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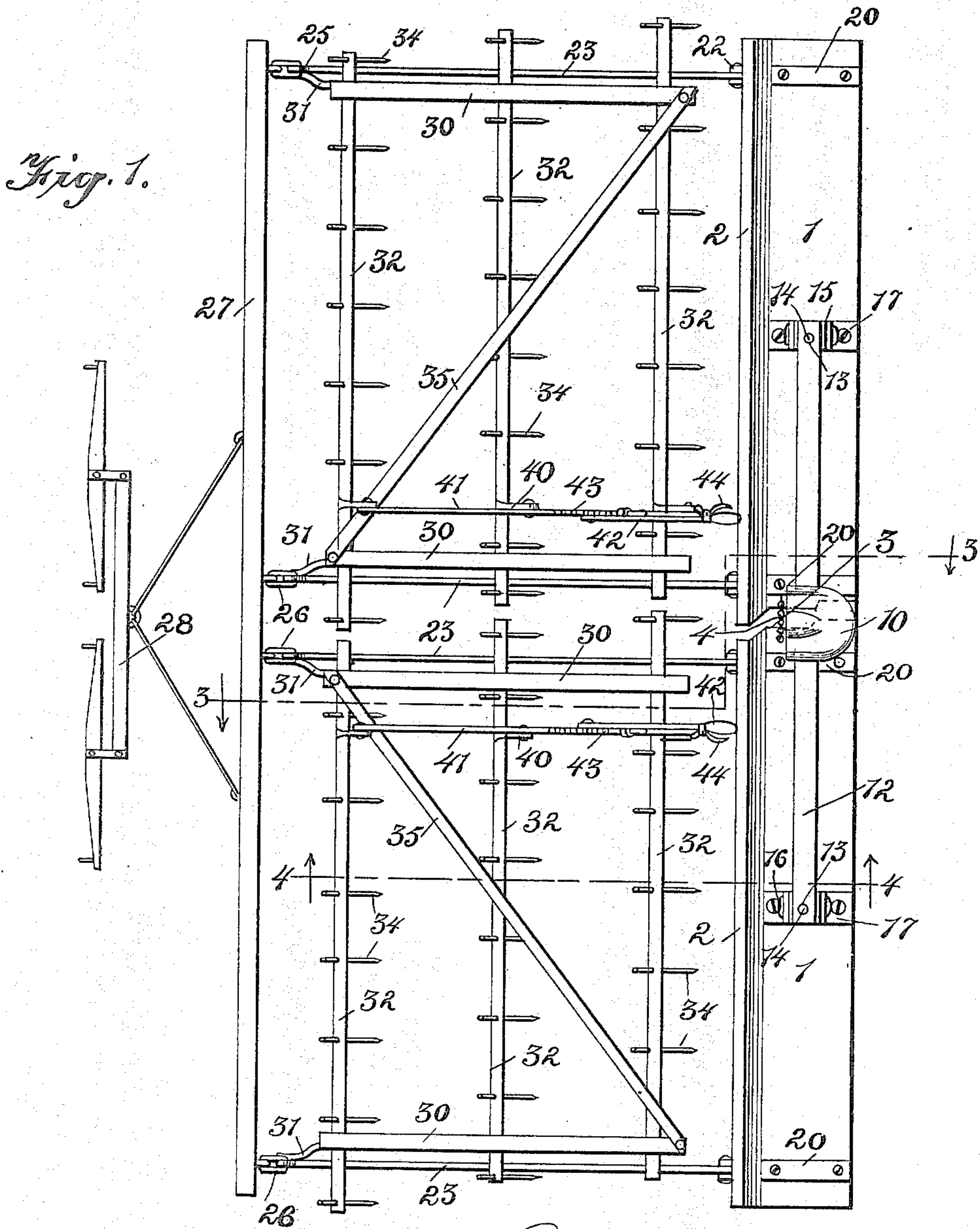
Patented Jan. 2, 1900.

S. ERNST.  
HARROW AND CLOD CRUSHER.

(Application filed May 31, 1899.)

(No Model.)

3 Sheets—Sheet 1.



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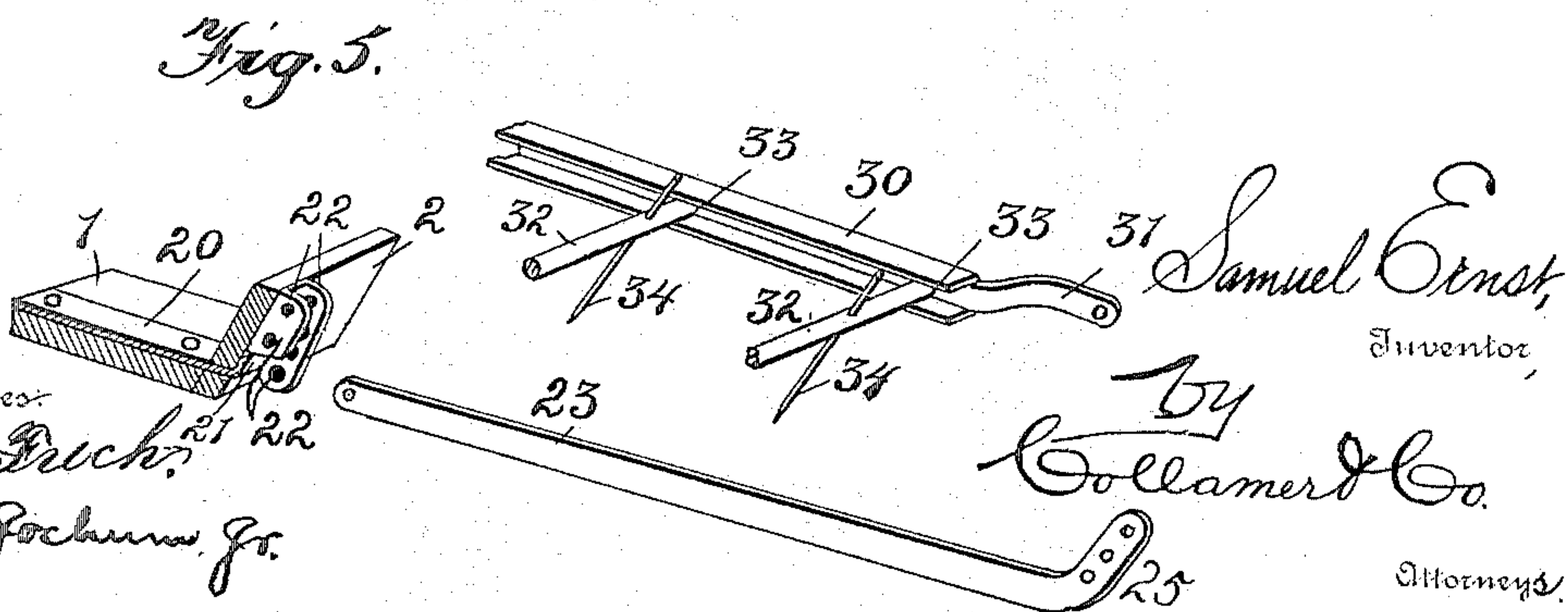
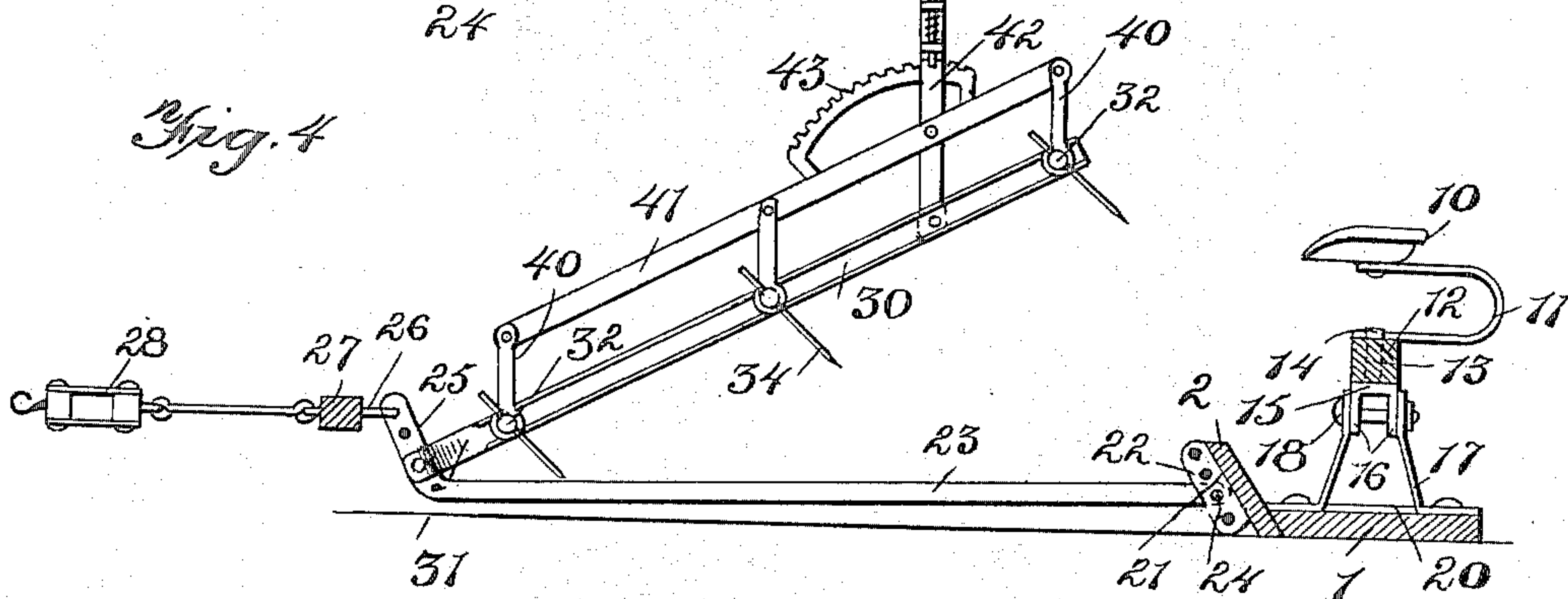
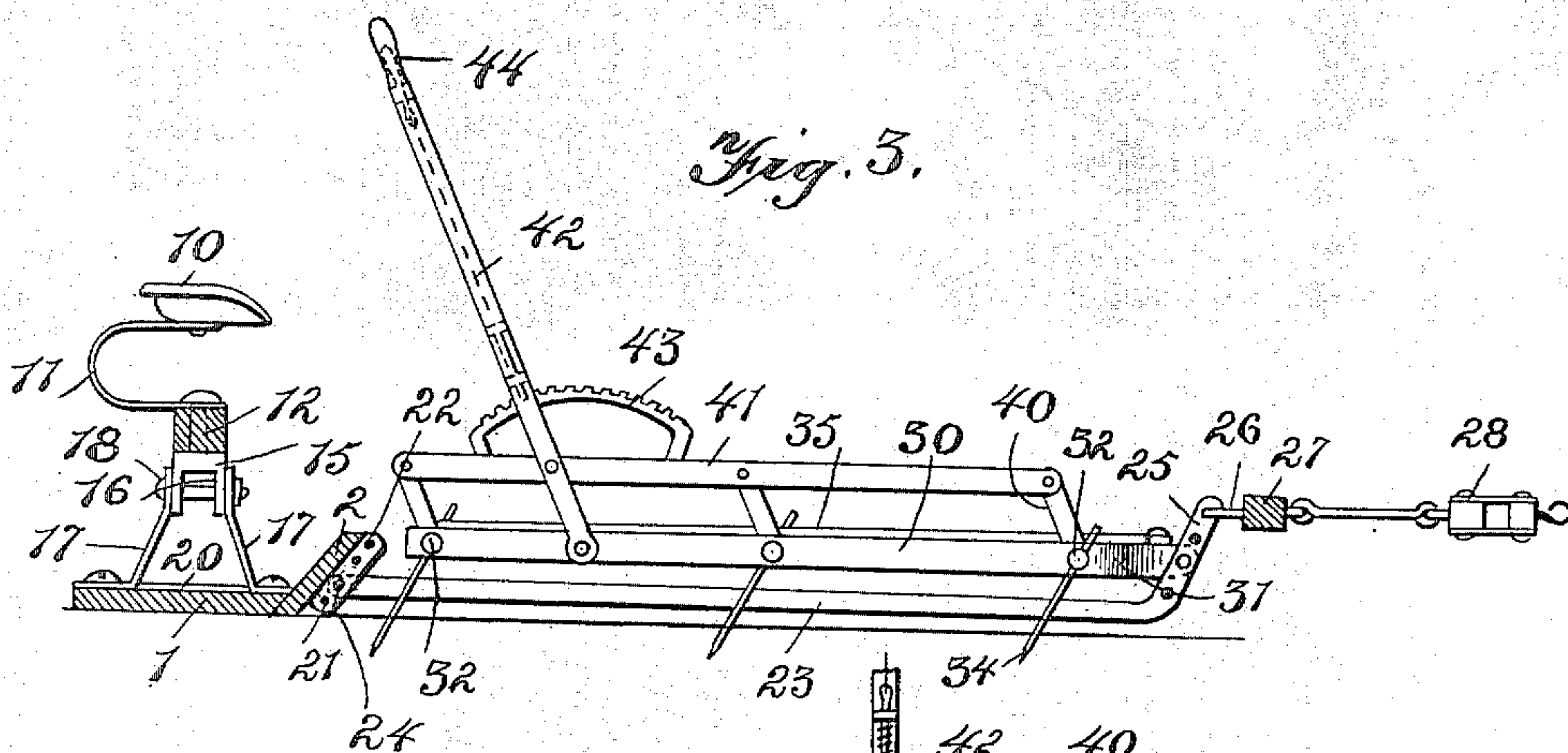
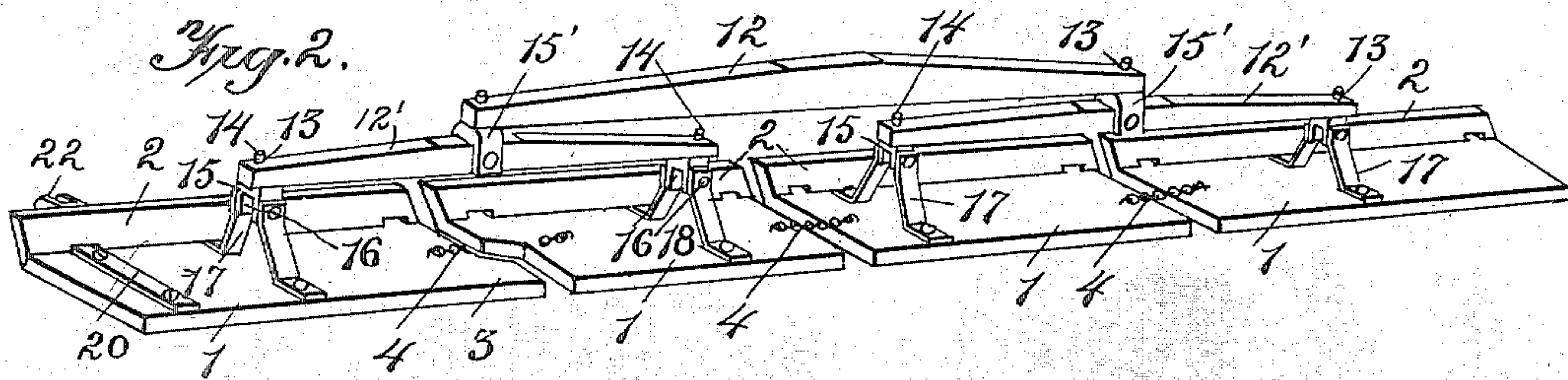
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3 Sheets—Sheet 2.



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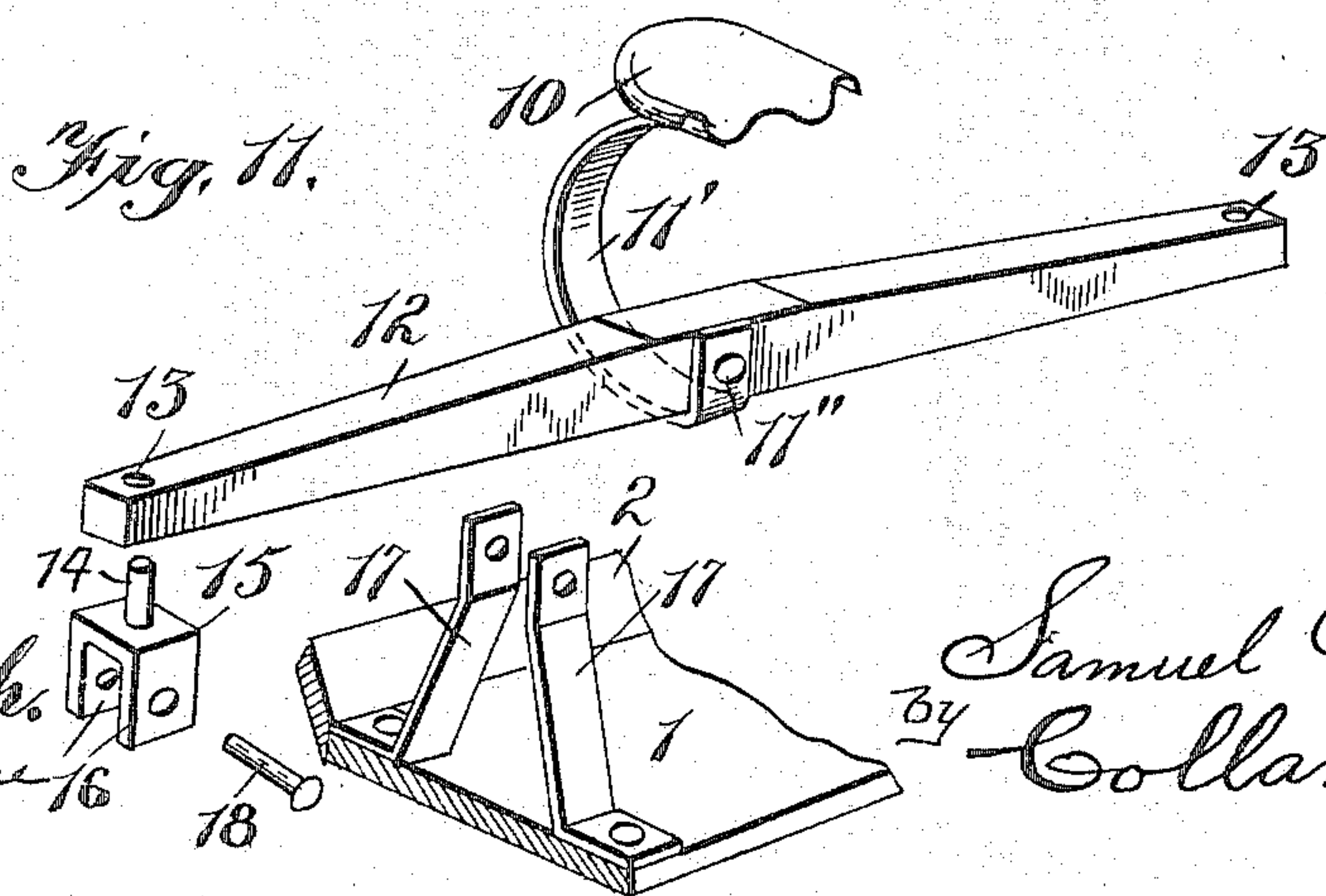
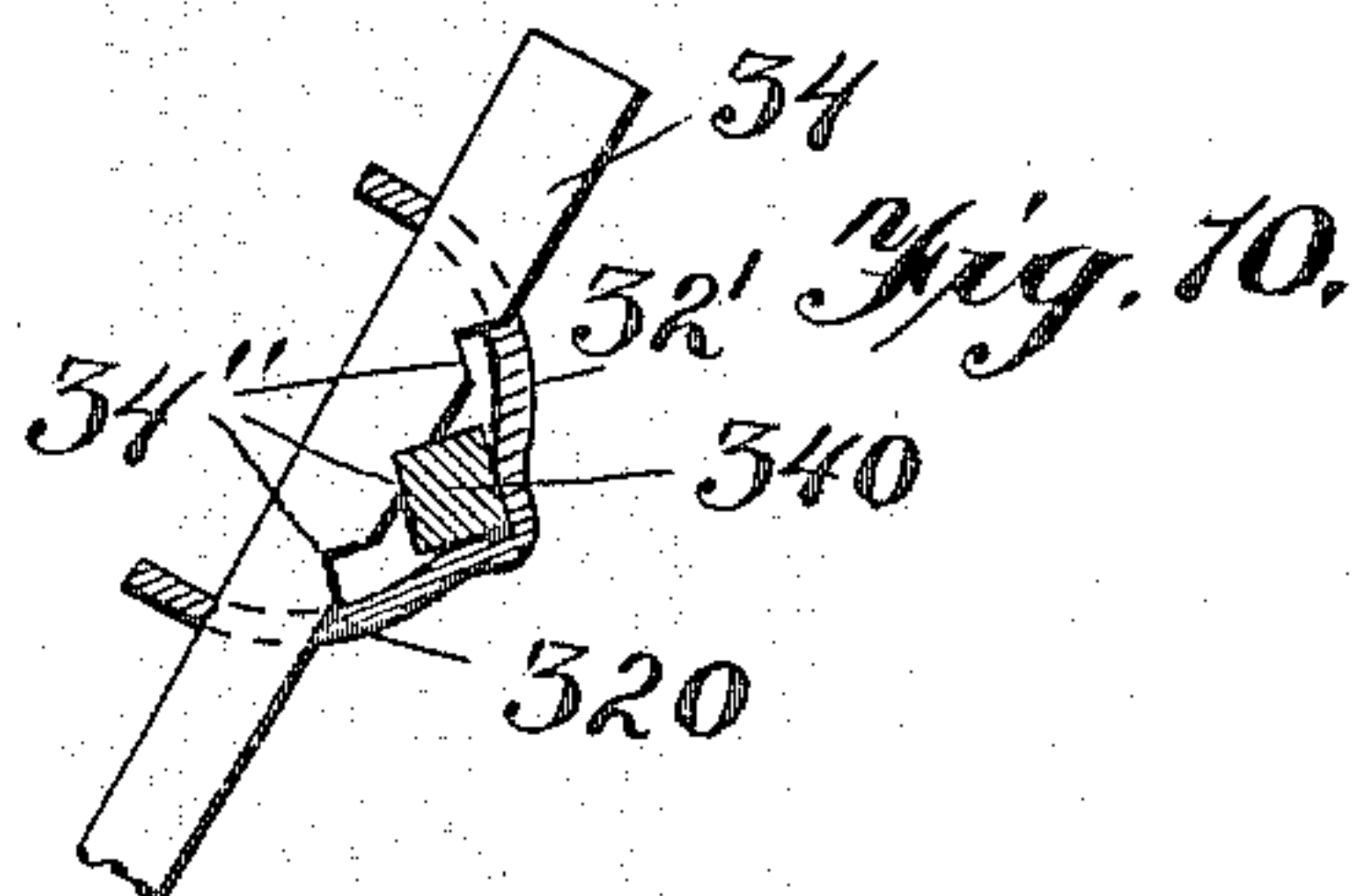
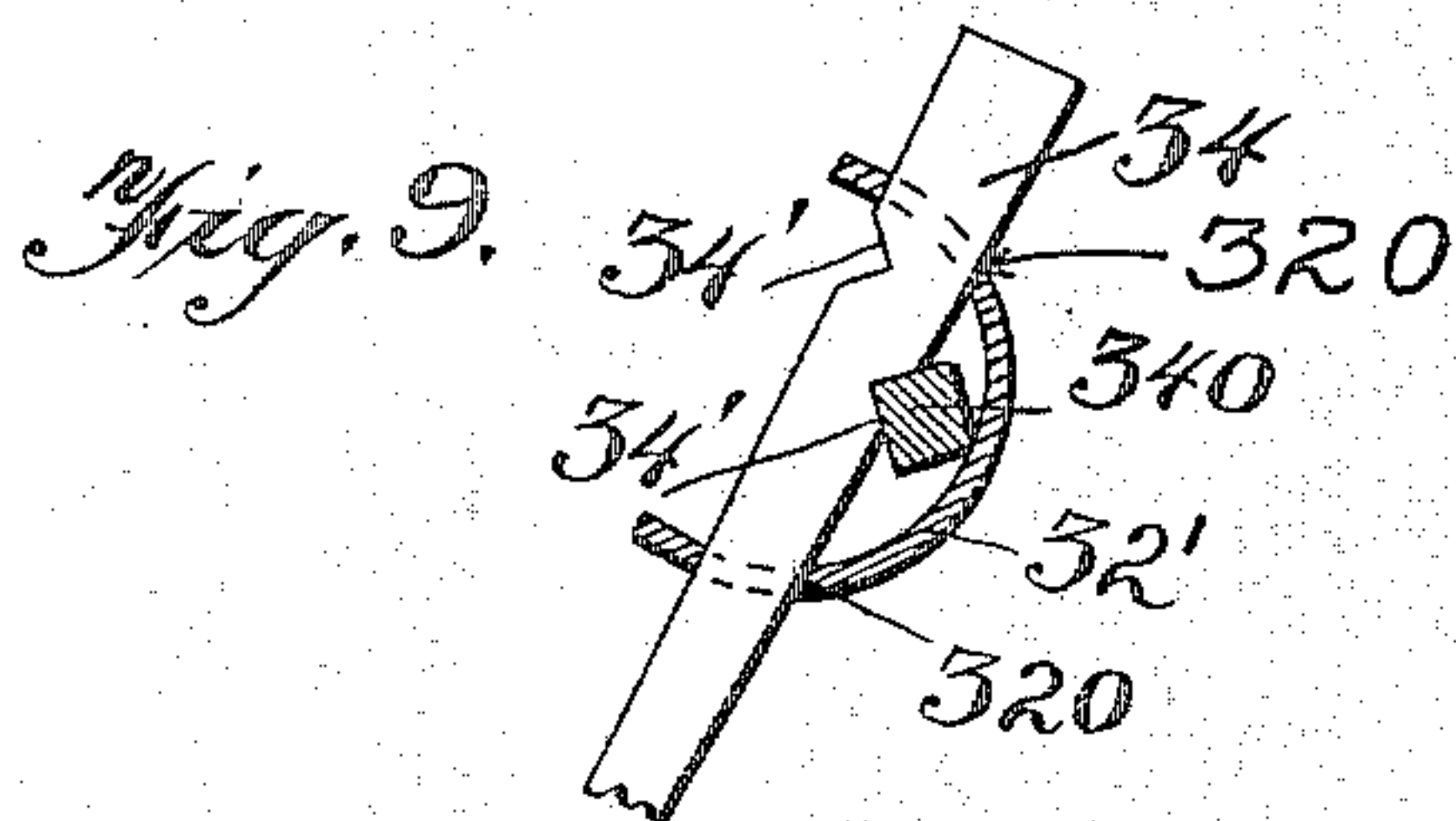
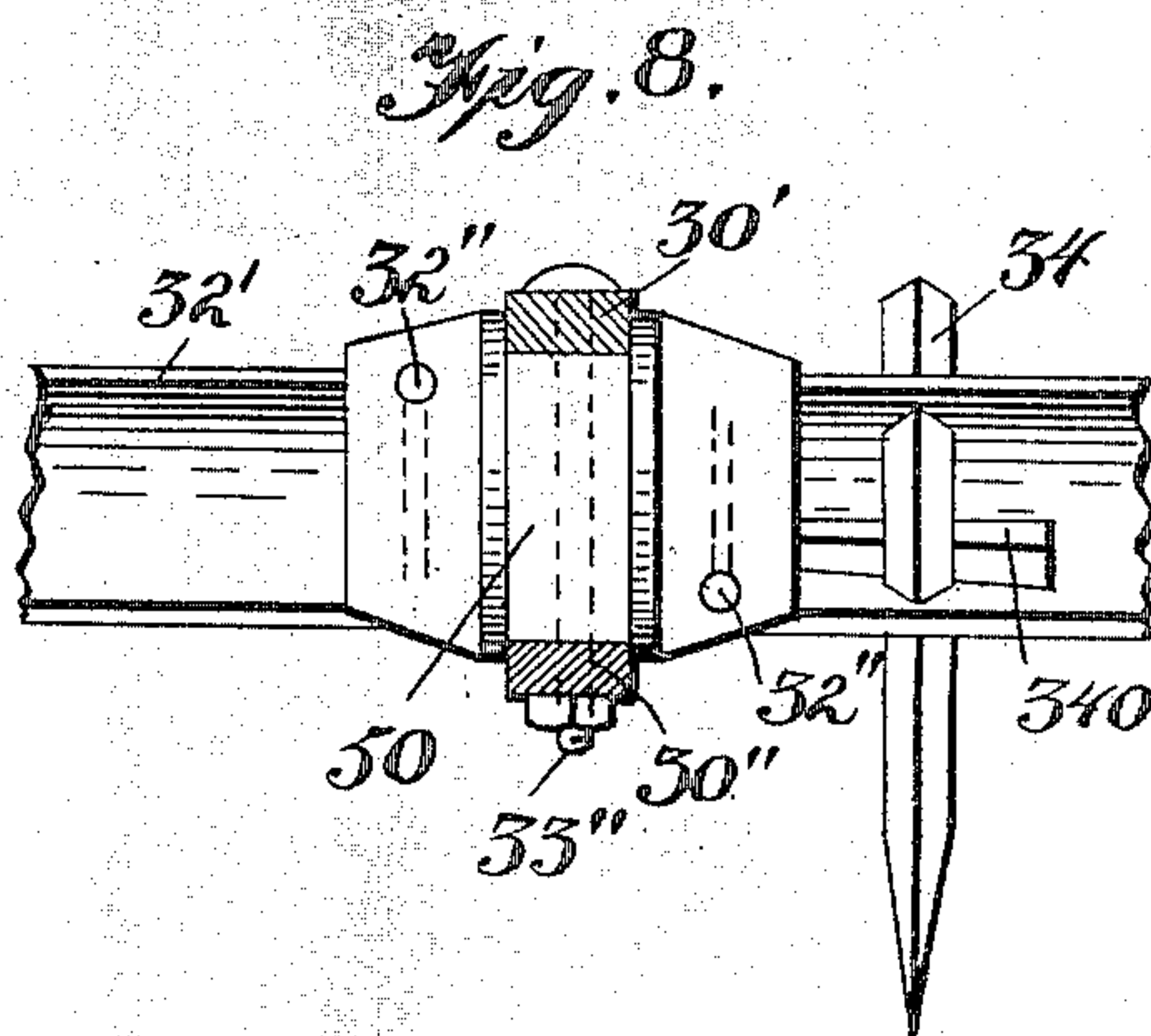
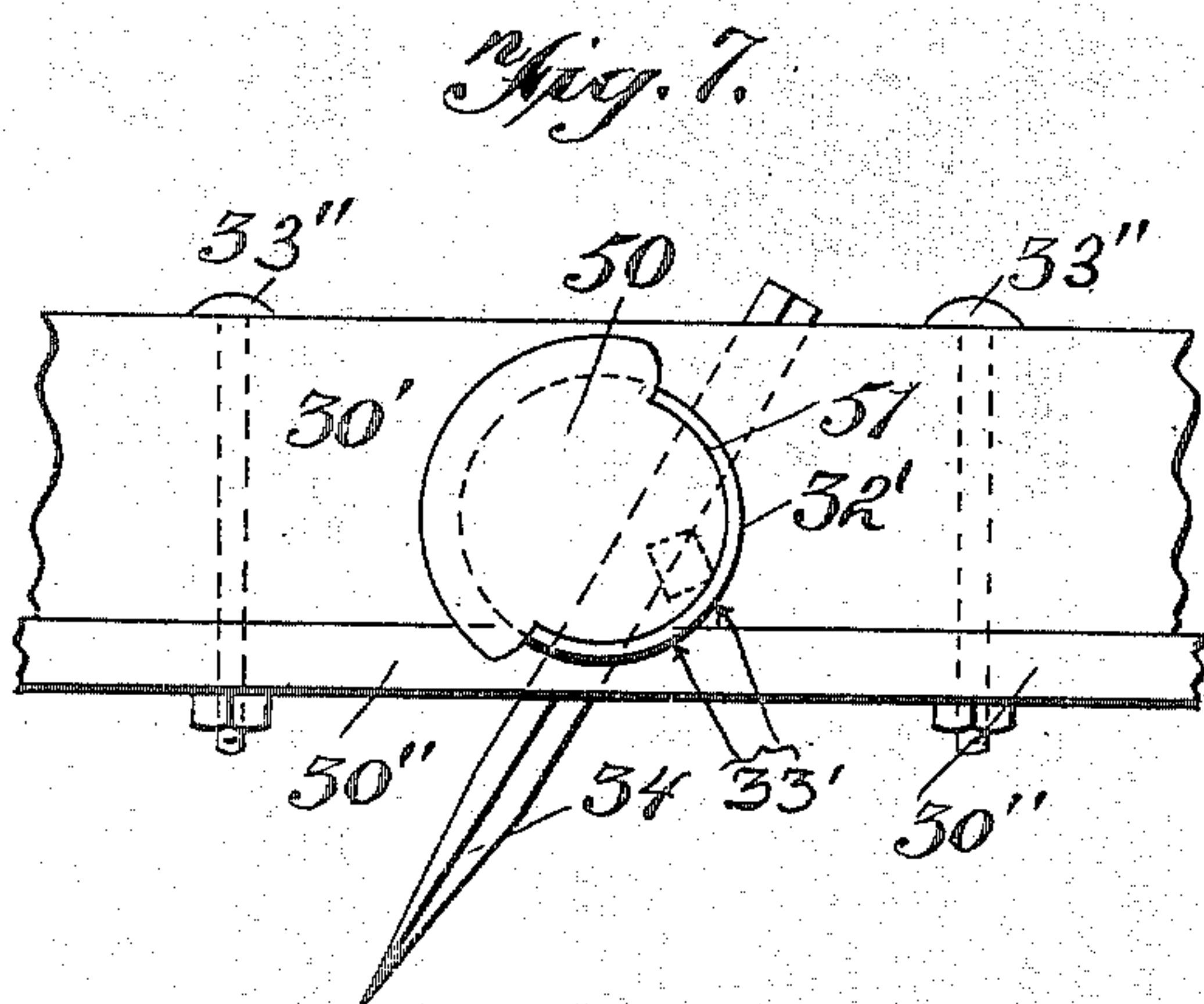
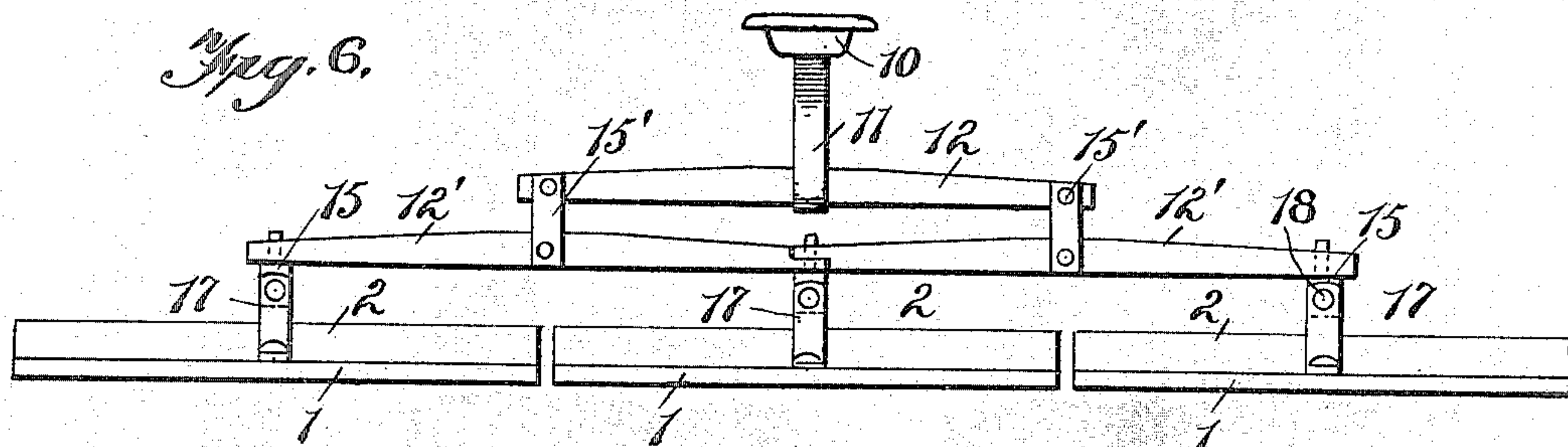
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

SAMUEL ERNST, OF GLEN ELDER, KANSAS.

## HARROW AND CLOD-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 640,514, dated January 2, 1900.

Application filed May 31, 1899. Serial No. 718,819. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL ERNST, a citizen of the United States, and a resident of Glen Elder, Mitchell county, State of Kansas, have invented certain new and useful Improvements in Harrows and Clod-Crushers; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to harrows, and more especially to that class thereof known as "clod-crushers" of the drag-bar type; and the object of the same is to construct a combined harrow and clod-crusher.

To this end the invention consists in the details hereinafter set forth and claimed and as illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view of this invention complete, showing the clod-crusher in two parts. Fig. 2 is a perspective view of the clod-crusher and seat-support, showing the former in four parts. Fig. 3 is a longitudinal section on the line 3 3 of Fig. 1 looking in the direction of the arrow and with the harrow in position for use. Fig. 4 is a similar section on the line 4 4 looking in the opposite direction and with the harrow raised so that all its teeth are above the surface of the earth. Fig. 5 is a perspective detail showing the clod-crusher in section to illustrate its strap-iron, one connecting-bar disconnected and slightly removed therefrom and one harrow-bar also slightly removed from connection with said bar and with its tooth-shafts in section. Fig. 6 is a rear elevation of the clod-crusher made in three sections. Fig. 7 is a side elevation showing my preferred construction of harrow-bar and the means for pivoting the shaft of the channel-iron therein. Fig. 8 is a cross-section of this preferred form of harrow-bar, taken just in rear of and looking toward one channel-iron. Figs. 9 and 10 are details of forms of teeth and means for locking them adjustably in place. Fig. 11 is a perspective detail of the evener-bar of Fig. 1, its seat and seat-spring, and one of its supports, the members of the latter being slightly separated.

The clod-crusher proper of this device consists of a board 1, turned up at its front edge or there attached to an upturned board 2,

both of which may be lined on their lower faces with metal, if desired. This board 1 is shown in two sections in Fig. 1 and in four sections in Fig. 2, and where the ends of the sections meet they are preferably cut off on irregular lines 3 and may be connected by chains or hinges 4, so as to permit independent movement vertically, but so as to hold the sections in substantial alinement.

The seat 10 is mounted on a spring 11, carried at the center of a bar 12, and the extremities of the latter have eyes 13, mounted on pins 14 at the upper ends of blocks 15, each of which has two legs 16 pivoted between the upper ends of brackets 17, attached to and rising from the sections of the board 1 and arranged in pairs connected by bolts 18, which pass pivotally through the legs of the block. When the board 1 is in more than two sections, as seen in Fig. 2, there are evener-bars 12', which are supported on these blocks 15 in the manner above described and which at their centers carry other pivoted blocks 15', that in turn support the extremities of the main bar 12, and the latter carries the seat, which is thus so disposed that the weight of the rider is equally distributed to all sections of the board 1. These sections have the necessary and limited vertical movement, which is desirable when the device is passing over rough ground.

20 designates a strap-iron, of which there are several, each secured upon the board 1, passing forward through the board 2, and having its front end turned up and secured to the latter board, while the edges of this upturned portion are bent forward into flanges 22, pierced with a number of registering holes. 23 designates a connecting-bar pivotally and adjustably bolted, as at 24, at its rear end into a pair of these holes, so that its body will travel above the ground, and having an upturned front end 25, provided with a series of holes. There are several of these bars 23, called "connecting-bars," because they connect the clod-crusher with the evener-bar described below and cause such members to move in parallelism, and I consider the upturning of their front ends highly important.

26 designates clevises connecting one of the holes of all the bars 23 with an evener-bar 27, which extends completely across the front



of the machine and to which in turn is attached the whiffletree 28. The fact that the draft is thus applied to the connecting-bars at points considerably above the line of their bodies prevents the latter from being unduly raised by the pull of the team resisted by the weight of the clod-crusher. Thus it will be seen that by adjusting the clevises the draft may be applied higher or lower, so as to keep the bars 23 substantially horizontal, while by adjusting the bolts 24 said bars will be caused to draw the clod-crusher forward without unduly raising or depressing its front edge, although the driver's weight will hold its body in working position.

The harrow proper comprises a series of harrow-bars 30, each in parts or made of channel-iron and with a laterally-bent ear 31 at its front end, which is adjustably pivoted in one of the holes in the upturned end of a connecting-bar 23 in such manner that the body of the harrow-bar 30 will not lie directly over the bar 23 and that the draft on the latter will not cause the front ends of the former to rise. 32 are tooth-shafts (three are shown herein) journaled through eyes 33 in the harrow-bars and which in turn carry teeth 34, secured to or through them in any suitable manner, preferably as described hereinafter, although any other manner may answer. In Fig. 1 the harrow is made in two banks, which is accomplished by severing the shafts 32 at the center of the machine and having one harrow-bar 30 sustain each end of the several shafts. I do not necessarily confine myself to this arrangement, nor do I limit myself particularly to two banks, as more might be used. 35 designates oblique braces which might be employed for holding the banks in rectangular position, and it will also be understood that the bar 23 might likewise be braced. From this description it will be clear that the harrow or either bank thereof can be raised around the bolts which pivot the ears to the connecting-bars, as seen in Fig. 4, when it is not desired that the teeth engage the earth, and any well-known means may be provided for holding the harrow in elevated position.

The shafts 32 are journaled in the eyes 33, so that when turned therein the teeth can be set at any desired angle to the surface of the earth.

40 are arms rising rigidly from the shafts, and connected by a link 41. 42 is a hand-lever pivoted to this link and moving over a toothed segment 43, also carried by the link, and 44 is a thumb-lever carried by the main lever and engaging said segment, as well understood. In Fig. 1 two of these arrangements are shown, one for each bank, and it will be clear that the driver by properly manipulating the levers 42 can adjust the angles of all the teeth in either bank simultaneously.

The remainder of this specification describes parts and details preferably used in connection with my improved device, al-

though no claim for novelty thereon is made herein.

In Figs. 7 and 8 I have shown my preferred manner of journaling said shafts in the harrow-bars, the preferred construction of the latter being also illustrated therein. 30' is the upper portion, of cast-iron, and 30'' the lower portion, of steel, these two comprising the harrow-bar and having in their adjacent edges complementary portions of eyes 33', corresponding with the eyes 33 above. The forward end of this harrow-bar is preferably formed with the ear above described and which is pivoted to the connecting-bar 23. The two portions are rigidly connected by bolts 33'' at intervals, and in each eye is journaled a block 50, which is exteriorly grooved for that purpose. The forward side of this block is struck on a smaller curvature, as at 51, to fit into the guttered side of a channeled shaft 32', which I use with this harrow-bar, and 32'' are bolts holding it therein. Thus the block turns in the eye and the channeled shaft fills out the smaller side 51 of the block, so as to form a perfect bearing, while the shaft is removable from the block and the latter from the bar at will.

Figs. 9 and 10 show my preferred means of securing the teeth 34 in the channeled shaft, which latter is provided with registering vertical openings 320 in its upper and lower sides for this purpose. The body of the tooth is passed down through a pair of said openings, and a wedge 340 is driven into the bend of the channel-iron between the same and the tooth, and the latter is preferably notched for the reception of the wedge, which may be angular to cooperate with a corner thereof. I may make two notches 34' in opposite corners of the tooth at different elevations or a series of notches 34'' in one corner, either plan permitting the tooth to be removed after its point has become worn off or must be sharpened and reset with the wedge 340 in another notch. The shaft 32' in Fig. 9 is truly semi-circular in section, and the wedge shaped to fit it. That in Fig. 10 comes to an angle midway between its edges, which angle receives the corner of the wedge. The latter may be individual wedges for the individual teeth or one continuous wedge for the entire shaft.

In Fig. 11 I have shown the evener-bar 12 of Fig. 1 with the members or parts of its support detached the better to illustrate their construction. This view also shows my preferred form of spring for the driver's seat 10, which consists of a strap of steel 11', bolted at its upper end below the seat, thence curving around behind the bar 12, and having its lower end bolted, as at 11'', to either the front of the bar 12, as shown, or possibly beneath it. This arrangement secures the greatest spring action of the spring without bringing the seat and the weight of the operator too high.

Other details of construction will suggest themselves to the manufacturer and can be



adopted without departing from the spirit of my invention. I have shown and described sufficient to give an intelligent understanding of the machine, and every farmer will understand its operation. The exact shape, proportion, size, and materials of parts are also matters of preference.

What is claimed as new is—

1. In a clod-crusher, the combination with a board having an upturned front made in sections in transverse alinement and with their meeting ends struck on irregular lines; of an evener-bar, a whiffletree attached thereto, and connections between the bar and the various sections of the board as and for the purpose set forth.

2. In a clod-crusher, the combination with a board made in alined sections flexibly connected at their meeting ends, and draft appliances for moving the board; of a pair of brackets on each section, a block having legs pivoted between the members of each pair, a pin rising from the block, an evener-bar having eyes engaging the pins of two blocks, and a seat supported by the bar in such manner as to distribute the rider's weight equally on the various sections, substantially as described.

3. In a device of the character described, the combination with a horizontal board having an upturned front, strap-irons each secured upon the board, passing through its front, turned up forward thereof, secured thereto, and having forwardly-turned flanges pierced with a series of registering holes, of a series of bars adjustably pivoted at their rear ends in said holes, an evener-bar connecting the front ends of all the bars, and draft appliances therefor, substantially as described.

4. In a device of the character set forth, the combination with a clod-crusher; of a series of parallel bars pivoted at their rear ends thereto and having upturned front ends pierced with a number of holes, an evener-bar forward of all said bars, draft appliances therefor, and clevises connected with said evener-bar and adjustably engaging certain of said holes, as and for the purpose set forth.

5. In a device of the character set forth, the combination with a clod-crusher, connecting-bars extending forward therefrom and having holes in their front ends, an evener-bar connecting the latter, and draft appliances; of a harrow comprising bars pivoted at their front ends to the holes in the connecting-bars and extending substantially parallel therewith, transverse shafts connecting said harrow-bars, and teeth depending from the shafts, as and for the purpose set forth.

6. In a device of the character described, the combination with a clod-crusher, connecting-bars extending forwardly therefrom and

connected at their front ends, and the draft appliances; of a harrow made in banks, each comprising bars pivoted at one extremity to said connecting-bars and extending substantially parallel therewith, transverse shafts connecting said harrow-bars, and teeth depending from the shafts, as and for the purpose set forth.

7. In a device of the character set forth the combination with a clod-crusher, a series of connecting-bars attached to said clod-crusher and extending longitudinally of the machine and having upturned front ends, and means for causing them to move in parallelism; of a harrow comprising bars each having a laterally-bent ear at its front pivoted to the front end of one connecting-bar so as to throw the bodies of the bars out of alinement, transverse shafts in said harrow-bars, teeth depending from the shafts and passing between the connecting-bars, and means for turning all the shafts simultaneously, as and for the purpose set forth.

8. In a device of the character set forth, the combination with a clod-crusher, an evener-bar forward of and parallel with said clod-crusher, draft appliances for said bar, and connecting-bars having straight bodies pivoted at their rear ends to said clod-crusher and standing above the ground and upturned front ends pivotally connected with said evener-bar; of a harrow pivoted to said upturned front ends so that its teeth shall be embedded in the earth, and means for adjusting the angle of said teeth, as and for the purpose set forth.

9. In a combined harrow and clod-crusher, the combination with the clod-crusher made in sections, a seat supported on an evener-bar, and pivotal supports on the sections for the extremity of this bar to equally dispose the rider's weight on the various sections; of a harrow made in banks, each comprising longitudinal bars, transverse shafts journaled in these bars, teeth depending from the shafts, and independent mechanism for each bank located within reach of the driver's seat for turning all the shafts therein in unison; and a series of connecting-bars pivoted at their rear ends to the clod-crusher sections and at their front ends to the harrow-bars, and means for moving said connecting-bars longitudinally in parallelism, all substantially as set forth.

In testimony whereof I have hereunto subscribed my signature this the 10th day of May, A. D. 1899.

SAMUEL ERNST.

Witnesses:

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