secured thereto, a hook carried on the under side of said door for receiving the free end of the chain when not in use, said hook having its free end toward the hinge of the door whereby as the door drops the chain slides away from said free end, substantially as described.

48. In a dump-car, in combination, a dumping-door, a chain secured thereto, a hook carried on the under side of said door for receiving the free end of the chain when not in use, said hook having a barb extending in the opposite direction from the point at which the other end of the chain is secured, substantially as described.

49. In a dump-car, in combination, a hinged dumping-door, a chain secured thereto, means carried by the side of the car for receiving the free end of the chain, and a hook carried on the under side of said door for receiving the free end of the chain when not in use, said hook having its free end toward the hinge of the door whereby as the door drops the chain slides away from said free end, said hook having near its free end a barb extending in the opposite direction from the point at which the other end of the chain is secured, substantially as described.

50. In a dump-car, in combination, a beam, a door hinged thereto and adapted to swing downward and outwardly, a strap on the under side of said door projecting beyond the edge thereof, mechanism carried by the side of the car and adapted to engage said strap, a chain secured to the under side of the door, a hook for receiving the free end of this chain, said hook having a plate which extends across said strap, and bolts taking through said plate on opposite sides of said strap for holding the hook and strap to the door, substantially as described.

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

FRANK S. INGOLDSBY.

Witnesses:

ALBERT H. BATES,
H. M. WISE.