

No. 742,199.

PATENTED OCT. 27, 1903.

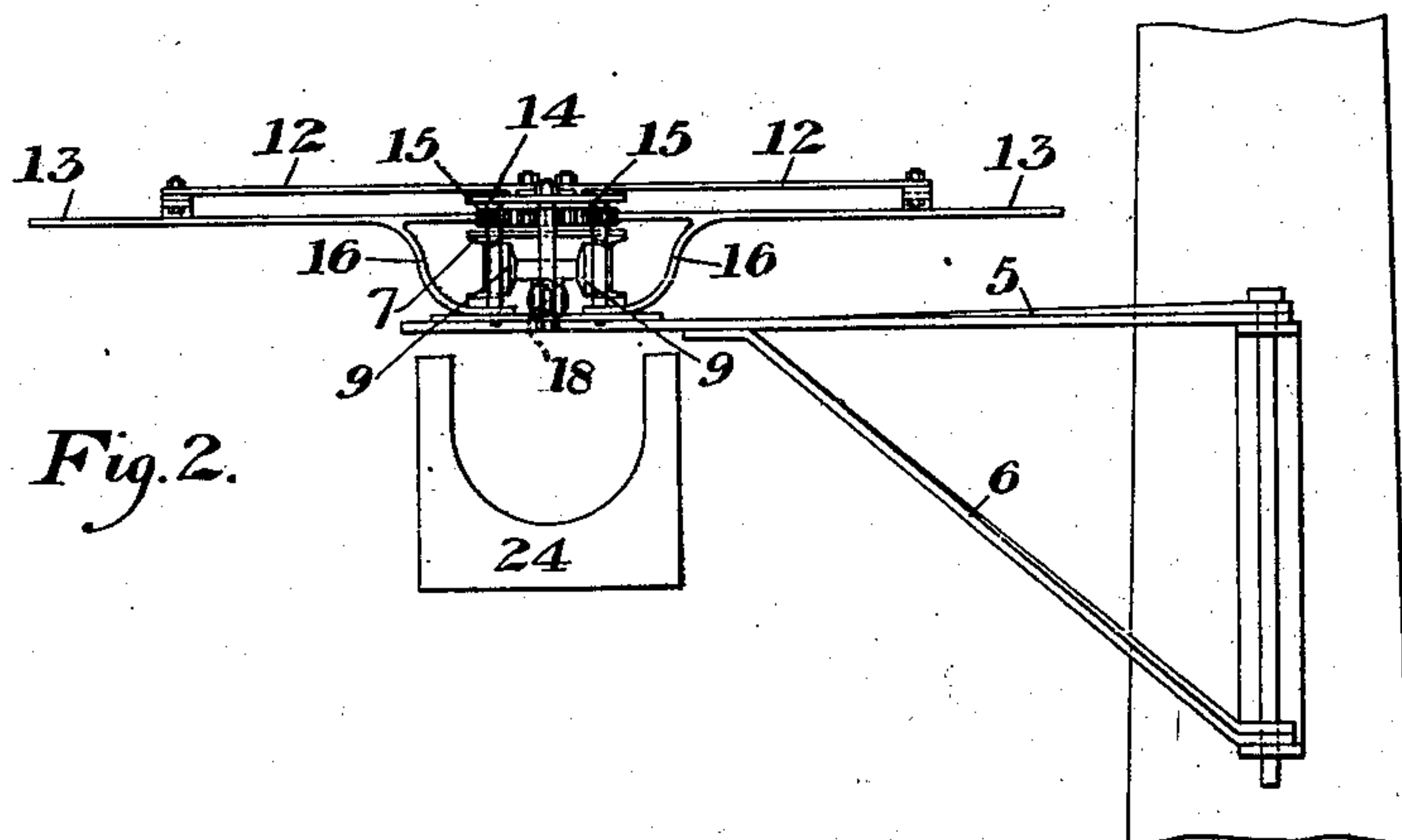
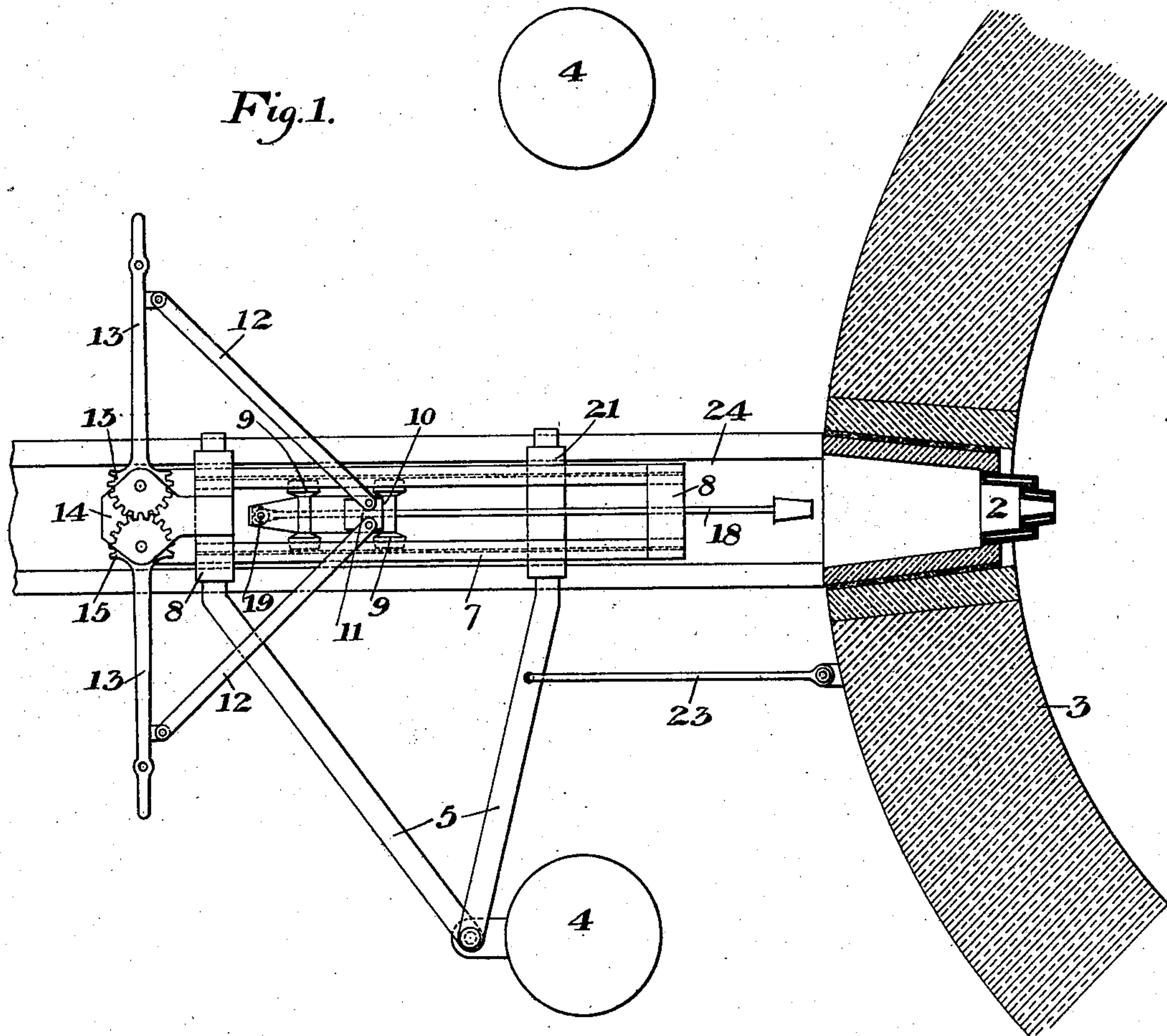
M. KILLEEN, J. F. LEWIS & A. P. AIKEN.

FURNACE BOTTING APPARATUS.

APPLICATION FILED JAN. 31, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES

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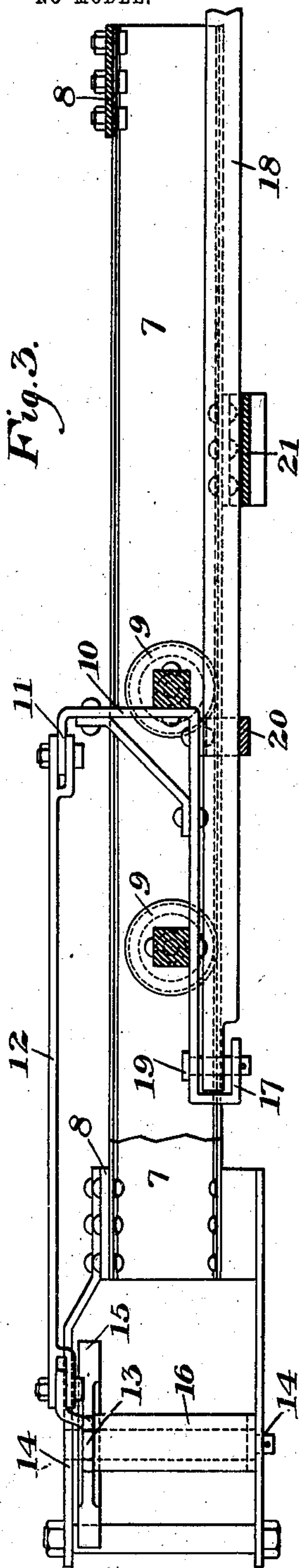


Fig. 3.

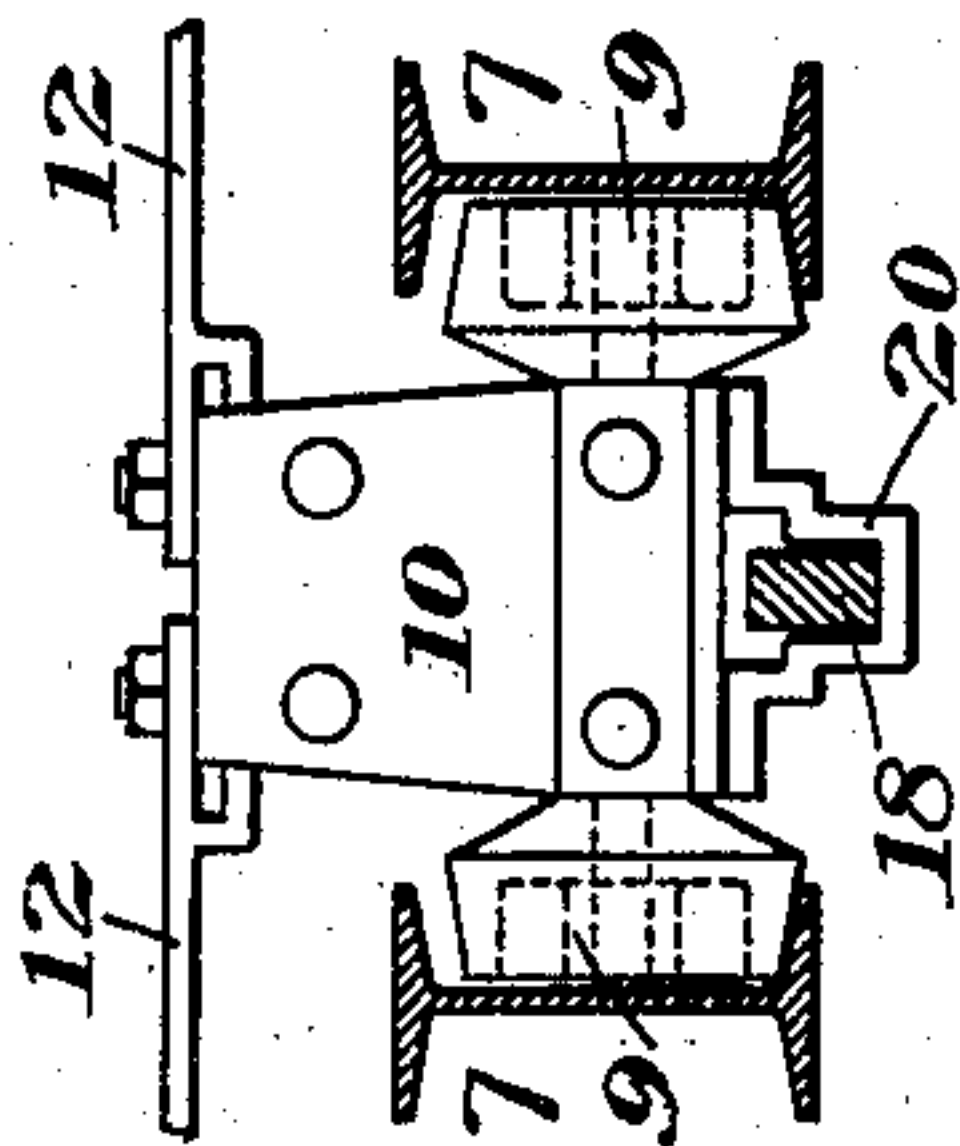


Fig. 4.

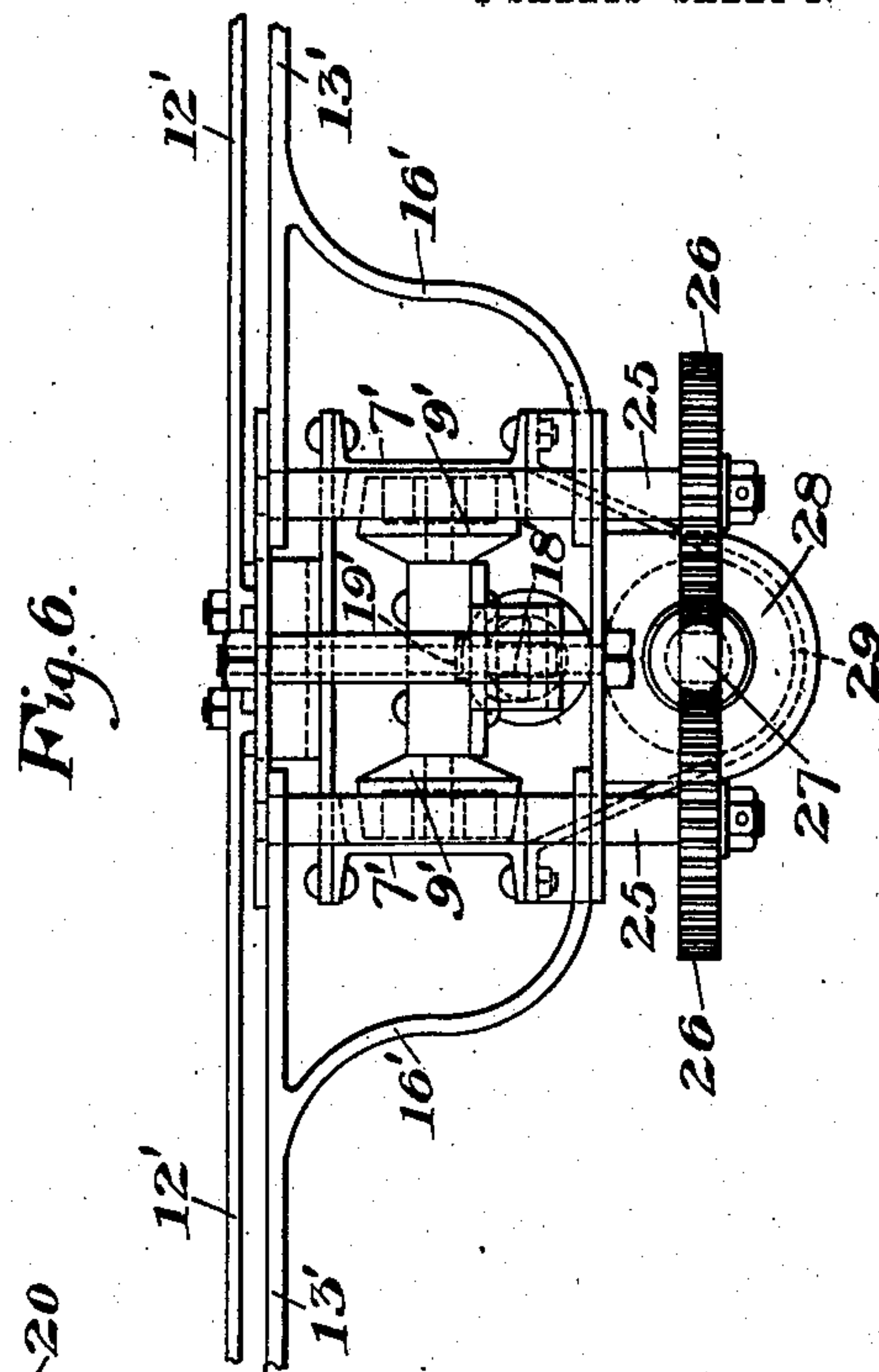


Fig. 6.

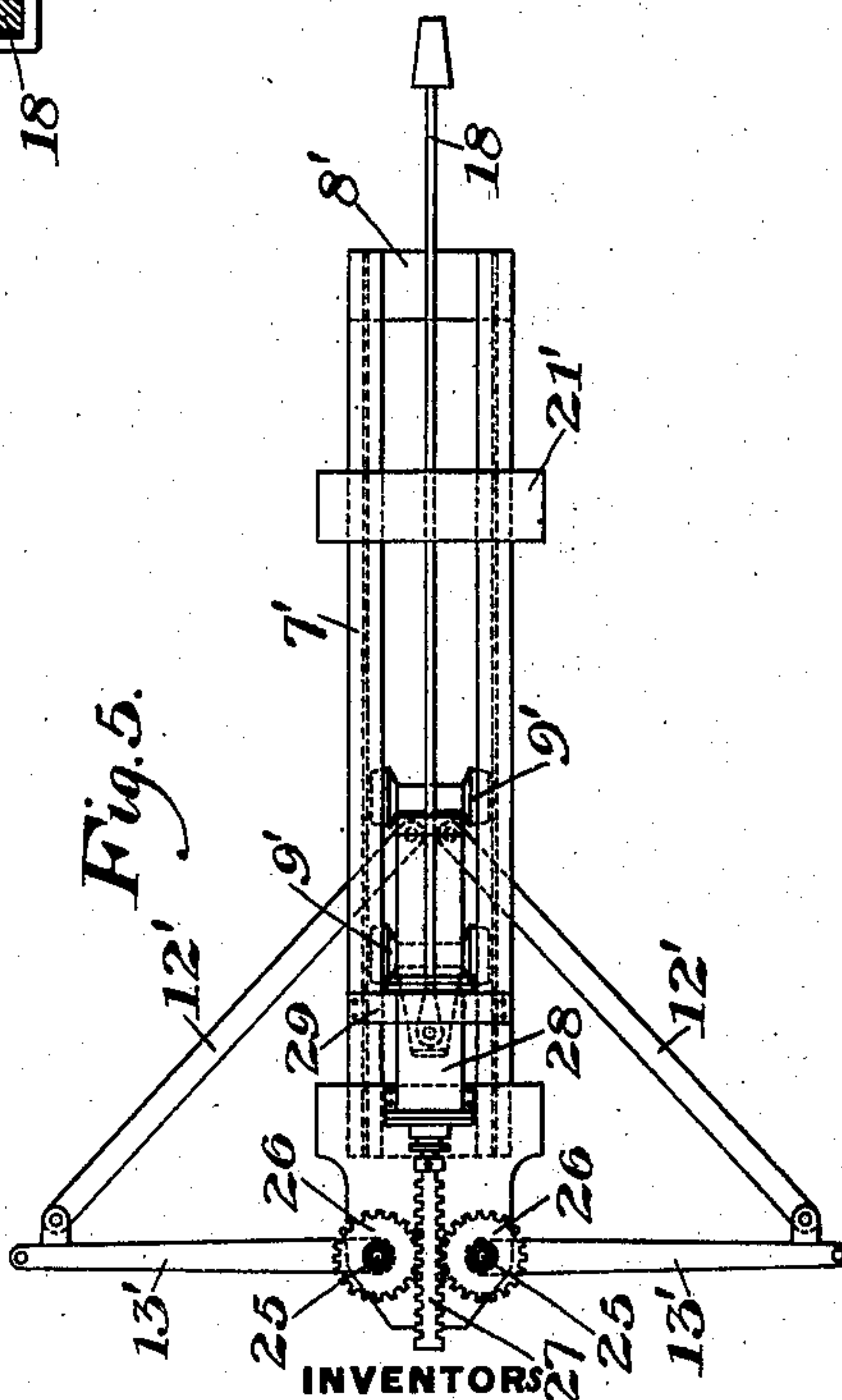


Fig. 5.

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UNITED STATES PATENT OFFICE.

MICHAEL KILLEEN AND JOHN F. LEWIS, OF BRADDOCK, AND ALBION P. AIKEN, OF PORT PERRY, PENNSYLVANIA.

FURNACE-BOTTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 742,199, dated October 27, 1903.

Application filed January 31, 1903. Serial No. 141,315. (No model.)

To all whom it may concern:

Be it known that we, MICHAEL KILLEEN and JOHN F. LEWIS, of Braddock, and ALBION P. AIKEN, of Port Perry, Allegheny county, Pennsylvania, have invented a new and useful Furnace-Botting Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view showing one form of our apparatus applied to the slag-hole of a blast-furnace. Fig. 2 is an outer end elevation of the same. Fig. 3 is a side elevation on a larger scale. Fig. 4 is a cross-section. Fig. 5 is a bottom plan view showing a modified form, and Fig. 6 is an enlarged end elevation of a modified form.

Our invention relates to the botting of tap-holes of furnaces, more especially plugging of the cinder-notches in blast-furnaces, melting-furnaces, cupolas, &c.; and the object of the invention is to provide a mechanism which may be controlled by an operator at a convenient distance from the cinder-hole and which will bott the tap-hole without danger or inconvenience to the workmen and also obviate the necessity of shutting off the blast while the hole is being plugged.

In the drawings, referring to the form of Figs. 1 to 4, inclusive, 2 represents the cinder-tap of a blast-furnace, 3 the wall of the furnace, and 4 4 the furnace-columns extending up to the mantle. To one of these posts is pivotally mounted a supporting-frame consisting of upper and lower diverging bars 5 and 6, the bars 6 forming braces for the upper bars, which carry the horizontal bridge or track-frame 7, which preferably consists of a pair of I-beams located side by side and beneath which the supporting-bars 5 extend. The I-beams are suitably tied and braced together by cross-plates 8, and upon their inner lower flanges travel the wheels 9 of a trolley or truck having a vertically-extending bracket or brace 10, provided with an upper horizontally-extending plate 11, to which are pivoted the actuating-links 12. These links extend rearwardly and are pivoted to lever-arms 13, mounted in bearings 14 upon the frame or bridge. The inner ends of the le-

vers 13 are provided with segmental toothed gears 15, which intermesh with each other, so that the movements of the links are simultaneous and equal in extent. The levers are preferably provided with downwardly and inwardly extending brace-arms 16, as shown in Fig. 2.

The frame or brace 10 of the trolley is extended rearwardly and bent into hook form, as shown at 17, to receive the rear end of the bott-bar 18, which is secured thereto by pivot-pin 19. The bott-bar is supported upon a front guide 20, which extends between the side members of the trolley, as shown in Fig. 4, and the bar may also be supported upon a transverse tie-plate 21, extending between the lower faces of the I-beam.

The device may be swung out of the way upon the column 4, and when it is desired to bott the cinder-hole it is swung into the position shown and held by a hooked link 23, which is pivoted to the furnace and engages one of the bars 5. The bott or refractory plug is then supplied at the end of the botting-bar, and the operator brings one or both of the handles 13 forwardly and inwardly. The angle relation of the links amplifies the movement of the levers and produces an increased movement of the bott-bar, which carries it forward, forcing the bott into the cinder-notch. The providing of mechanism for amplifying the movement is important, since owing to the heat and flying heated particles near the notch it is uncomfortable and dangerous to approach it closely. By increasing the movement we produce the required movement of the bott with a smaller movement of the lever mechanism. When the bott is introduced, the levers are swung back, the trolley moved back upon the bridge, and the device may then be again swung out of the way. The cinder-trough is illustrated in Figs. 1 and 2 at 24.

Instead of using the hand-operated lever mechanism shown in Figs. 1 and 2 we may provide the valve-controlled motive cylinder for actuating the levers. Thus in Figs. 5 and 6 we show the levers 13' and their braces 16' as keyed or secured to short vertical shafts 25, which are provided at their lower ends with pinions 26, engaging opposite teeth upon

a horizontally-extending rack 27. This rack is secured to the piston-rod of a motive cylinder 28, which is mounted in the frame beneath the trolley, preferably on curved supports 29. The bott-bar, its connections, and the trolley are arranged as before, and through the peculiar lever connections a movement of the piston or movable element of the cylinder will give an amplified movement of the bott-bar sufficient to carry it the required distance.

The advantages of our invention result from the simple and effective means for forcing the bott or refractory plug into place. Owing to the amplified movement and the mechanical connections, the operator is well removed from the cinder-hole or tap-hole, and a relatively short movement gives the required long stroke of the bott-bar. The mechanism may be swung out of the way, may be cheaply made and applied, and overcomes the present difficulties of inserting the bott.

Many variations may be made in the form and arrangement of the apparatus and its supporting means, &c., without departing from our invention.

We claim—

1. A botting-machine comprising a botting-bar, a reciprocating support arranged to actuate the bar, and actuating mechanism for the support arranged to increase or amplify its movement over that of the power applied; substantially as described.

2. A supporting-frame, a slide mounted therein, a botting-bar connected to the slide, and toothed-gear connections arranged to move the support and amplify its range of movement over that of the actuating means; substantially as described.

3. In botting-machines, a horizontally-extending frame, a reciprocating slide mounted therein and held against upward movement and gear mechanism having lever and angular-link connections with the support; substantially as described.

4. A furnace having columns, a botting-machine pivotally mounted to one of said columns and arranged to be swung into position in front of the tap-hole, and a swinging link arranged to connect the machine to the furnace-shell to hold it in botting position; substantially as described.

5. A furnace having a swinging botting-machine pivoted adjacent to the tap-hole, and a link pivoted to the furnace-shell and arranged to engage the machine for retaining it in botting position; substantially as described.

6. In botting-machines, a horizontally-extending or guide frame, a trolley or slide movable therein, toothed gears intermeshing with each other mounted upon the frame and having oppositely-projecting lever-arms, and angular links connecting the lever-arms with the trolley; substantially as described.

7. In botting-machines a furnace-column, a horizontal bridge pivotally mounted upon said column, mechanism for holding the bridge in position in front of the tap-hole, a slide or trolley on the bridge held against upward or downward movements, and mechanism for reciprocating the slide arranged to amplify its movement over that of the power applied; substantially as described.

8. In botting-machines a furnace-column, a horizontally-extending bridge arranged to swing upon said column, mechanism for holding it in position, a slide or trolley upon the bridge having separable connections with the botting-bar, and toothed gear mechanism on the bridge having lever-arms connected to the trolley by opposite angular links; substantially as described.

In testimony whereof we have hereunto set our hands.

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Witnesses:

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J. E. MITCHELL.