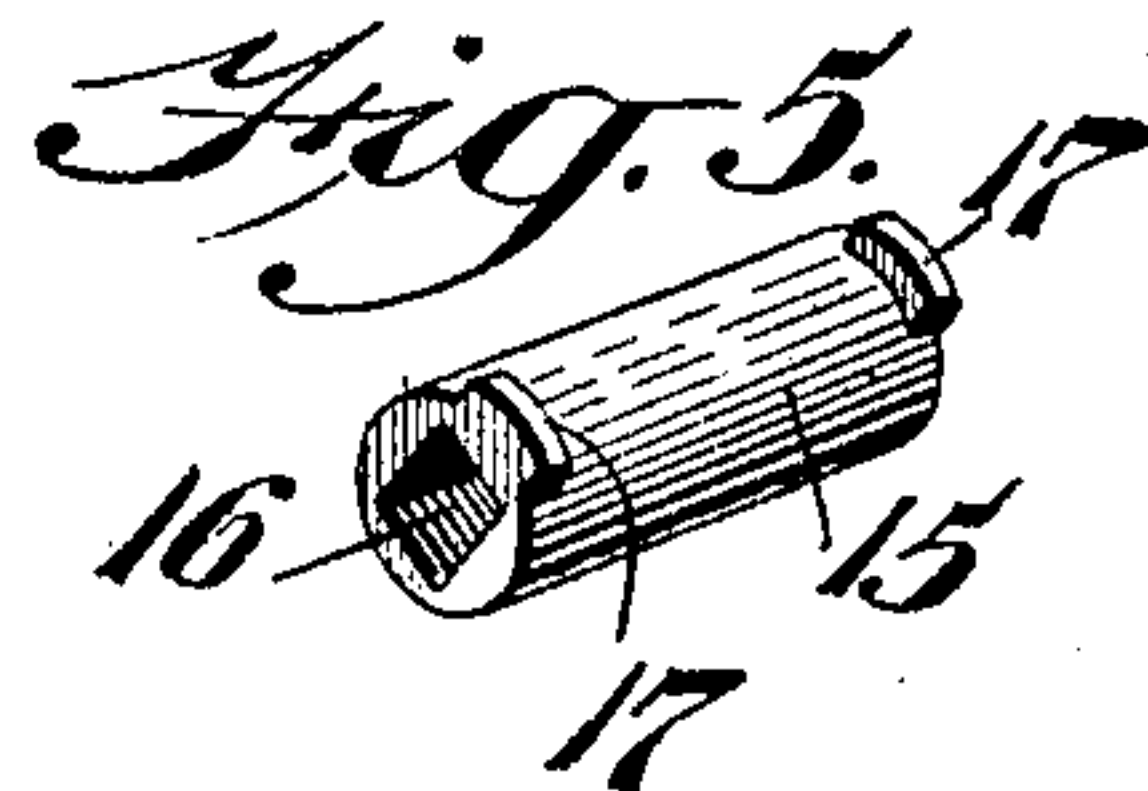
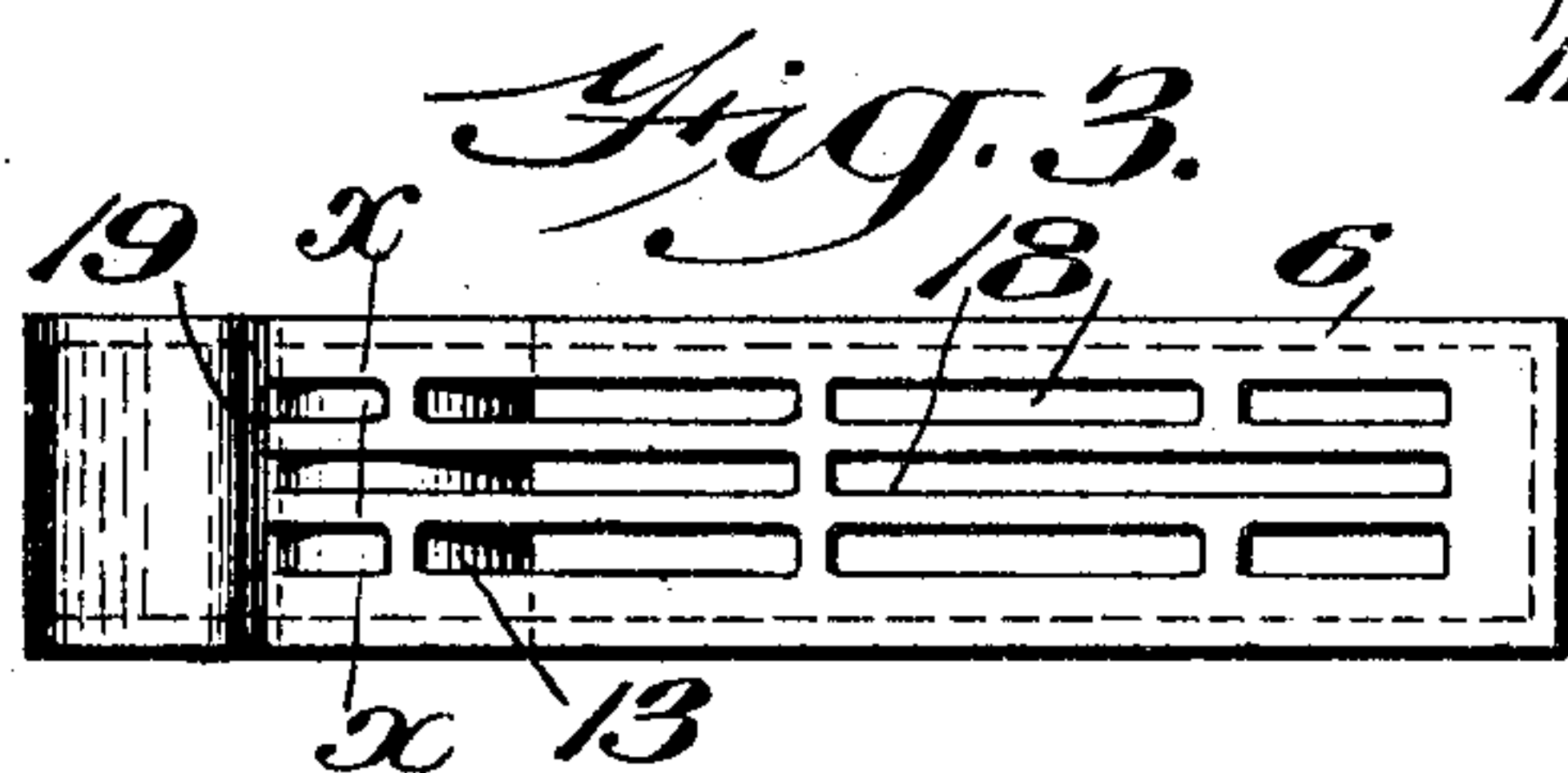
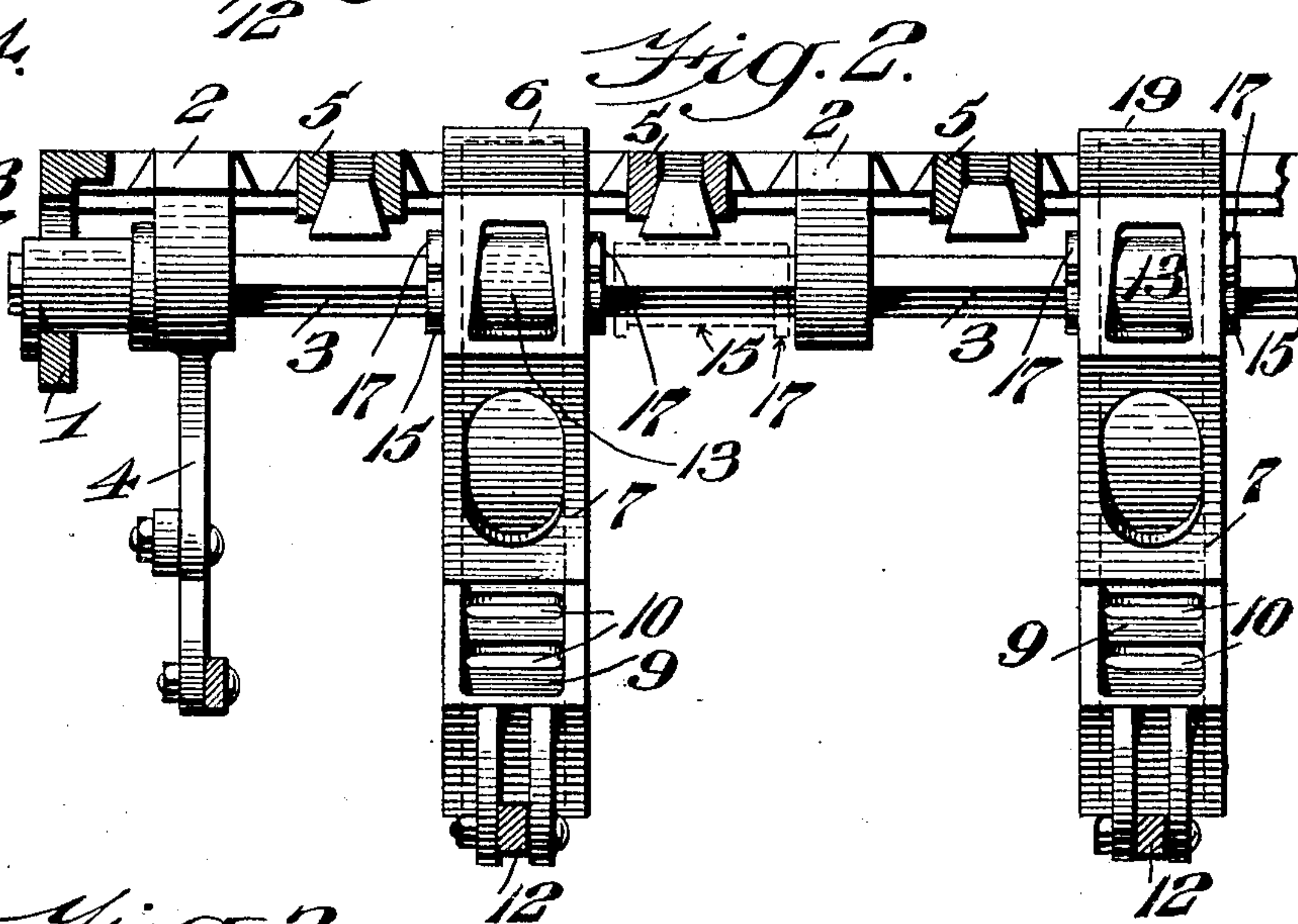
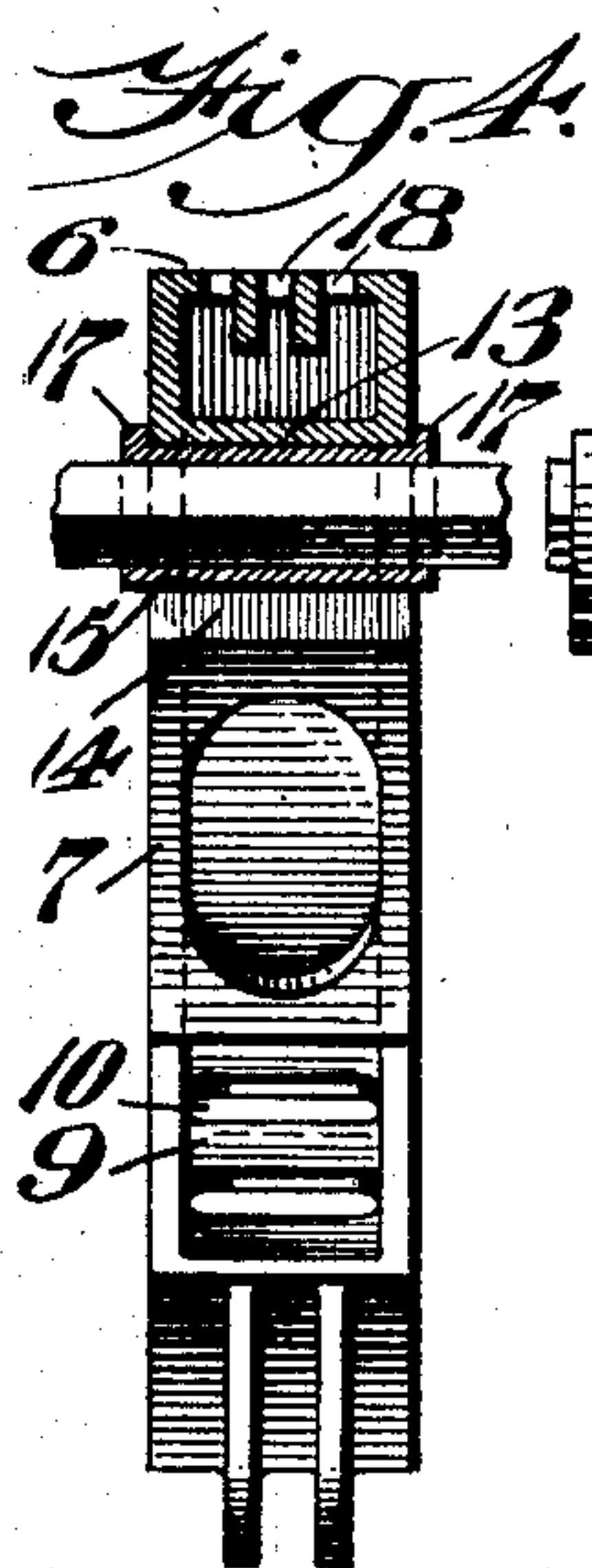
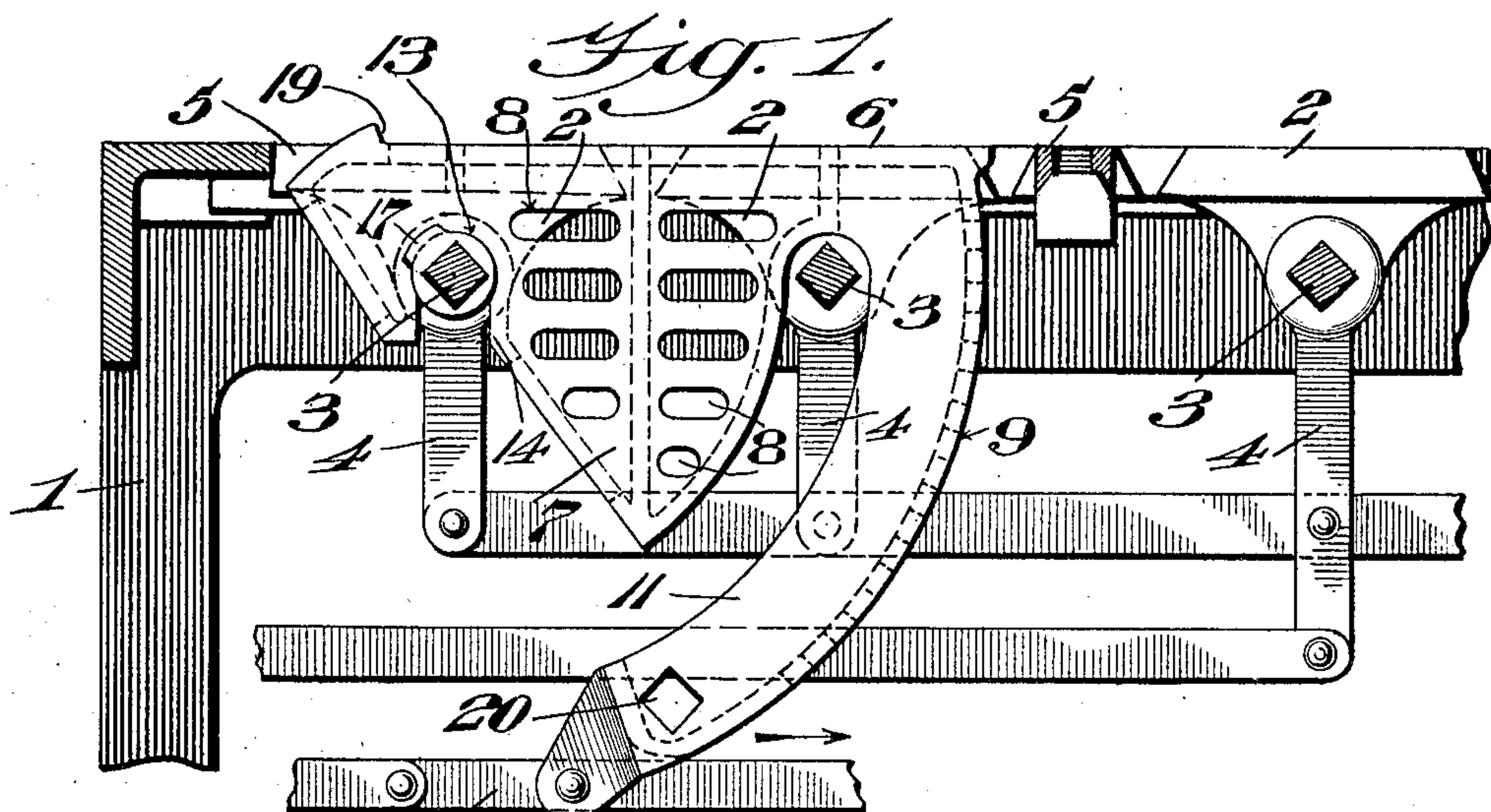


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2 SHEETS—SHEET 1.



Witnesses  
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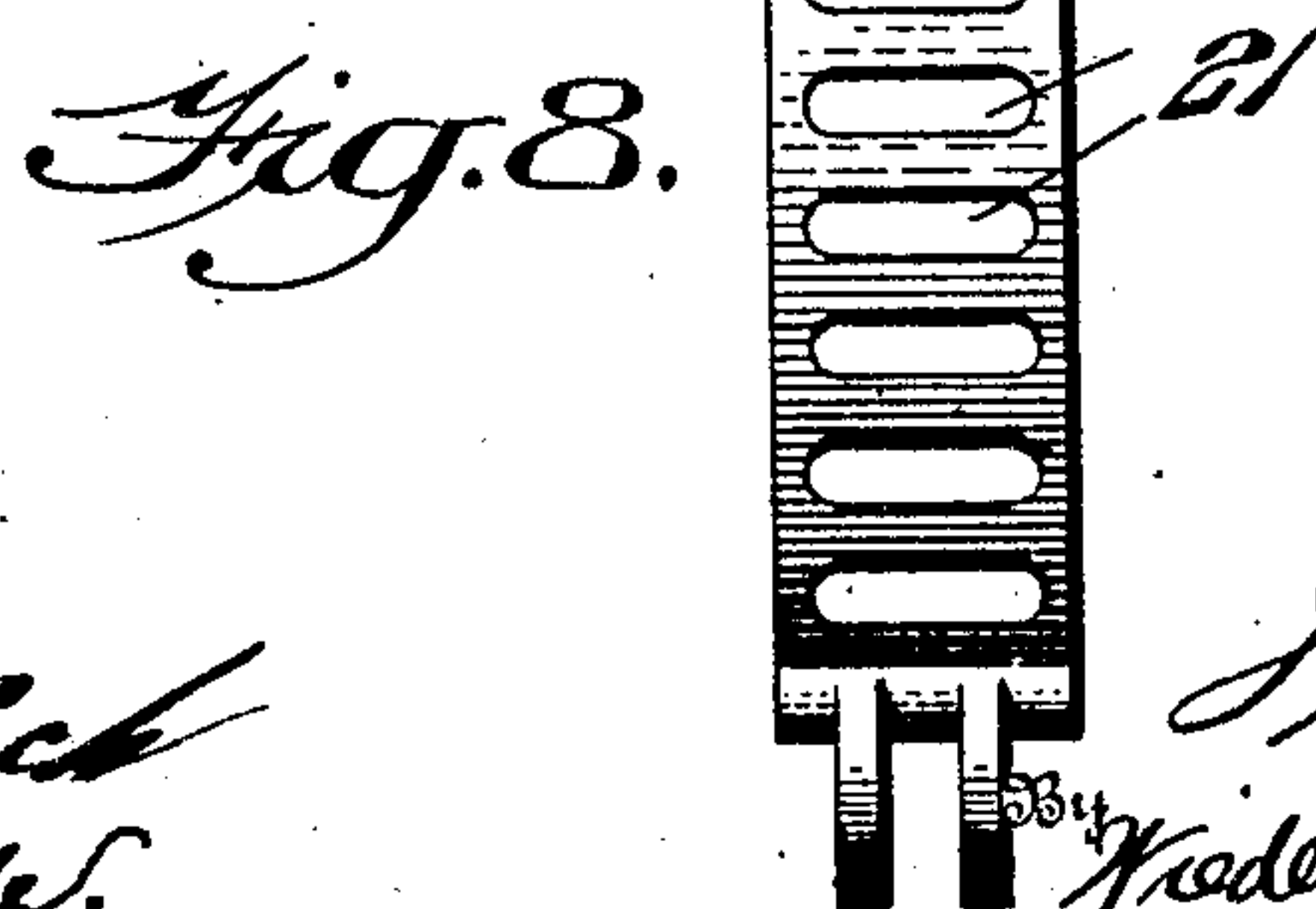
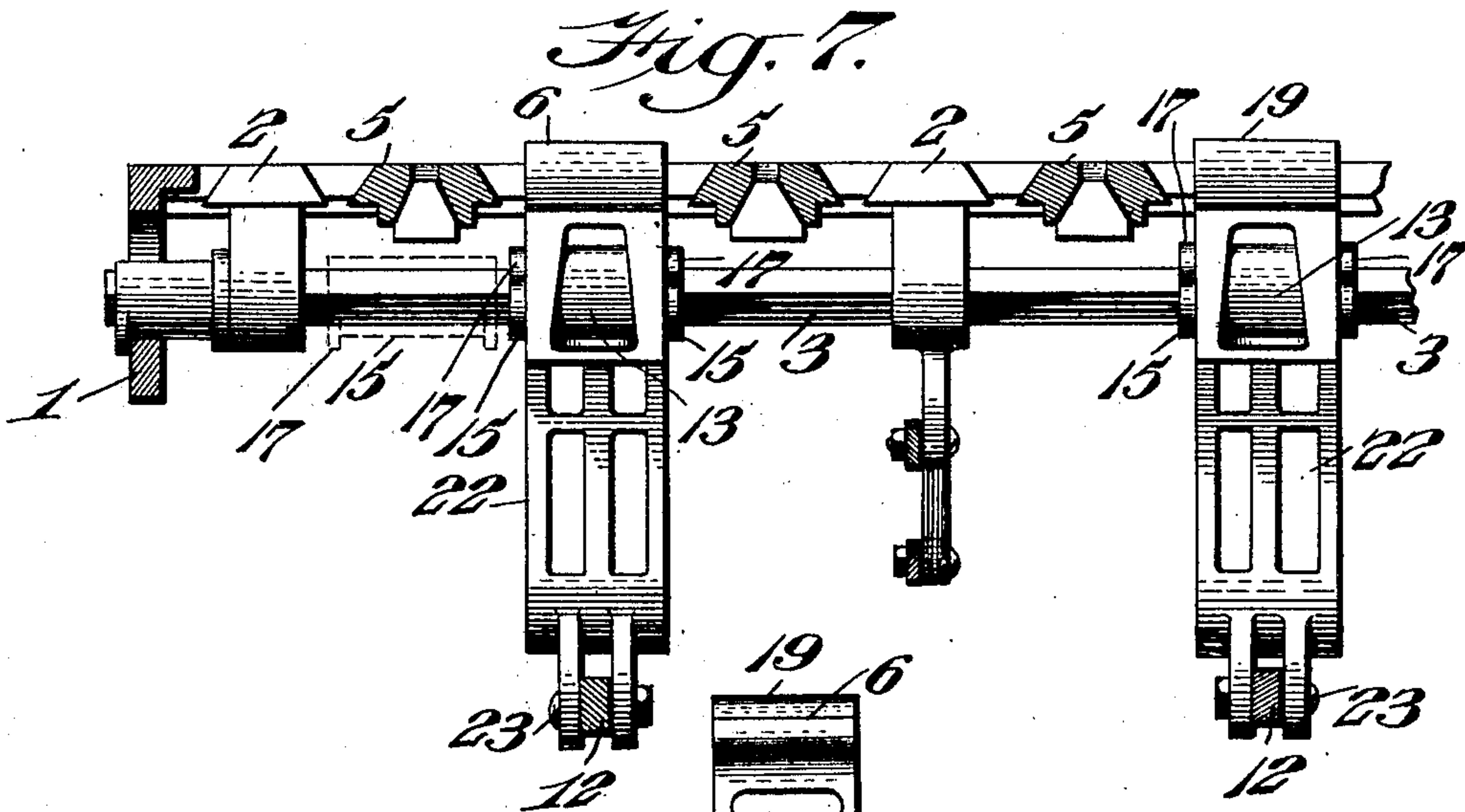
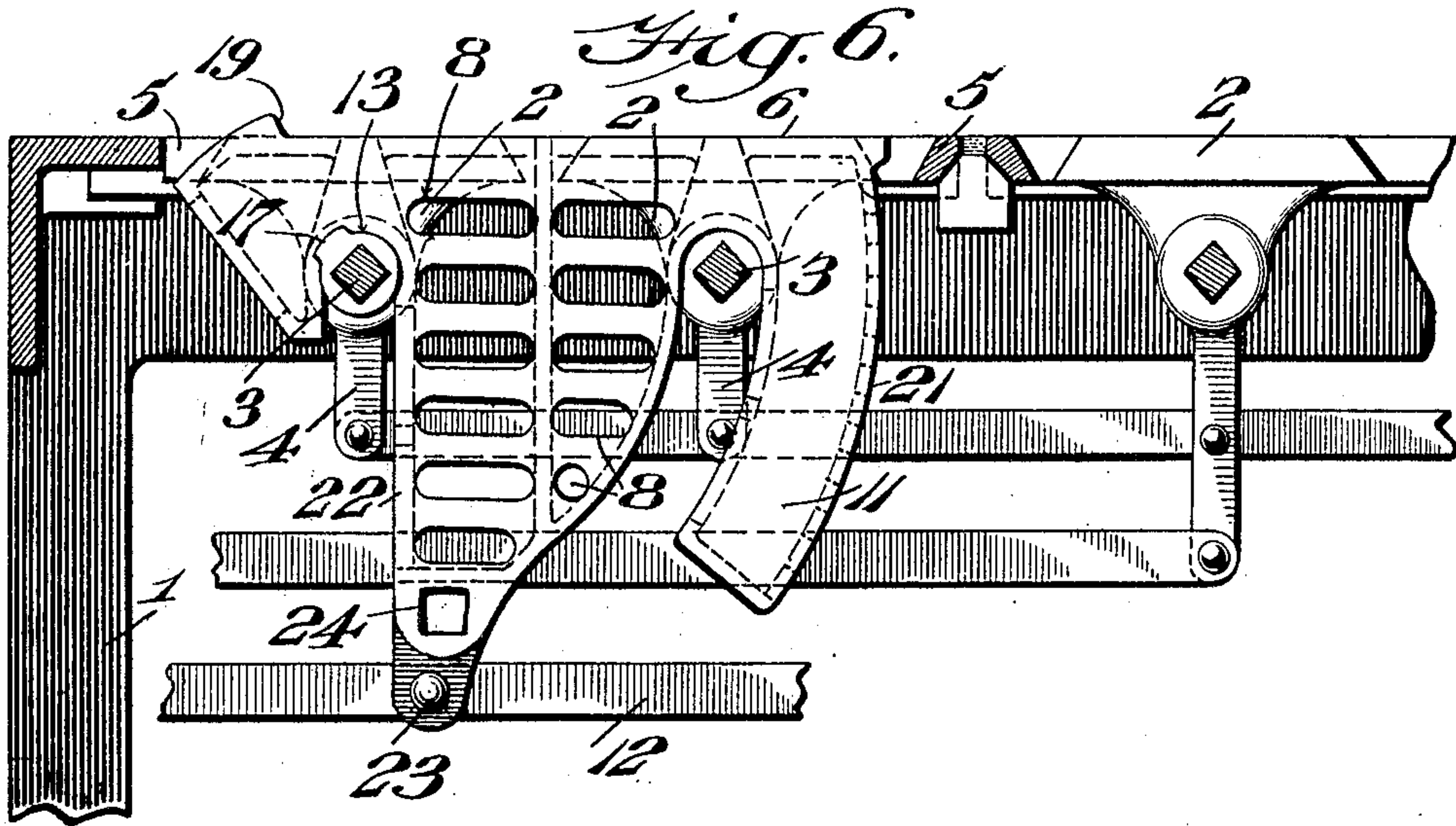
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# UNITED STATES PATENT OFFICE.

JAMES REAGAN AND WILLIAM REAGAN, OF PHILADELPHIA, PENNSYLVANIA; SAID WILLIAM REAGAN ASSIGNOR TO SAID JAMES REAGAN.

## SHAKING-GRATE.

No. 926,076.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed September 4, 1908. Serial No. 451,642.

*To all whom it may concern:*

Be it known that we, JAMES REAGAN and WILLIAM REAGAN, citizens of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Shaking-Grate, of which the following is a specification.

Our invention relates to a new and useful shaking grate and consists in providing lifting fire bars which can be used with or without choppers and each of which lifting fire bars is capable of being removed and replaced without disturbing the remainder.

It further consists of a novel construction of lifting fire bars whereby the coal is prevented from leaving the grate when the parts are operated.

It further consists of novel means of mounting the lifting fire bars.

It further consists of novel details of construction all as will be hereinafter fully set forth.

Figure 1 represents a sectional view of a portion of a grate showing a lifting fire bar in position with a portion of the device for operating the same. Fig. 2 represents a sectional view showing the lifting bar in position alternately with choppers and stationary fire bars. Fig. 3 represents a top plan view of one of the lifting fire bars. Fig. 4 represents a sectional view on line  $x-x$ , Fig. 3. Fig. 5 represents a perspective view of locking sleeve employed. Fig. 6 represents a longitudinal section of another embodiment of our invention. Fig. 7 represents a transverse section of Fig. 6. Fig. 8 represents a rear elevation of one of the lifting fire bars.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: We have found in shaking grates that it is necessary to provide a construction wherein there are no dead points in the fire and in which free passage of air is permitted and caused in order that a suitable draft is provided. Our invention is designed to accomplish these results and in the drawings we have shown a construction for carrying out our invention but it will be evident that various changes may be made which will come within the scope of our invention and we do not, therefore, desire to be limited in every instance to the exact construction as herein shown and described but desire to make such changes as may be necessary. We desire it understood that the lift-

ing fire bars can be arranged for use on any suitable grate construction and we desire to use the same either in conjunction with rocking choppers or not, as may be necessary. In some instances, we may alternate the lifting fire bars with choppers or we may make one section entirely of the lifting fire bars, the use and arrangement of the parts depending upon the conditions.

1 designates a frame or portion thereof of a shaking grate of suitable construction and 2 designates choppers which are suitably mounted in order to be rocked, each of said choppers in the present instance being mounted upon the chopper bars 3, which are angular and one or more of the choppers being provided with the depending portion 4 to which the rocking mechanism can be attached in any suitable manner.

It will be understood that we may mount our lifting fire bars directly between the choppers or as we have shown in the drawings, we may provide the stationary fire bars 5 which are suitably supported in any desired manner and which are adapted to rest preferably upon a suitable portion of the frame 1 and can be lifted from position or returned thereto by hand. Between the fire bars 5, are placed the hollow lifting fire bars 6 the same having the sides or wings 7 with the openings or slots 8 therethrough and the front side 9 being provided with slots or recesses 10, it being understood and noted that the slots are provided for the purpose of permitting a free passage of air therethrough. The front side 9, it will be noted, is preferably curved downwardly and rearwardly as best understood from Fig. 1 and is provided with the sides 11, said front side 9 and sides 11 extending a considerable distance below the sides 7, and to a suitable portion of said front side 9 is pivoted or otherwise secured a bar 12 which is connected with a suitable actuating mechanism for the lifting fire bars.

13 designates a circular opening formed in the sides 7 with which communicates a slot 14 formed in the sides 7 and which slot 14 is slightly narrower than the diameter of the circular opening 13, but which is capable of passing the chopper bar 3.

15 designates a sleeve or collar which is provided with an angular opening 16 to receive the bar 3 and which is adapted for sliding movement thereon, the circumference of said sleeve 15 being adapted to suitably fit



the opening 13 in the lifting fire bars 6. Projecting from opposite ends of the sleeve 15 are the lugs or lips 17 which are of a suitable size in order to freely pass the slot 14 leading to the circular opening 13 when in proper position therefor, it being noted that the normal position of said sleeve 15 is within the openings 13 with the lips 17 engaging the sides of the lifting fire bars 6, this construction being best seen in Fig. 1 and in full lines Fig. 2 and it being understood that said sleeve 15 serves as the fulcrum or support for the lifting fire bar 6. The upper face of the fire bar 6 is provided with the slots or openings 18 and with a transversely extending shoulder 19 adjacent the rear end of the bar. In the figure we have shown the lifting bars in conjunction with the choppers and the stationary fire bars but as previously stated, we may in some instances use a plurality of fire bars without the choppers and stationary fire bars or we may use the lifting fire bars and the rocking choppers without the stationary fire bars.

The operation of the parts just described will be apparent. The parts being in the position seen in Fig. 1 the choppers 2 can be actuated by suitable movement of the depending portions 4 and the lifting fire bars can be actuated by suitable movement of the bars 12, it being understood that when the bar 12 is moved in a direction indicated by the arrow in Fig. 1 that the front side 9 will be elevated, carrying with it that end of the lifting fire bar which will be rotated on the sleeve 15 as previously described and the shoulder 19 extending transversely of the upper face will prevent the escape of the coal, it being understood that the lifting fire bars can be suitably actuated in order that the same can be raised to any desired angle. The wings and sides 7 of the fire bars when raised, prevent the green coal from leaving the furnace since they form a bar for that purpose and close up any opening which might otherwise occur if these wings were not of suitable size and dimension therefor. The slots or openings in the lifting fire bar not only permit free passage of air, but increase the air supply, thus insuring a draft and assist in preventing any dead points in the fire.

By reason of the arrangements above described any one of the lifting fire bars can be removed without disturbing the remainder, this being accomplished by removing one of the fire bars 5 and by rotating the bar 3 the sleeve 15 will also be rotated therewith until the lugs 17 are in line with the slots 14 in the sides 7 of the lifting bars 6 after which the said sleeve can be moved along the rod 3 into position seen in dotted lines, Fig. 2, and by releasing the connection of the front side 9 with the bar 12 the lifting fire bar 6 can be removed vertically from the position in the grate since the slot 14 permits free passage of

the said bar 3, from which it will be understood that the sleeve serves as a locking means for the lifting fire bar for holding the same in position in the grate, the lugs preventing lateral movement. The reverse operation will occur when it is desired to return the bar to proper position. Each of the lifting fire bars 6 may be connected to a suitable bar 12 for actuating the same or in some instances, we may employ a square rod which passes through a suitable squared opening 20 in the sides 11 of each of the lifting fire bars which will connect a series of these lifting fire bars so that the operation of one will actuate all. By reason of the actuating means with the front end of the lifting fire bar 6, that is with the long axes thereof, the direct power is applied to the longest radius, the effect of which is evident.

In the embodiment seen in Figs. 6 to 8 inclusive, we have shown another embodiment of our invention which it is preferable to employ in conjunction with certain kinds of fuel, and this embodiment, in construction and operation, corresponds to that already described with reference to Figs. 1 to 5 inclusive, except that the front side 21 of the lifting grate is not connected with the bar 12 but the rear side 22 is connected with the bar 12 as indicated at 23 and a squared opening 24 is provided in the rear portion of the lifting grate instead of in the front portion thereof.

We desire to call attention to the fact that our invention takes the place, or at least obviates the use of the stoker-bar in slicing the fires, for the reasons, that it uniformly stokes the fire from the bridge-wall to the dead plate; its movement is such as to keep the fire in a porous condition at all times and thereby dissolve clinkers in their infancy, permitting a continuous supply and flow of air through the fuel with the result of perfect combustion. From actual experience we have noted, when the stoking device was in action, *i. e.*, when it was lifted into the fire, the fire being broken and the clinkers dissolved that the air is permitted to pass through, and the entire bed of fuel was immediately ignited with what seemed to be an explosion.

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

1. In a shaking grate, a supporting bar, a series of hollow lifting fire bars, means for actuating the same and independent means for locking each lifting bar to said supporting bar, each of said locking means being independently movable on said supporting bar for releasing the lifting bar locked thereby and permitting independent removal thereof and each of said locking means serving as the pivot for the lifting bar locked thereby.



2. In a shaking grate, a supporting bar, a series of hollow lifting fire bars, means for actuating the same and independent means for locking each lifting bar to said supporting bar, each of said locking means being independently movable for releasing the lifting bar locked thereby and permitting independent removal thereof and each of said locking means serving as the pivot for the lifting bar locked thereby.

3. In a shaking grate, a supporting bar, a series of hollow lifting fire bars, means for actuating the same and independent means mounted on said supporting bar for locking each lifting bar thereto, each of said locking means being independently movable on said supporting bar for releasing the lifting bar locked thereby and permitting independent removal thereof and each of said locking means serving as the pivot for the lifting bar locked thereby.

4. In a shaking grate, a series of shakers, means for actuating the same, a series of hollow lifting fire bars, supporting means therefor, and independent means for locking each lifting bar to said supporting means, each of said locking means being independently movable on said supporting bar for releasing the lifting bar locked thereby and permitting independent removal thereof and each of said locking means serving as the pivot for the lifting bar locked thereby.

5. In a shaking grate, a series of shakers, means for actuating the same, a series of hollow lifting fire bars, supporting means therefor, and independent means for locking each lifting bar to said supporting means, each of said locking means being independently movable for releasing the lifting bar locked thereby and permitting independent removal thereof, and each of said locking means serving as a pivot for the lifting fire bar locked thereby.

6. In a shaking grate, a supporting bar, a series of hollow lifting fire bars, means for actuating the same and independent means for locking each lifting bar to said supporting bar, said locking means being rotatable with said supporting bar and each of said locking means being independently movable on said supporting bar for releasing the lifting bar locked thereby and permitting independent removal thereof and each of said locking means serving as the pivot for the lifting bar locked thereby.

7. In a shaking grate, an annular supporting bar, a series of hollow lifting fire bars, means for actuating the same and a circular sleeve for each of said lifting fire bars mounted on said supporting bar for locking each lifting bar thereto, each of said sleeves serving as a pivot for the lifting fire bar locked thereby and each of said sleeves being independently movable on said supporting bar for releasing the fire bar locked thereby for

permitting independent removal thereof and each of said sleeves having lugs at its opposite end.

8. In a shaking grate, a hollow lifting fire bar having a circular opening and a slot communicating therewith, means for actuating the lifting fire bar, an annular supporting bar and a sleeve mounted on said supporting bar and normally seated in said circular opening, said sleeve having lugs normally engaging the sides of said lifting fire bar and adapted in one position of the supporting bar to pass through said slot, the latter being wider than the supporting bar whereby said lifting bar may be moved laterally to release the same from the supporting bar.

9. In a shaking grate, a series of hollow lifting fire bars each having an elongated downwardly, rearwardly curved perforated front side, a supporting bar for the lifting fire bars, independent locking means for each lifting fire bar for preventing the same from being lifted from the supporting bar and each locking means adapted for independent movement for permitting the removal of any one of said lifting bars and means connected with the front end of said lifting fire bar for actuating the same.

10. In a shaking grate, a series of hollow lifting fire bars each having an elongated downwardly and rearwardly curved perforated front side, a supporting bar for the lifting fire bars, independent locking means for each lifting fire bar for preventing the same from being lifted from the supporting bar and each of said locking means being capable of independent movement for permitting removal of any one of said lifting bars, each of said locking means serving as a pivot, for a lifting fire bar, adjacent one end thereof and means connected with the other end of said lifting fire bar for actuating the same.

11. A hollow lifting fire bar having a perforated top, perforated side wings and the front side of said bar projecting downwardly and curved rearwardly below said side wings, a side of the bar having a circular opening and a slot communicating therewith narrower than the diameter of said circular opening and said downwardly and rearwardly curved projection having means for connection with the actuating means.

12. A hollow lifting fire bar having a perforated top, perforated side wings and the front side of said bar being perforated and projecting downwardly and curved rearwardly below said side wings, the side of the bar having a circular opening and a slot communicating therewith narrower than the diameter of said opening and said downwardly and rearwardly curved projection having means for connection with its actuating means.

13. A hollow lifting fire bar having a per-



forated top, perforated side wings and the front side of said bar being perforated and projecting downwardly and curved rearwardly below said side wings, a side of the  
5 bar having a circular opening therein and a slot communicating therewith narrower than the diameter of said opening, said downwardly and rearwardly curved projection having means for connection with its actuating means and a shoulder extending transversely of the top of said bar for preventing  
10 escape of the fuel.

14. In a device of the character described, a hollow lifting fire bar having in its side a  
15 circular opening and a slot communicating therewith, said slot being narrower than the diameter of the circular opening and wider than the supporting bar for said lifting fire bar, a supporting bar and a sleeve adapted  
20 to receive said supporting bar and adapted to fit the circular opening in the lifting fire bar.

15. In a device of the character described, a hollow lifting fire bar having in its side a  
25 circular opening and a slot communicating therewith, said slot being narrower than the diameter of the circular opening and wider than the supporting bar for said lifting fire

bar, a supporting bar and a sleeve mounted on said supporting bar and adapted to fit  
30 the circular opening in the lifting fire bar, the opposite end of said sleeve being provided with lugs of a size to freely pass said slot when in line therewith.

16. In a device of the character described,  
35 a hollow lifting fire bar having in its side a circular opening and a slot communicating therewith, said slot being narrower than the diameter of the circular opening and wider than the supporting bar for said lifting fire  
40 bar, a supporting bar for said lifting fire bar and a sleeve mounted on said supporting bar and adapted to fit the circular opening for locking the said lifting fire bar to the supporting bar, said sleeve having lugs normally  
45 engaging the sides of said fire bar and adapted to freely pass said slot, when said sleeve is rotated for this purpose, whereby said sleeve may be moved on said supporting bar for releasing said lifting fire bar.

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