

No. 638,089.

Patented Nov. 28, 1899.

J. L. BROWN & J. R. TANNER.

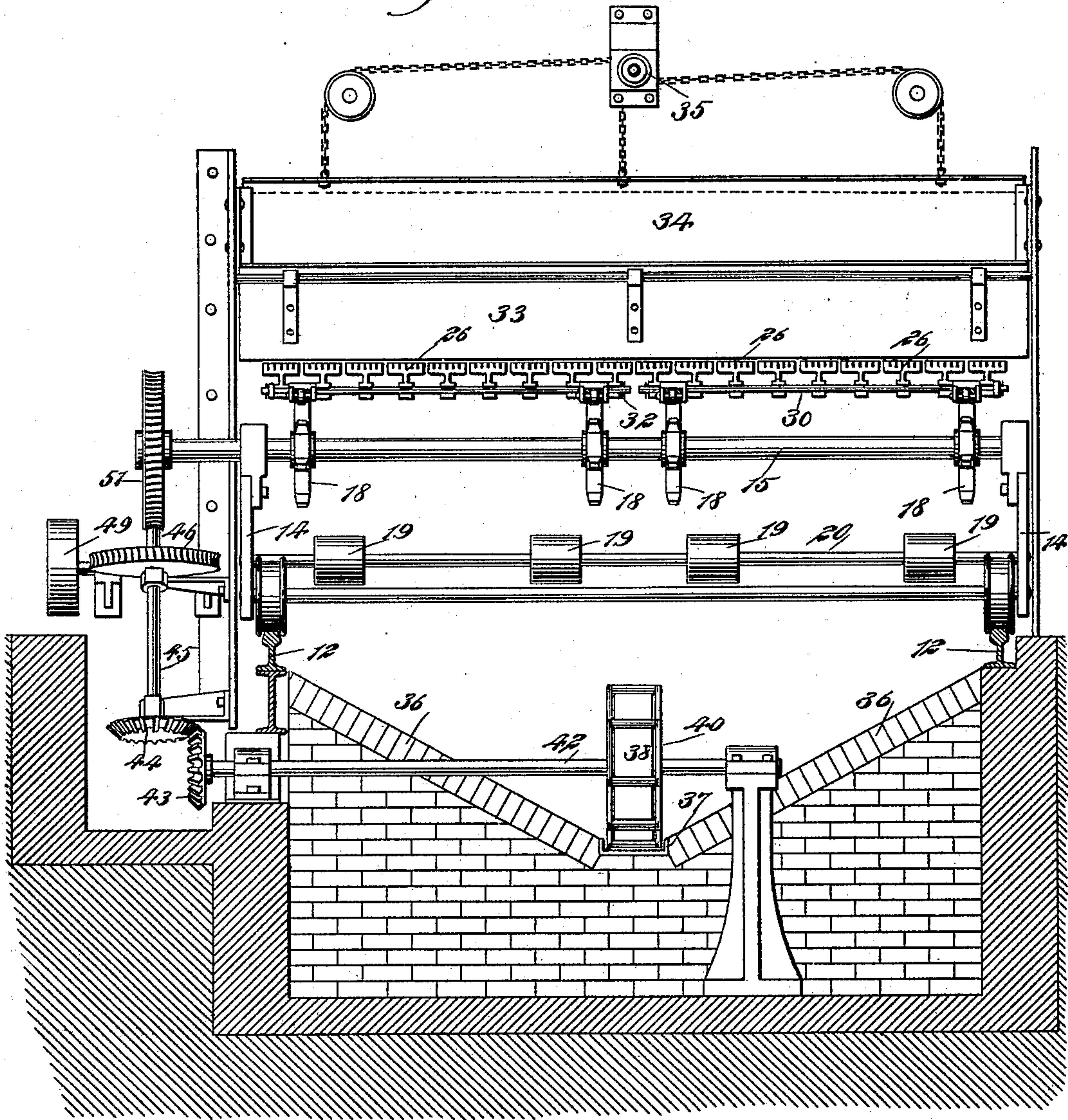
FURNACE.

(Application filed Dec. 27, 1898.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 2.



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3 Sheets—Sheet 3.

Fig. 3.

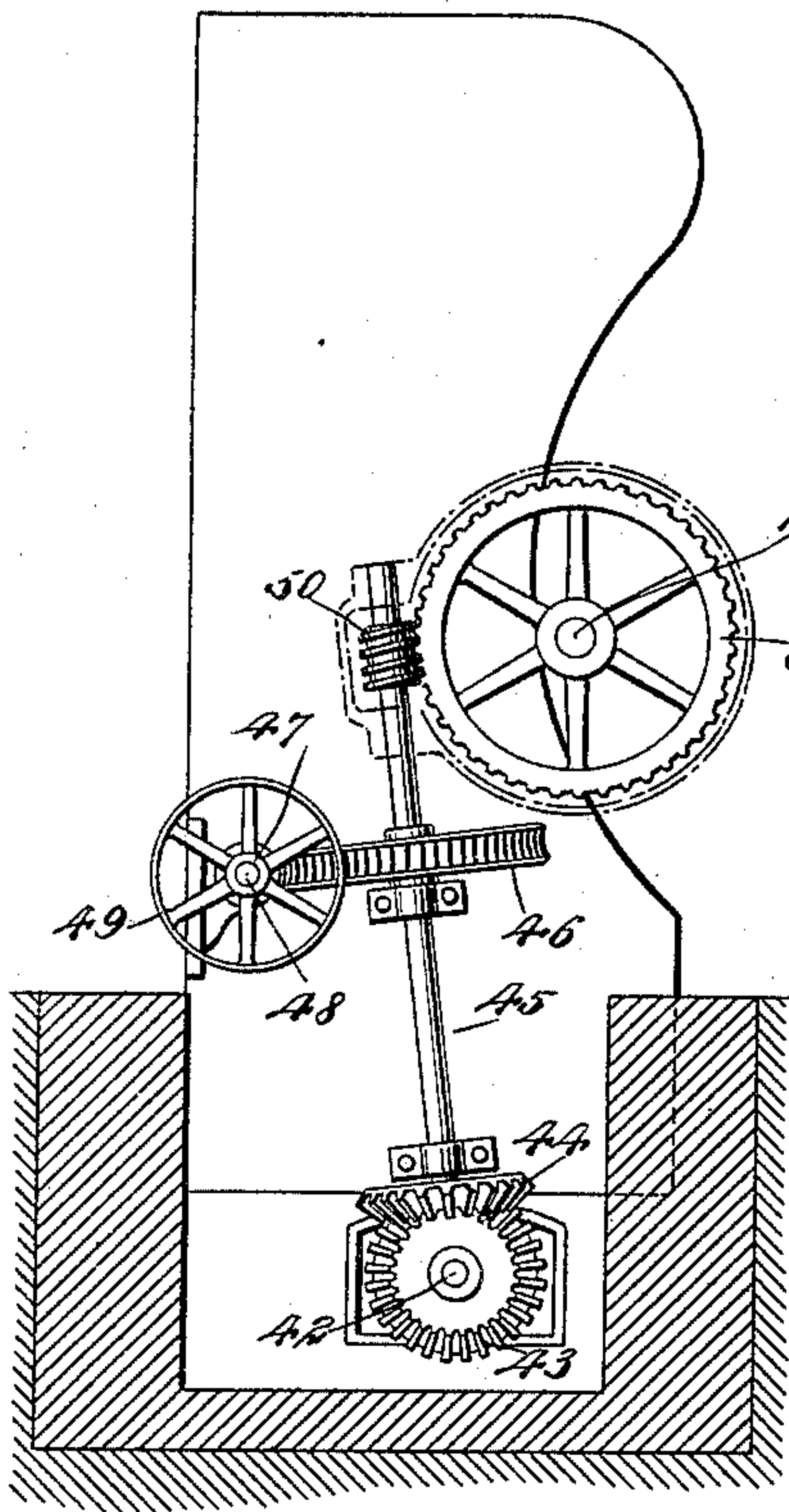


Fig. 4.

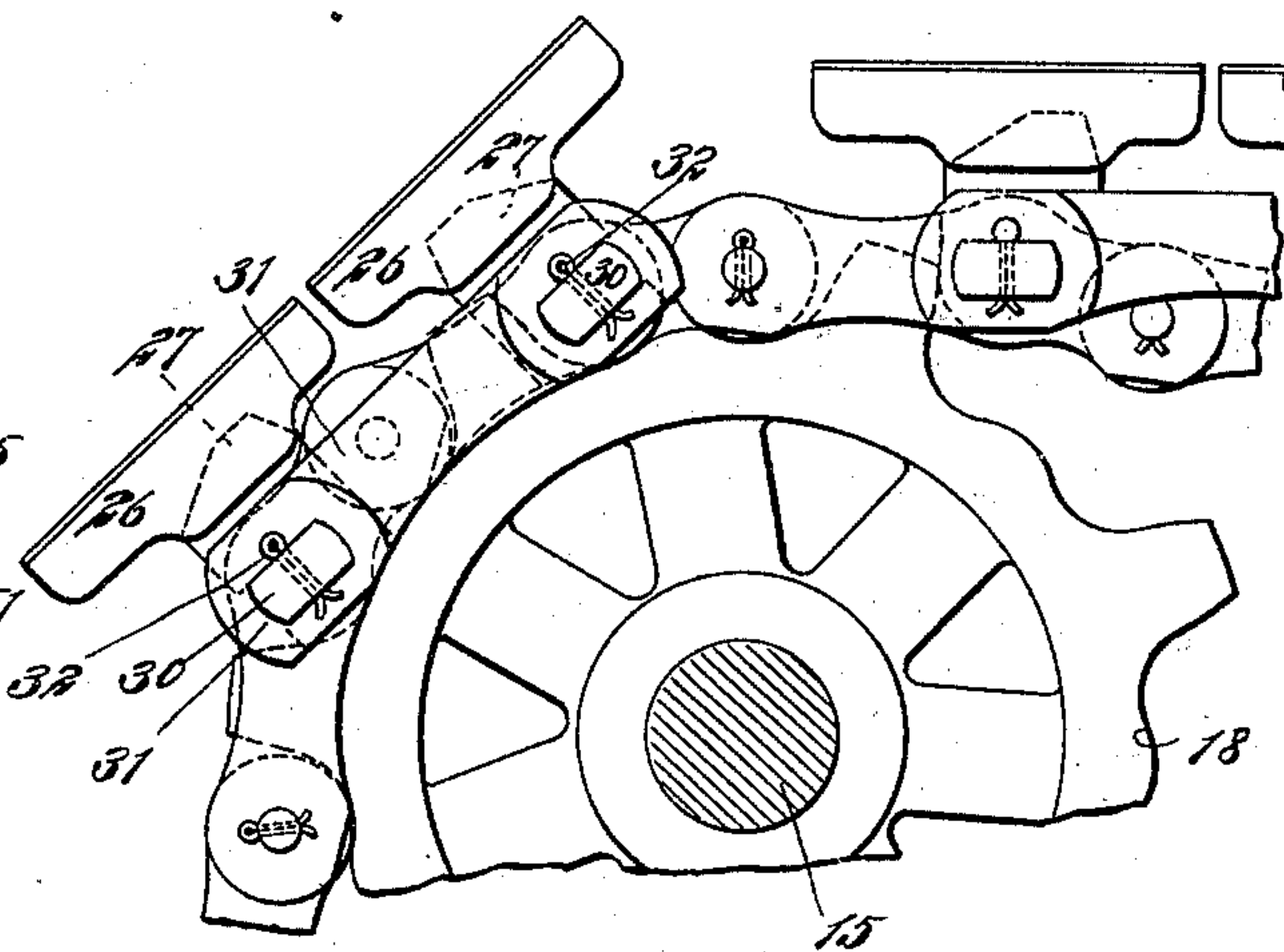


Fig. 5.

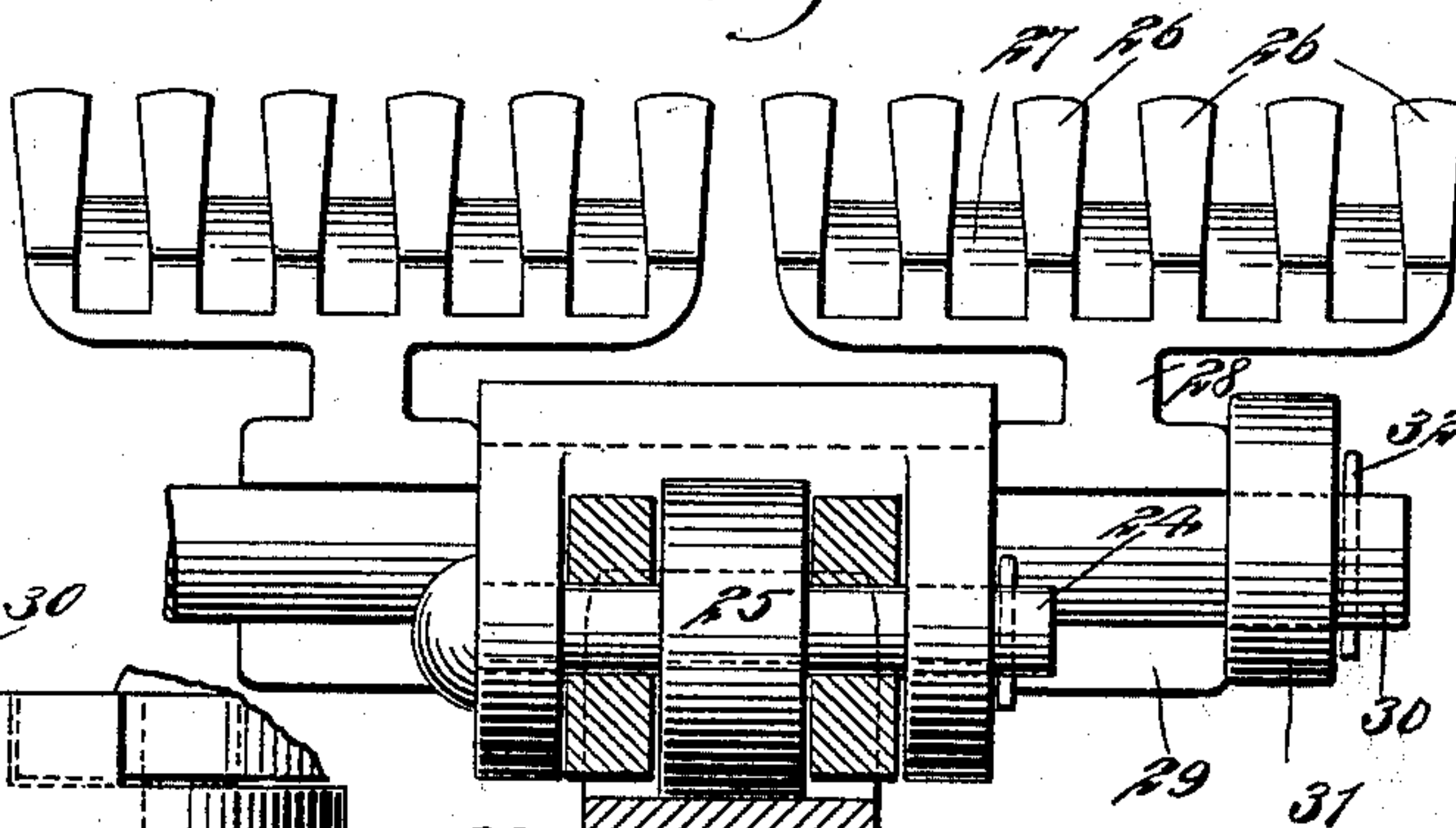


Fig. 6.

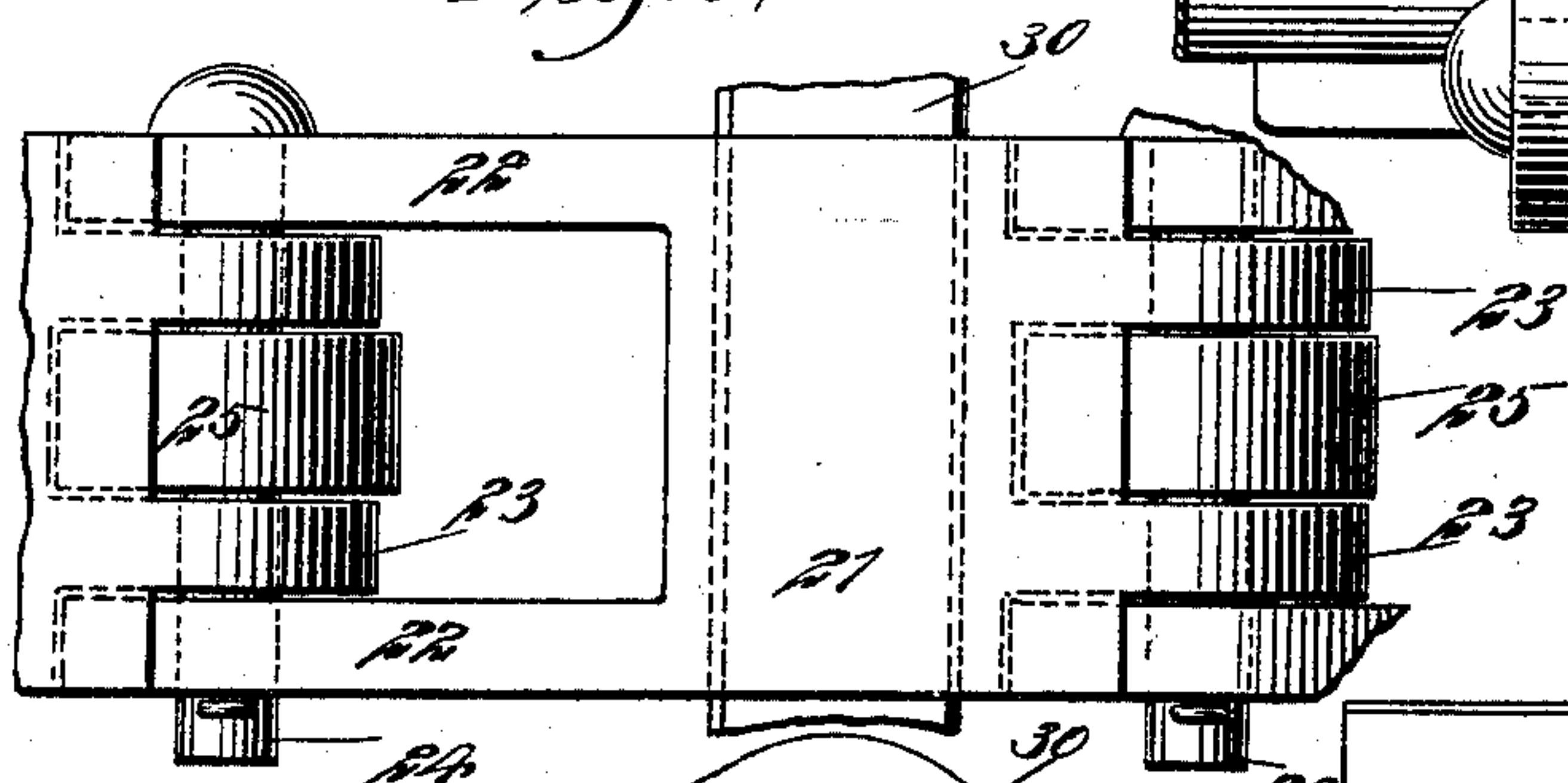
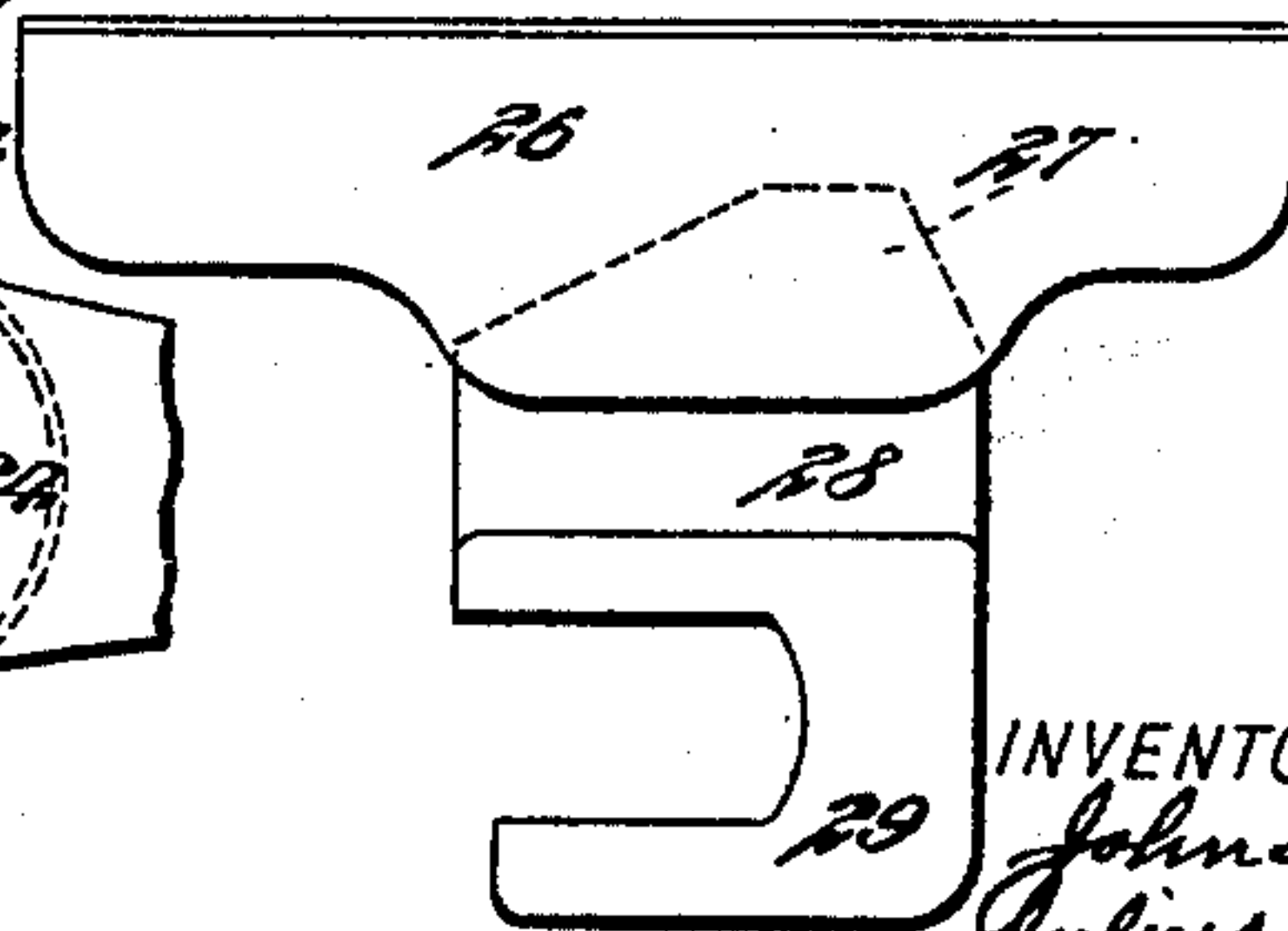


Fig. 8.



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Fig. 7.

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FURNACE.

SPECIFICATION forming part of Letters Patent No. 638,089, dated November 28, 1899.

Application filed December 27, 1898. Serial No. 700,378. (No model.)

To all whom it may concern:

Be it known that we, JOHN L. BROWN and JULIUS R. TANNER, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Furnace, of which the following is a full, clear, and exact description.

This invention relates to an improvement in that class of furnaces wherein the grate is in the form of an endless conveyer mounted to travel in the fire-box of the furnace, so as to carry the fuel uniformly to the point of combustion.

The invention also includes means for clearing the ash-pit.

This specification is the disclosure of one form of the invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a vertical section of the combustion-chamber or fire-box and ash-pit of a furnace having our invention applied thereto. Fig. 2 is a cross-section of the same. Fig. 3 is a fragmentary side elevation showing the gearing for driving the mobile parts of the apparatus. Fig. 4 is a fragmentary elevation of the endless grate. Fig. 5 is a fragmentary section of the same. Fig. 6 is a fragmentary plan view showing the links of the grate. Fig. 7 is an edge view of one of the links, and Fig. 8 is a side or edge view of one of the sections of the grate.

The invention may be applied to a furnace having a fire-box or combustion-chamber 10. Mounted in the fire-box are rails 12, on which rolls the wheeled carriage 14. This carriage 14 supports the traveling grate and is movable in and out of the furnace for the purpose of cleaning and repairing the several parts.

Mounted respectively at the ends of the carriage 14 are revoluble shafts 15 and 16, the bearings of the former of which are adjustable by means of screws 17, one of which is shown in Fig. 1. Fast to each shaft 15 and 16 are sprocket-wheels 18, which wheels may be increased or diminished in number according to the lateral extent of the grate. The

endless grate is mounted to travel over the sprocket-wheels 18 and is driven from the shaft 15 by means which will be hereinafter described. The lower run of the grate is permitted to sag upon and be supported by rollers 19, carried by shafts 20, mounted in the carriage 14.

The traveling grate is composed of a number of similar bars (see Fig. 8) and a number of chain-links, (see Figs. 6 and 7,) by which the grate-bars are connected. The chain-links are joined with each other to form a number of chains, which chains are equal in number to the coacting pairs of sprocket-wheels 18 and pass respectively over the same. The grate is constructed in sections, each embodying two pairs of sprockets 18 and two chains, together with the grate-bars, which are carried on the chains. In the drawings (see Fig. 2) we have shown two grate-sections. It is obvious that, if desired, only one might be employed or that the sections could be multiplied indefinitely according to the size of the furnace. The links of the chains each comprise a main portion or body 21, formed with a transverse circular bore or passage therein. From the body 21 two parallel arms 22 project in one direction and two parallel arms 23 project in the other direction, the parallel arms 23 being adapted to fit between the arms 22 of the adjacent link. The links are pivotally connected by means of pins 24, passing through the arms 22 and 23 and each carrying an antifriction-roller 25, which rollers are situated between the members of each pair of arms 23 and are adapted to bear on the faces of the several sprockets 18 to reduce the friction between the vertically-moving parts. The several links are arched, as shown best in Fig. 7, so that they will conform with the peripheries of the wheels 18. This construction provides, therefore, continuous chains running over the sprockets and serving to support the grate-bars. These grate-bars are formed with a body or top portion comprising a number of parallel ribs 26, joined to a backbone 27, which in turn is joined to a web 28, terminating in a horizontal fork 29. Each section of the grate is provided with a number of rods 30, which rods pass through the

bores in the body portions 21 of the links of the chain. These rods 30 are, as best shown in Fig. 7, oval-shaped in cross-section, so that the horizontal forks 29 of the grate-bars may fit on the rods, whereby the rods and grate-bars must turn in unison. The two chains of each section of the grate are therefore joined by these rods 30, and the several grate-bars are mounted on the rods by means of the forks 29 of the grate-bars. As may be seen best in Fig. 4, the grate-bars are arranged in pairs in transverse lines and have their backs adjacent to each other, so that when once in place the grate-bars cannot be moved transversely over the rods 30. The rods are held from sliding in the parts 21 of the links and are coupled to each other in pairs by means of coupling-links 31, which have oval-shaped openings in their ends to receive the respective ends of the rods and are held in place by cotter-pins 32. To place the grate-bars in position, one of the rods 30 to which the grate-bars are to be attached is turned on its edge and the grate-bars placed side by side on the rod. The immediately-adjacent rod should next be turned on its edge and the grate-bars thereof mounted in the same way, the bars of the two rods being arranged back to back, as shown in Fig. 4. The rods 30 should now be returned to the relative positions shown in Fig. 4, and the coupling-links 31 attached, whereby the rods are prevented from sliding or turning independently and the vertical grate-bars are secured in place. The grate thus constructed is carried on the chains over the sprockets 18 and caused to move continuously on the carriage 14 and through the fire-box of the furnace, thus carrying the fuel into the same as fast as the fuel is consumed.

Mounted above the carriage 14 and outside of the furnace, so as to bear down on the upper run of the traveling grate, is a hinged wall 33, which forms, with the sliding gate 34, a hopper, into which the fuel is fed. The sliding gate 34 is operated by means of winding mechanism 35, and by raising or lowering the gate 34 the amount of fuel taken into the furnace on the grate may be regulated.

The bottom of the fire-box is formed with two inclined portions 36, sloping toward each other and leading to a central longitudinal channel 37, set in the masonry of the furnace. Mounted to travel on wheels 38 and 39 and driven by the former is an endless chain 40, formed of links, with their pintles forming scraper-bars. The lower run of the chain slides through the channel 37. The chain is driven in the direction of the arrow shown in Fig. 1, so that the ashes falling from the grate and rolling down the inclined surfaces 36 to the channel 37 will be dragged out of the channel by the action of the chain. The upper run of the chain 40 is supported at intermediate points by an idler 41. It will be seen that the chain, with its pintles, forms an endless series of scraper-bars and that the

ashes will drop through the upper run and will not clog the same, but when the ashes fall into the channel 37 the continual movement of scraper-bars of the lower run of the chain 40 will keep the ashes moving outwardly and thus clear the ash-pit. This arrangement prevents clinkers from forming in the ash-pit and insures continually cleaning the same.

The wheel 38 is mounted on a revoluble shaft 42, which has one end extended outside of the furnace and carrying a bevel-gear 43, meshing with a corresponding gear 44, fast to a vertically-extending shaft 45. This shaft 45 is mounted at one side of the furnace and has a worm-wheel 46 fast thereto, which wheel meshes with a worm 47, fixed to a shaft 48. This shaft 48 is the prime mover of the gearing for driving the several mobile parts of the furnace and is fitted with a band-wheel 49 whereby to drive the said shaft. The shaft 45 is also provided with a fixed worm 50, meshing with a worm-wheel 51, fixed upon the shaft 15. It will thus be seen that the two shafts 15 and 42 are driven in unison to drive the grate and the belt 40. The gearing is such that the shaft 15 is driven by a relatively slow movement and the shaft 42 at a faster speed.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a traveling grate, the combination of a chain, a pair of rods mounted loosely in the chain and having an oblong cross-section, grate-bars provided with horizontal forks, the forks being mounted on the rods and the bars being arranged in pairs back to back to prevent the displacement of the grate-bars when in position, and a coupling-link joining the rods with each other to hold them from independent movement.

2. In a grate, the combination of a chain, rods mounted loosely in the chain, means for removably connecting the rods to prevent the independent movement thereof, and grate-bars having transverse sliding engagement with the rods, the grate-bars being carried on the rods and arranged back to back when in position, to prevent the removal of the grate-bars.

3. In a grate, the combination with supporting means, of two rods mounted therein, means for removably joining the rods to prevent the independent turning thereof, and grate-bars having sliding connection with the rods and disposed back to back so that when the rods are in the proper axial position, the grate-bars cannot be removed.

4. In a grate, the combination with supporting means, of two rods mounted to turn therein, means for removably holding the rods to prevent the turning thereof, and grate-bars having horizontal forks adapted to slide transversely of the rods, the forks opening at one side of the grate-bars and the grate-bars being arranged back to back on the rods so as to prevent the displacement of the grate-bars when the rods are in position.

5. In a grate, the combination of a chain consisting in a series of pivotally-connected links, each link having a body portion with a transverse bore therein, rods respectively
5 mounted loose in the bores of the links, coupling-links serving to join the rods in pairs, whereby to prevent the turning of the rods, and grate-bars mounted on the rods.

6. In a grate, the combination of a chain
10 formed of a series of links, each link having a main or body portion with a transverse bore therein and having two pairs of oppositely-projecting arms, the arms being pivotally connected with each other to join the links, rods
15 passed through the bores of the links, coupling-links for joining the rods in pairs to prevent the turning thereof, and grate-bars supported on the rods.

7. In a grate, the combination of a chain
20 having a series of links each formed with a main or body portion having a transverse bore and two pairs of oppositely-projecting arms, the arms being adapted to fit one pair between the other, pins serving pivotally to join the
25 arms, antifriction-rollers carried on the pins between the arms, rods fitted to turn in the bores of the links, coupling-links for joining the rods in pairs to prevent the turning thereof, and grate-bars supported by the rods.

8. In a grate, a grate-bar having a series of parallel ribs rigidly joined to a transversely-extending back, and a web projecting from the back and having a fork at its lower portion by which to support the grate-bar.
30

9. The combination with a chain, of movable rods carried thereby, grate-bars thereon, transversely attachable to and detachable from said rods when the rods are rotated in one direction, and means for normally holding
35 the rods against rotation to prevent removal of the grate-bars.
40

10. The combination with a chain, of rods carried thereby, grate-bars thereon and attachable and detachable by movement transversely of the rods and in a direction lengthwise of the chain, adjacent grate-bars serving
45 normally to block each other and prevent the said transverse movement, the rods being

movable on the chain to permit the transverse movement of the grate-bars, and means for 50 normally holding the rods.

11. The combination of rods, and grate-bars for the rods, the bars being mounted on the rods to slide transversely thereto and being normally disposed the one in the path of trans- 55 verse movement of the other to prevent the removal of the grate-bars.

12. The combination of traveling chains, comprising links pivotally united at their respective ends, rods loosely supported by the 60 links intermediate the ends of the latter to permit movement of the links independently of the rods, means for joining the rods to prevent independent turning thereof and grate-bars attached to the rods. 65

13. In a grate, the combination of a rod, a series of grate-bars detachably held on the rod and removable therefrom by movement transversely of the rod, the rod being rockable to place the grate-bars in position for removal, 70 and means for normally holding the rod against rocking to prevent the removal of the grate-bars.

14. In a grate, the combination of traveling chains, comprising links pivotally united at 75 their respective ends, rollers mounted on the pivots of the links, rods loosely supported by the links at points intermediate the ends of the links, means for joining the rods to hold the same from turning independently of one 80 another and grate-bars attached to the rods.

15. In a grate, the combination of rocking rods, a series of grate-bars detachably carried on the rods and removable therefrom by movement transversely of the rods, when the rods 85 are in a certain position, and means for uniting the rods in pairs to prevent the independent movement of the grate-bars on the several pairs of rods whereby to prevent the removal of the grate-bars.

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