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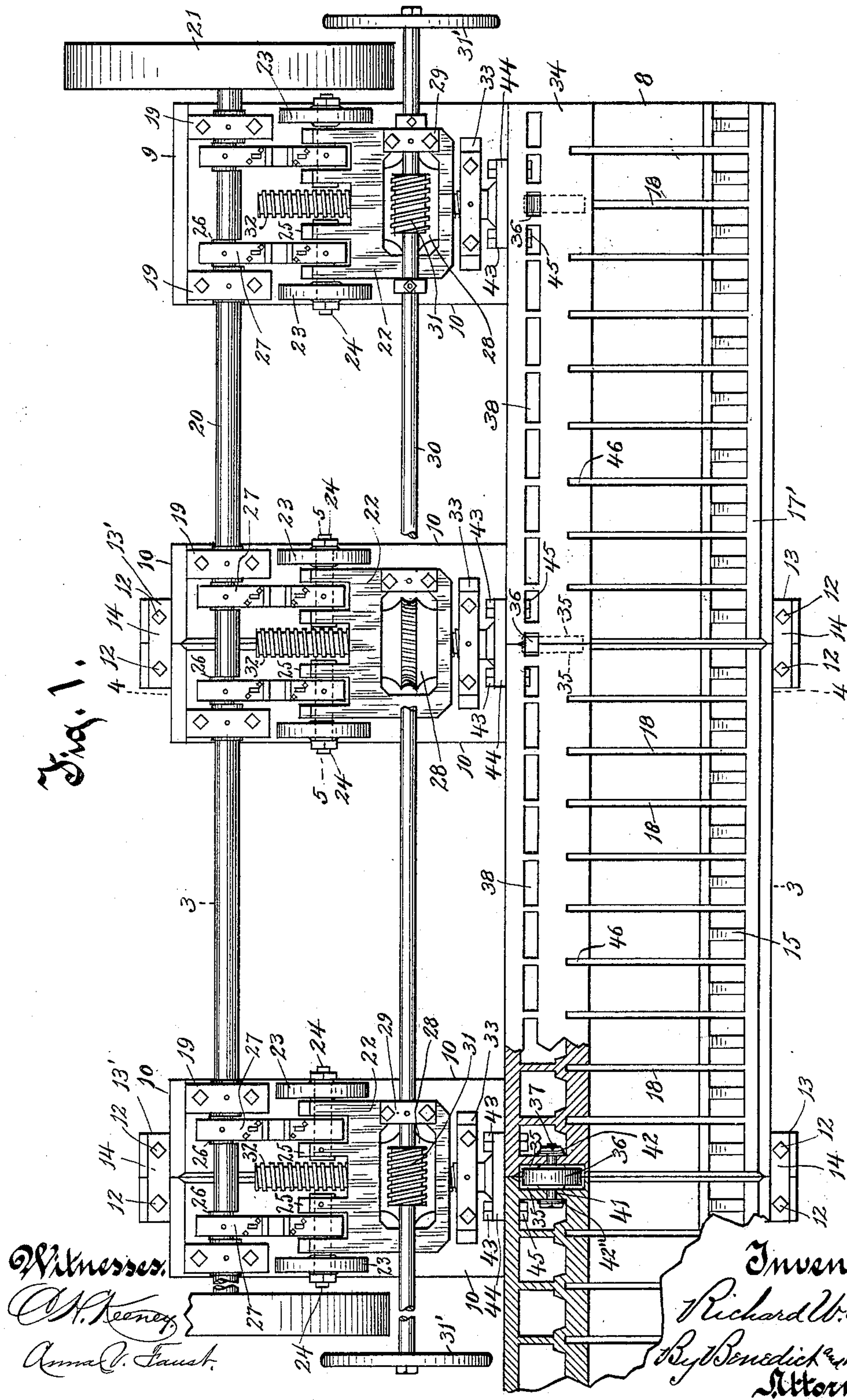
Patented Oct. 4, 1898.

R. W. LUNDY.  
STRAIGHTENING MACHINE.

(Application filed Oct. 13, 1897.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:  
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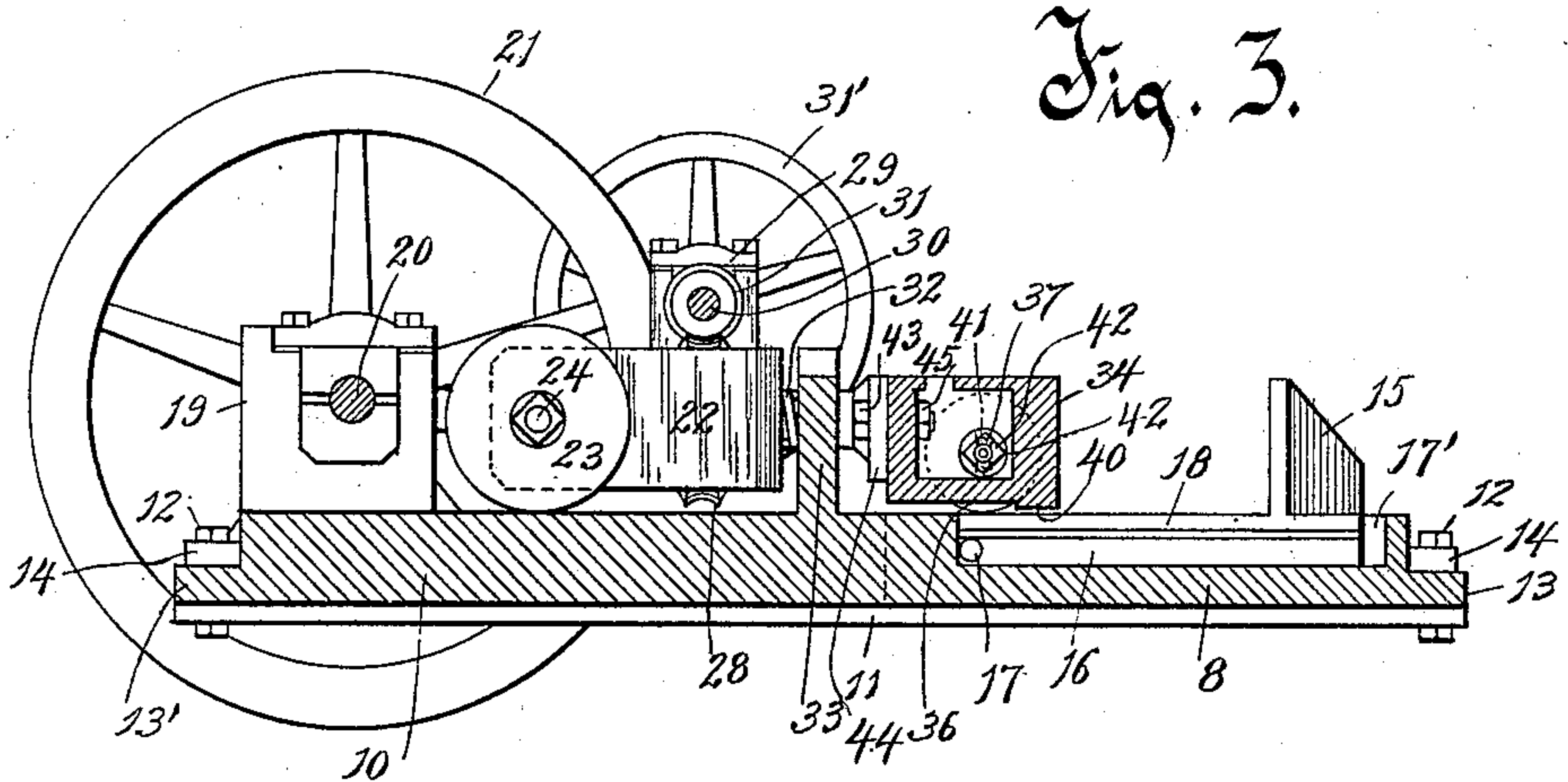
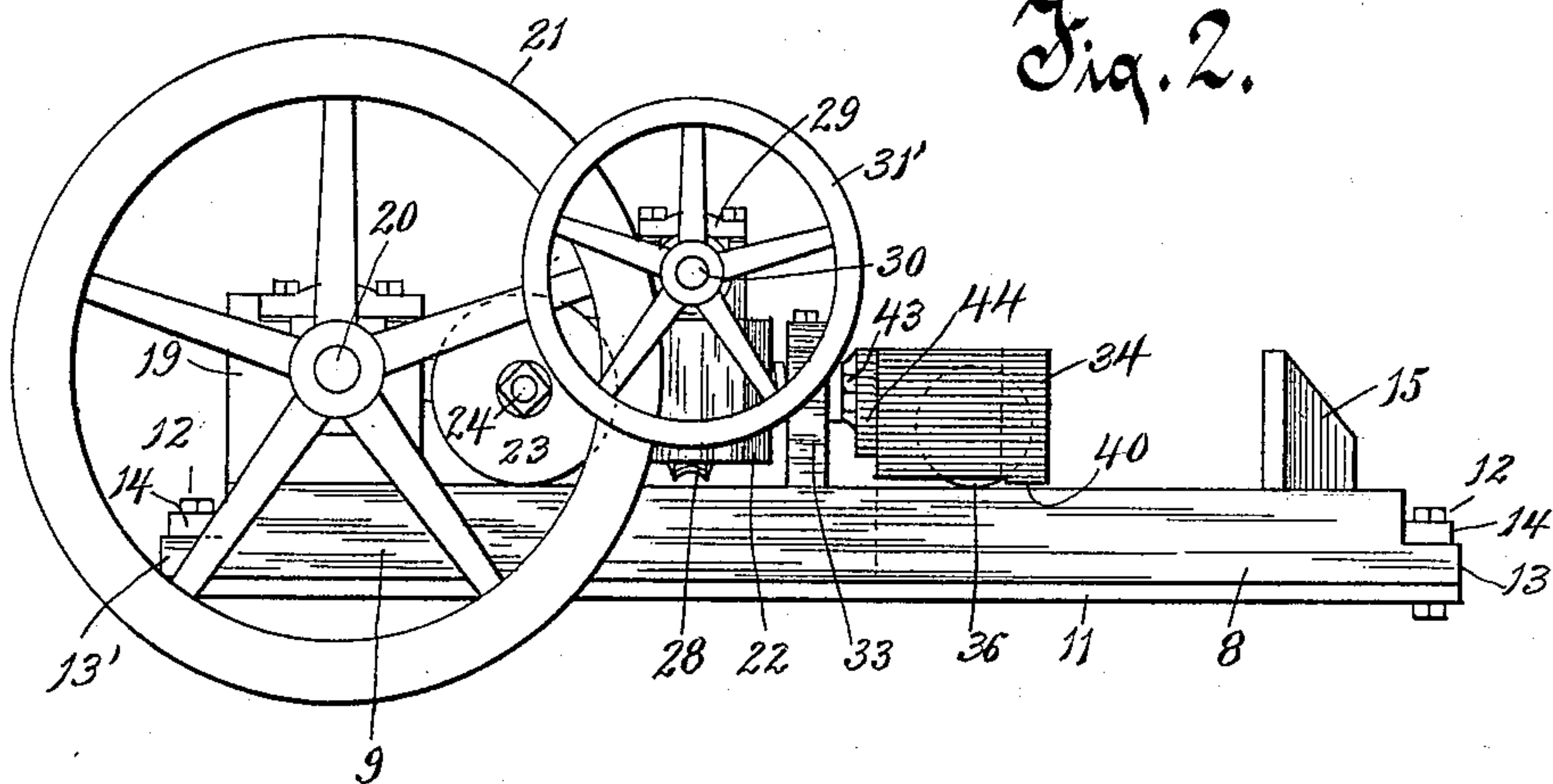
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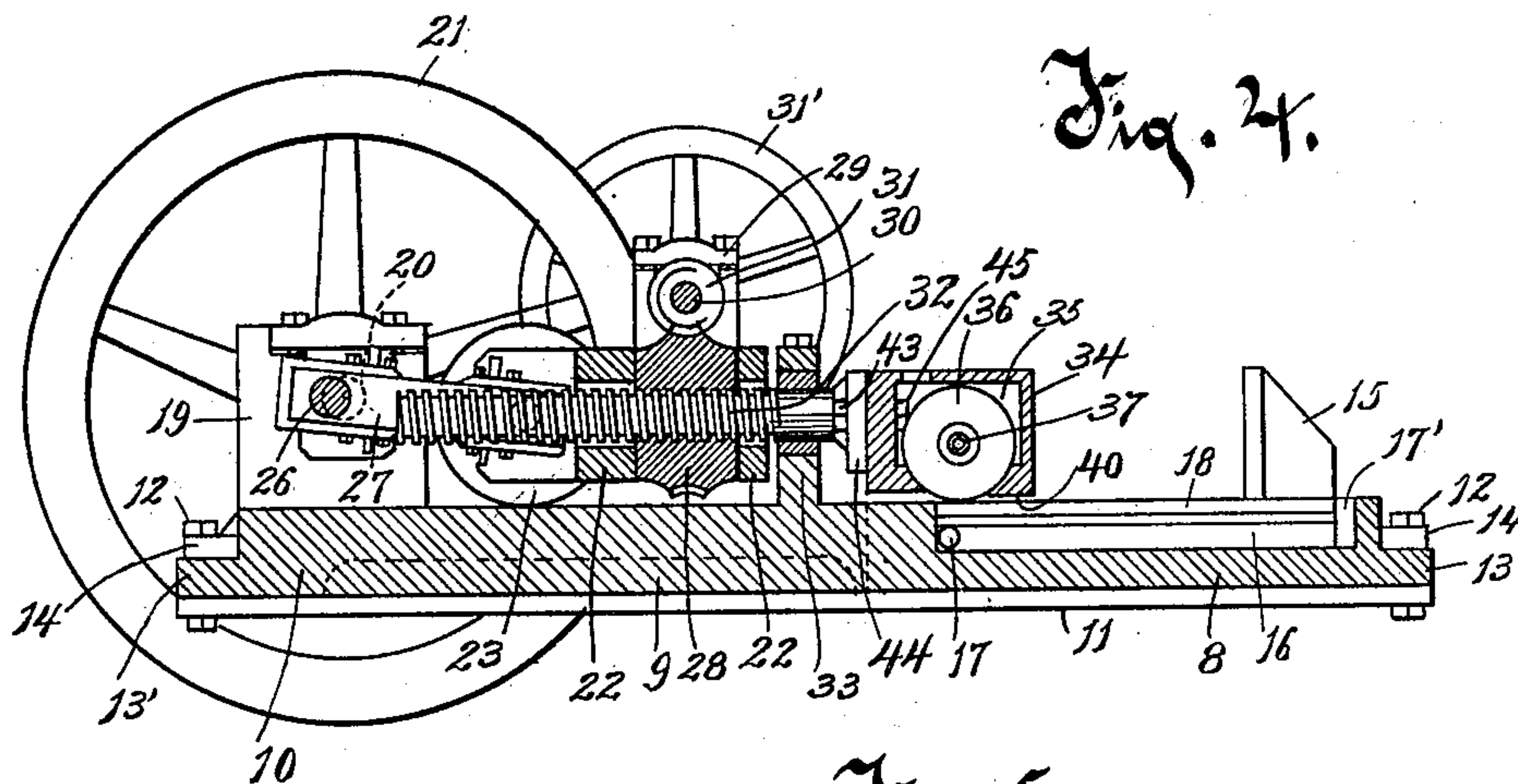


Fig. 4.

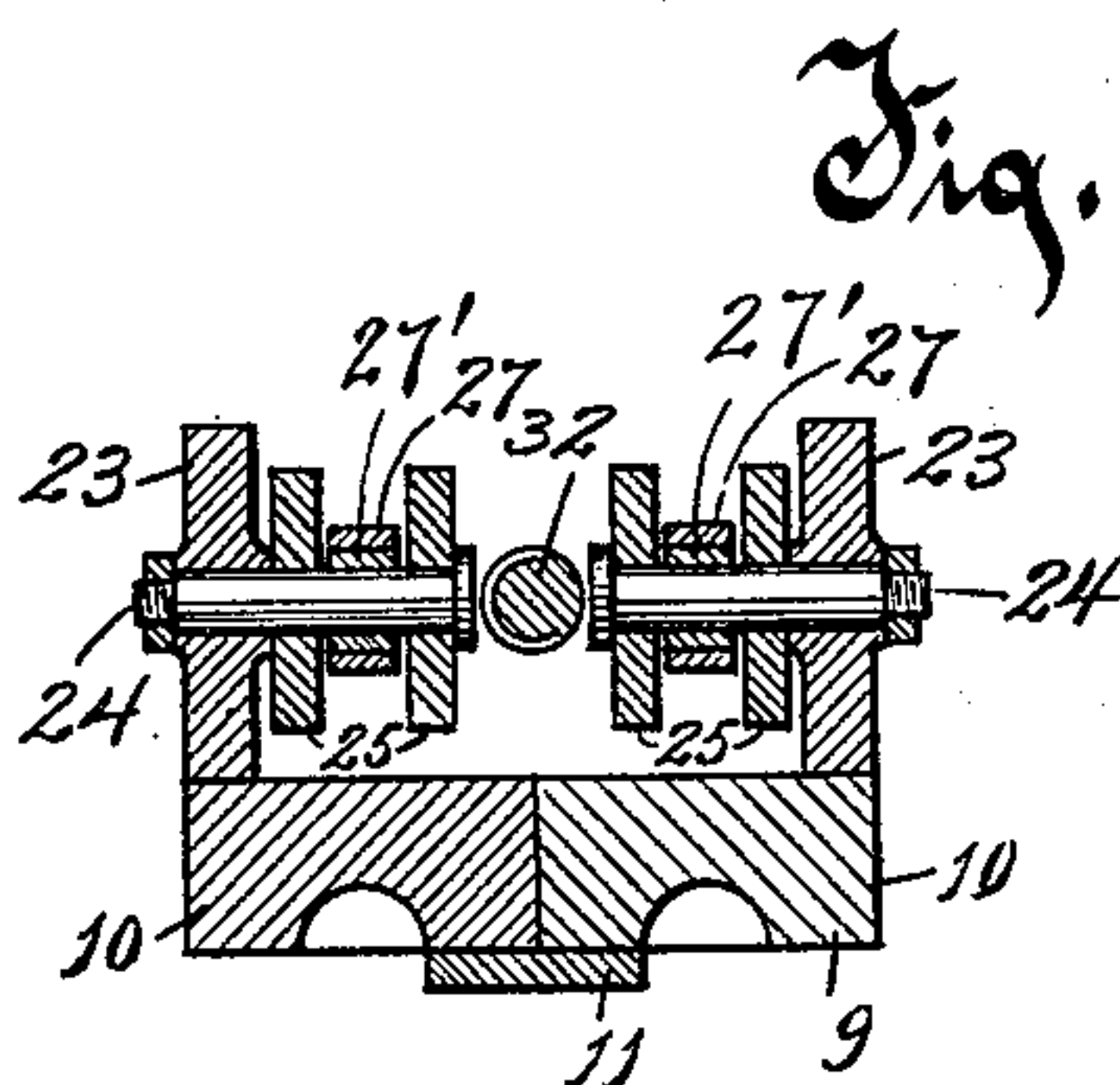


Fig. 5.

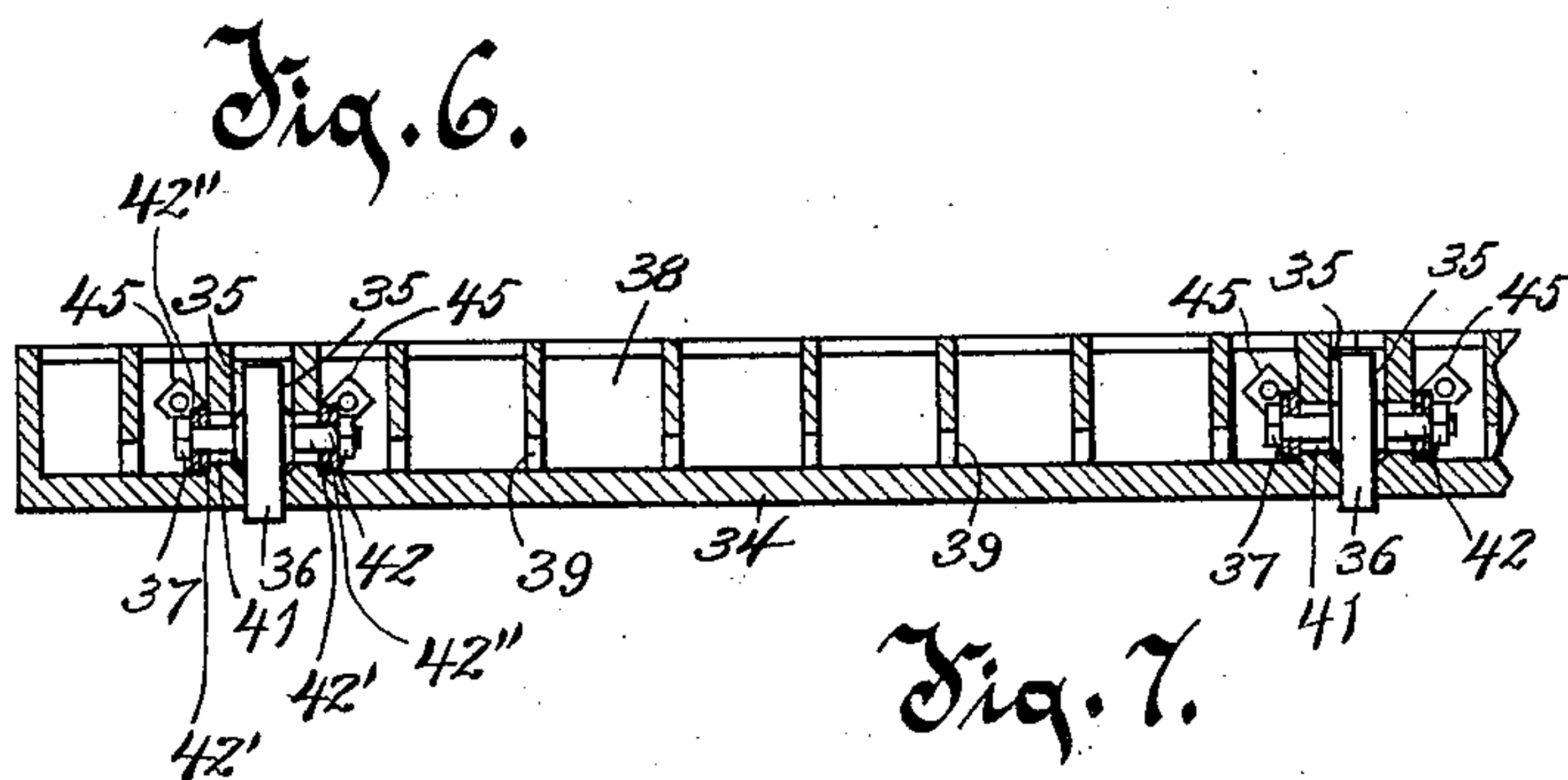


Fig. 6.

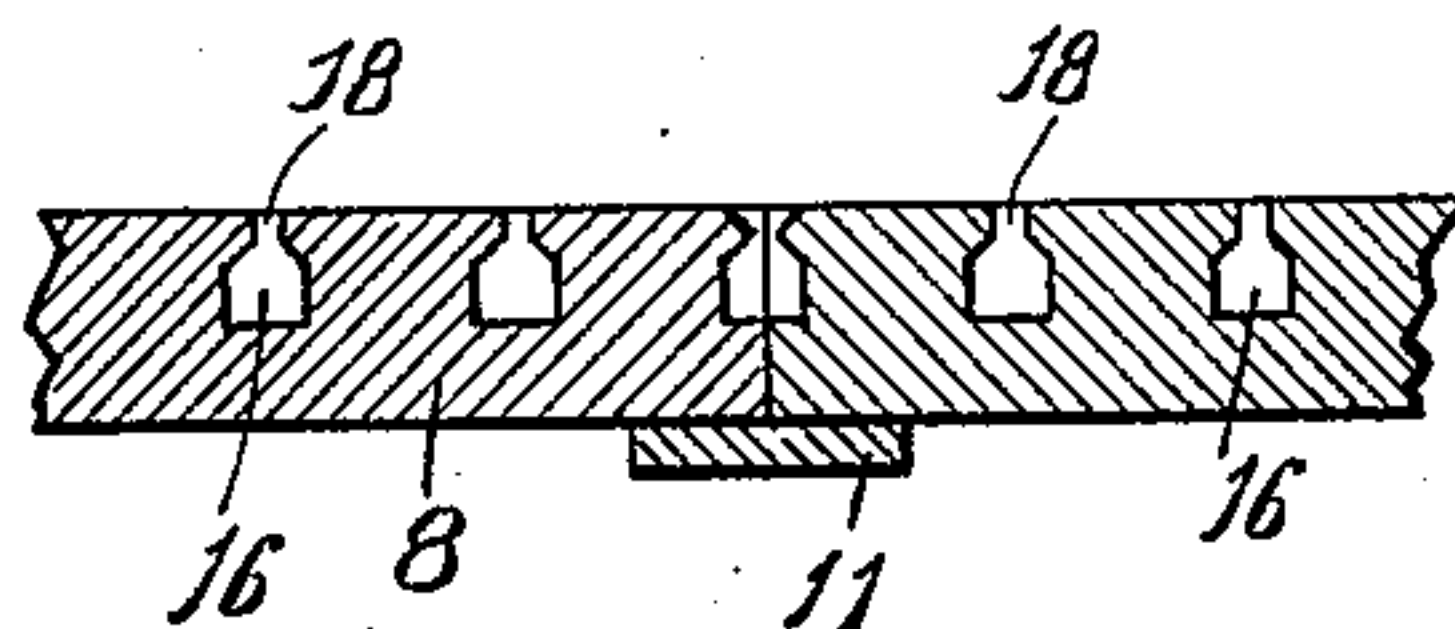


Fig. 7.

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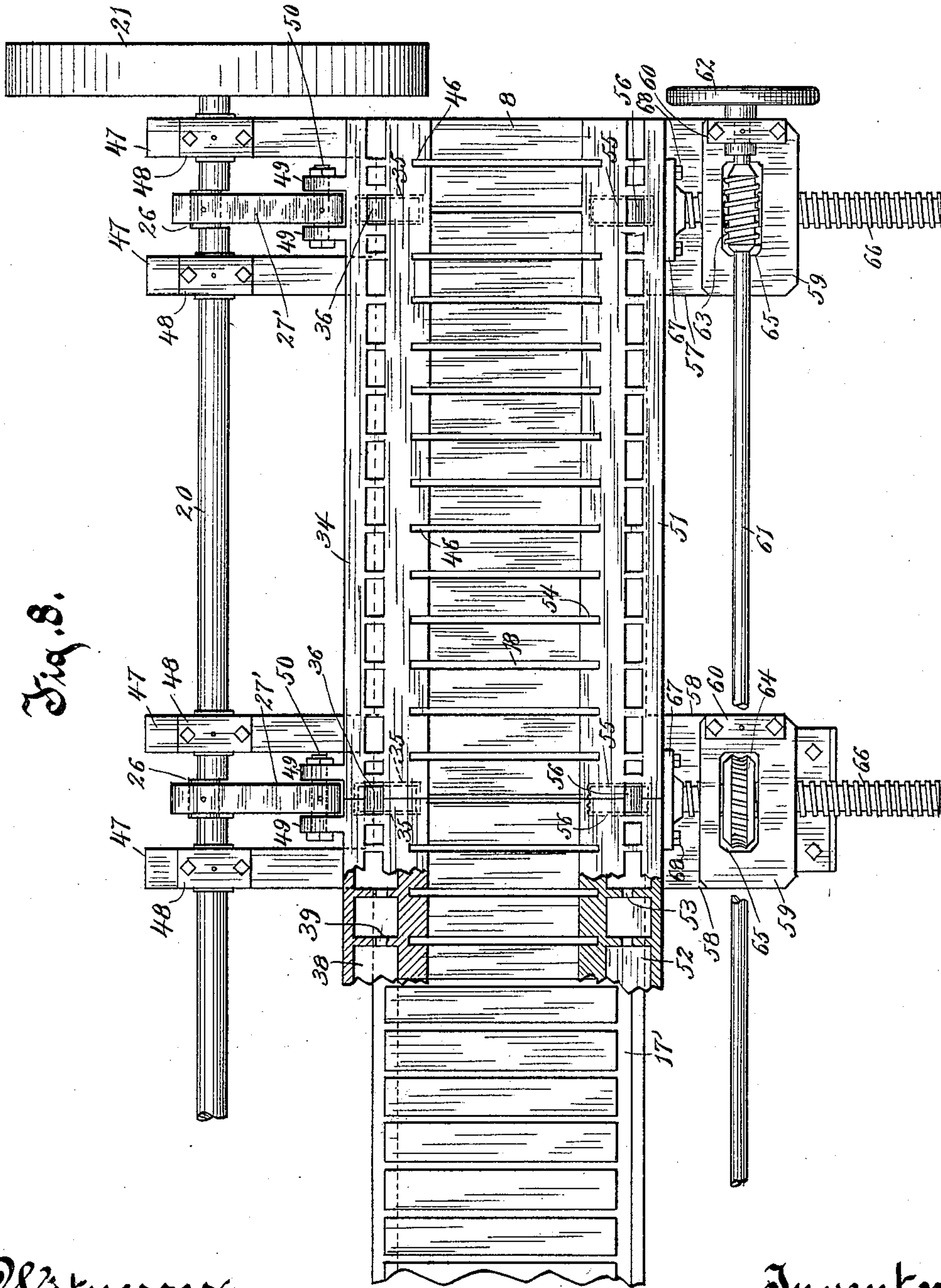
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

RICHARD W. LUNDY, OF SOUTH BEND, INDIANA.

## STRAIGHTENING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 611,695, dated October 4, 1898.

Application filed October 13, 1897. Serial No. 655,074. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD W. LUNDY, of South Bend, in the county of St. Joseph and State of Indiana, have invented a new and useful Improvement in Straightening-Machines, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in straightening - machines adapted for straightening the heaviest products of bar iron or steel mills, structural iron or steel mills, rail-mills, &c.

It is important that bars for shafting, rails for railroad and street-car tracks, and heavy bars for many other purposes should be straight. It is the common practice of manufacturers of heavy bars in iron and steel to place the bars on straightening-beds made of heavy plates and to then use heavy mauls or sledges to straighten the bars. This method and others in common vogue are crude, laborious, and expensive, and, besides, in such methods the accuracy of the work depends altogether upon the care and the accuracy of the eyes of the men who perform this labor.

The primary object of my invention is to provide a machine for straightening the heaviest bars of any length rolled immediately after being finished by the mill and while yet sufficiently hot to be straightened by pressure, the machine being capable of being operated at small expense for power and labor.

With the above primary object and other incidental objects in view the invention consists of the devices and parts or their equivalents, as hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a plan view of the complete machine, showing parts broken away and parts in section. Fig. 2 is a view of the left-hand end of Fig. 1. Fig. 3 is a cross-section on the line 3 3 of Fig. 1. Fig. 4 is a cross-section on the line 4 4 of Fig. 1. Fig. 5 is a section on the line 5 5 of Fig. 1. Fig. 6 is a sectional view of the straightening-jaw. Fig. 7 is a fragmentary sectional view of the straightening-bed, and Fig. 8 is a fragmentary plan view showing a modification in which the jaw of the bed is adjustable.

Referring to the drawings, the numeral 8 indicates a straightener-bed which is prefer-

ably made in sections of from six to ten feet in length and thirty-three inches in width. Each end section of the bed is provided at the end of its rear edge with an extension 9 of desirable length and width, preferably twenty-six inches in width. Each section is also formed with rearwardly-projecting extensions 10 10, located at the rear edges and at the several intermediate joints of the contiguous ends of the section, and when thus joined form an extension similar to extension 9. The several sections are held together at their joints by means of plates 11, placed beneath the bottom of the bed and coextensive in length with the joint, and these plates are secured by means of bolts 12, which extend through opposite ends of said plates and also through flanges 13 13', projecting, respectively, from the front edges of the sections of the bed 8 and the rear edges of the extensions 10. Other plates 14 14 are superimposed upon the flanges 13 13', and the bolts 12 also pass through these latter plates. The several joints are advisably closed and made water-tight by means of lead fillings. (Not shown.) Each section of the bed 8 is formed or provided near its front edge with an upwardly-extending jaw 15. The surfaces of the sections of the bed 8 and the inner faces of the jaws 15 are planed perfectly straight and level and at exact right angles, so that when the sections are put together the faces of said sections will be flush and the jaws will also be flush, so as to render the whole perfectly level and in a straight line, forming practically a continuous bed and a continuous jaw.

The bed 8 is provided with a series of longitudinal waterways 16, which are connected at one end with each other by means of openings or passages 17, extending from one waterway to the other, (see Figs. 3 and 4,) and at the opposite ends said waterways are open, as indicated at 17', to provide a free passage also for the water from one waterway to the other at said opposite ends. Water is supplied at one end of the bed and discharged at the other. By the provision of these waterways and the connecting passages water is conveyed to all parts of the bed which come in contact with the hot bars placed upon the bed. It is not intended, however, that the water should



rise to the surface and come in contact with the bar. The bed is also provided with narrow slits or spaces 18, which extend from the top surface downwardly to the waterways 16.

5 These spaces permit expansion and at the same time prevent the warping which occurs when one side of a solid plate is constantly kept at a higher degree of heat than the other.

The extensions 9 and 10 of the bed-plate  
10 are formed with upwardly-extending pillow-blocks 19, which form bearings for a shaft 20. Mounted upon opposite ends of the shaft 20 are two heavy balance-wheels 21 21, which are also adapted to serve as belt-pulleys for driving the machine. Above the bed-plate extensions 9 and 10 are mounted traveling carriages or trucks 22. These carriages travel on wheels 23 23, which are mounted on short axles 24 24, said axles having their bearings in projections  
20 25, extending rearwardly from the carriages. Between each set of pillow-blocks 19 19 the shaft 20 is formed with eccentrics 26 26. These eccentrics are connected to the axles 24 by means of pitmen 27 27, packings 27' being  
25 preferably interposed between the pitmen and the axles. Babbitt-lined or brass boxes (not shown) are also advisably interposed between the eccentrics 26 and the pitmen 27. It is obvious that as the shaft 20 is rotated a  
30 limited reciprocating movement is imparted to the several carriages. Mounted in each carriage in such manner as to prevent endwise movement therein is a worm-nut 28. Near the forward ends of the carriages are provided upwardly-extending journal-boxes 29. These boxes form bearings for a shaft 30. This shaft is formed or provided immediately above each worm-nut with worms 31, which mesh with said worm-nuts. Upon opposite  
40 ends of this shaft are mounted hand-wheels 31' 31'. Screws 32, arranged at right angles to the shaft 30, extend through bearings 33, projecting upwardly from the extensions 9 and 10, and also extend through the worm-nuts.  
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The numeral 34 indicates a straightener-beam which is coextensive in length with the bed 8 and is also preferably made in sections of from six to ten feet in length. This  
50 beam is advisably twelve inches wide and nine inches deep. At the contiguous or meeting ends of the several sections are formed recesses 35 35, which form a recess for a wheel 36, said wheel being journaled on a short  
55 axle 37, the ends of said axle being fast in openings in the opposed side walls of the recess. These axles also serve as bolts for bolting the sections of the straightener-beam together. The straightener-beam is also formed  
60 throughout its length with a series of water-spaces 38, which are in communication with each other by means of openings or passages 39 (see Fig. 6) through the walls separating the waterways. The water is introduced at  
65 one end of the straightener-beam and flows from one waterway or recess to the other through these openings 39, and is discharged

at the opposite end of said beam. At the points in the straightener-beam where the walls forming the bearings for the axle 37  
70 are located the free flow of the water is not interfered with, inasmuch as the axles 37 are made tubular, so as to permit the water to flow therethrough. These axles are preferably made adjustable, so as to be capable of  
75 being raised or lowered in order to permit the raising of the straightener-beam 34 in case wear on the axle and in the hub of the wheel 36 should cause the beam to settle and the rib 40 on the under side of said beam to come  
80 in contact with the surface of the bed 8. This adaptability is preferably secured by forming the walls of the recesses 35 with elongated slots 41 41, in which each axle 37 is mounted, nuts 42 taking onto opposite thread-  
85 ed ends of the axle and being adapted to be turned up tightly against the walls of the recesses, so as to hold the axle in adjusted position. The water passing through the waterway of the straightener is prevented from  
90 passing through the slots by employing sheet-packings 42', fitting the axles snugly and bearing against and covering the slots. Metal plates 42'' are interposed between the packing 42' and the head of the axle at one end  
95 of said axle and between the packing 42' and the nut 42 at the opposite end of said axle. The face of the straightener-beam and the rib 40 on the under side thereof are planed perfectly straight and true, and the sections  
100 of said straightener-beam are joined together by means of bolts 43, which pass through an enlarged end or head 44, formed at the end of each screw 32, and enter the sections of the straightener-beam, nuts 45 turning on the  
105 inner threaded ends of said bolts. The lug 40 on the straightener-beam is to provide a narrow surface to be planed. Without this lug it would be necessary to plane the entire lower surface. The face of the straight-  
110 ener-beam which comes in contact with the hot bars is also formed with slits or spaces 46, which are in line with the slits 18 of the bed 8 and subserve a similar function to said slits 18 with respect to the straightener-  
115 beam—that is to say, they permit expansion and prevent warping.

In the assembling of the parts of my machine the bed 8 is put together on a foundation prepared for it, the top of which should  
120 be about seven inches (the thickness of the bed) below the floor-level, the surface being made perfectly level and the face of the jaw 15 placed in a perfectly straight line the entire length of the machine. The straightener-  
125 beam 34 is assembled on the bed 8, with its face in contact with the face of the jaw 15, this being done before the nuts on the axle of the several wheels and those on the bolts which connect the screws 32 to the straight-  
130 ener-beam are set.

In operation the bar to be straightened is placed on the bed 8 and the machine started so as to rotate the shaft 20, and consequently



reciprocate the traveling carriages 22. The hand-wheel 31' at one end of the shaft 30 is then turned to the left, causing the worms 31 on said shaft to turn the worm-nuts 28 on the screws 32 and the straightener-beam 34 to be forced against the bar to be straightened. It is of course obvious that the carriages have only a limited movement toward the bar to be straightened, and it is thus necessary that a further movement be imparted to the straightener-beam and that it be adjusted farther forward toward the jaw 15. It is for this reason that the shaft 30 and allied parts are provided, whereby said additional movement and adjustment are imparted, it being understood that the operator continues to turn the wheel on the end of the shaft 30 until the bar being acted upon is made straight, when of course the hand-wheel is immediately reversed and the bar removed from the machine to the cooling-floor. The bearing 33 for each screw 32 is designed to keep the straightener-beam in its position relative to the eccentric-bearings on the shaft 20 and also to prevent the tendency to an upward springing of the screws 32 when the bar undergoing the operation of straightening is very wide and comparatively thin, and the straightener comes in contact with said bar at the greatest distance below the line of the screws 32. The throw of the eccentrics is advisably one inch. The screws 32, together with allied parts, provide for adjusting the straightener toward and from the jaw 15, adapting the machine for straightening bars, I-beams, rails, &c., of any thickness and of any width up to fourteen inches, the machine in each case being made the required length to straighten the longest bars or beams rolled by the mill in connection with which it is to be used.

The machine covered by the present application for patent is designed and is herein shown as adapted for use only as a straightener and not as a cooling-bed also, as is the case with the machine covered by my other application for patent of even date herewith. To a certain extent, however, the machine covered by the present application may be used as a cooling-bed, the same as in the case of the machine covered in my other application for patent referred to—as, for instance, for cooling ordinary bars which are too heavy for the machine covered in said other application for patent. The capacity of the present machine as a cooling-bed can of course be increased by simply increasing the width of the bed 8 and extending the extensions 9 and 10 so as to carry the shafts farther from the jaw 15 and by setting back the bearings 29 and increasing the length of the screws 32.

While I have herein shown the jaw 15 as a part of the bed 8 and as rigid thereto, yet I do not wish to be understood as limiting myself to such an arrangement, inasmuch as, if desired, said jaw 15 may be separate from the bed 8 and made adjustable to the different

widths and thicknesses of the bars instead of the straightener-beam 34 being adjustable. I also do not wish to be understood as limiting my invention to any one specific method or device for adjusting the straightener-beam 34 or the jaw 15, when said jaw is adjustable, to the different widths and thicknesses of the bars. In fact, the adjustable feature of the straightener-beam 34 or of the jaw 15, or both, may be eliminated entirely in the case of machines for straightening the product of mills which make bars of one size only, as in mills making rails for railroad-tracks.

In Fig. 8 of the drawings I have illustrated a modification in which instead of having the straightener-beam adjustable said beam is merely reciprocative and the jaw of the straightener-bed adjustable. In this modification the shaft 30, with its worms and the worm-nuts 28 and screw-shafts 32 for adjusting the straightener-beam, are omitted altogether. The extensions 9 and 10 at the rear edge of the bed 8 are also omitted and the bed provided at said rear edge merely with projecting arms 47, to which are secured bearings 48 for the shaft 20. This shaft, as in the other construction, is formed or provided with eccentrics 26, to which are connected the outer ends of pitmen 27'. The inner ends of said pitmen, however, instead of connecting to a reciprocating carriage are connected directly to the straightener-beam, said straightener-beam being provided with rearwardly-projecting arms 49 49, in which are mounted bolts 50, said bolts forming pivots for the inner ends of the eccentrics. The jaw of the bed in this form of construction is designated by the numeral 51. Where the jaw is adjustable, as illustrated in Fig. 8, it may, although not necessarily, be constructed exactly similar to the straightener-beam—that is to say, it may be composed of sections and may be provided with waterways 52 in communication with each other by means of openings 53 in the dividing-walls of the waterways. It may also be provided with slits or passages 54 and with recesses 55 for the traveling wheels 56. The bed 8 is provided at its front edge with extensions 57 and 58. Boxes 59 are cast on these extensions, and upon these boxes are provided bearings 60 for a shaft 61, said shaft having a wheel 62 at one end and, if desired, a balance-wheel (not shown) at its opposite end. The shaft 61 is also formed with worms 63, which mesh with worm-nuts 64, which worm-nuts are fitted in recesses 65 65 therefor in the boxes 59 and in which recesses they are held against endwise movement. Screw-shafts 66 66 pass through the worm-nuts, and said shafts are formed or provided at their inner ends with heads 67 67, which are bolted to the sections of the jaw by means of bolts 68, said heads and the bolts thereby serving to hold the sections of the jaw together. The operation of this form of construction is as follows: The shaft 20 on being turned will, of course, through the pit-



men 27', cause a reciprocation of the straightener-beam toward and from the jaw 51. The hand-wheel 62 at the end of the shaft 61 is now turned, causing the worm 63 thereon to

5 turn the worm-nuts 64 on the screws 66 and said screws being thereby turned and forcing the jaw against the bar to be straightened, whereby said jaw is made adjustable to different widths and thicknesses of the bars.

10 What I claim as my invention is—

1. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby, and having its length parallel with the length of the bed, and coextensive in length, or substantially coextensive in length, with the bed, a continuous reciprocative straightener-beam opposed to the jaw, and having its length parallel with the length of the bed, and coextensive, or substantially coextensive, with the length of said bed, and means for adjusting one of the latter parts to the different widths or thicknesses of the bars to be straightened, said means acting in a direction at right angles to the length

25 of the bed.

2. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby and having its length parallel with the length of the bed, and coextensive, or substantially coextensive, with the length of said bed, a continuous reciprocative straightener-beam opposed to the jaw, and also having its length parallel with the length of the bed, and coextensive, or substantially coextensive, with the length of said bed, and means for imparting an independent movement to the straightener-beam, so as to adjust said beam to the different widths or thicknesses of the bars to be straightened, said means acting in a direction at right angles to the length of the bed.

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3. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby, and having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of said bed, a continuous straightener-beam opposed to the jaw and also having its length parallel with the length of the bed, and coextensive, or substantially coextensive, with the length of said bed, means for reciprocating the beam, said means acting in a direction at right angles to the length of the bed, and said means extending to the end of the machine for operation at that point, and an adjusting mechanism engaging one of the parts, and acting in a direction at right angles to the length of the bed, and also extending to the end of the machine for operation by the operator at that point, whereby the reciprocating and adjusting mechanisms may be operated at the same end of the machine.

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4. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby, and having its length parallel with the length of the bed, and coex-

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tensive or substantially coextensive in length with the length of said bed, an eccentric-shaft parallel with the length of the bed, a continuous straightener-beam opposed to the jaw, said beam having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of said bed, one or more traveling carriages or trucks connected to the straightener-beam, and a connection or connections between the eccentric-shaft and the carriage or carriages.

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5. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby, and having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of said bed, an eccentric-shaft parallel with the length of the bed, a continuous straightener-beam opposed to the jaw, said beam having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of said bed, one or more traveling carriages or trucks, a connection or connections between the eccentric-shaft and the carriage or carriages, a worm-nut mounted in each carriage against endwise movement therein, a shaft having a worm therein meshing with each worm-nut, means for turning said shaft, and a screw passing through each worm-nut and connected at one end to the straightener-beam.

80 85 90 95 100

6. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby and having its length parallel with the length of the bed and coextensive, or substantially coextensive, in length with the length of said bed, an eccentric-shaft parallel with the length of the bed, a continuous straightener-beam opposed to the jaw, said beam having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of said bed, one or more traveling carriages or trucks, a connection or connections between the eccentric-shaft and the carriage or carriages, a worm-nut mounted in each carriage against endwise movement therein, a shaft having a worm therein meshing with the worm-nut, means for turning said shaft, a screw passing through each worm-nut and connected at one end to the straightener-beam, and a bearing extending from a fixed part, and through which bearing said screw extends.

105 110 115 120

7. In a straightening-machine, the combination, of a straightening-bed, a continuous jaw carried thereby and having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of said bed, a continuous straightener-beam opposed to the jaw, said beam having its length parallel with the length of the bed, and coextensive, or substantially coextensive, in length with the length of the bed, an eccentric-shaft parallel with the length of

125 130



the bed, said shaft having a balance-wheel at one or both ends thereof, one or more traveling carriages or trucks, a worm-nut mounted in each carriage against endwise movement  
5 therein, a shaft having a worm-wheel thereon meshing with each worm-nut, said shaft having a hand-wheel at one or both ends thereof, and a screw passing through each worm-nut

and connected at one end to the straightener-beam.

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

RICHARD W. LUNDY.

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