

No. 706,275.

Patented Aug. 5, 1902.

H. STRAETEN & F. SCHNECK.

GRATE FOR BOILERS.

(Application filed Mar. 3, 1902.)

(No Model.)

2 Sheets—Sheet 1.

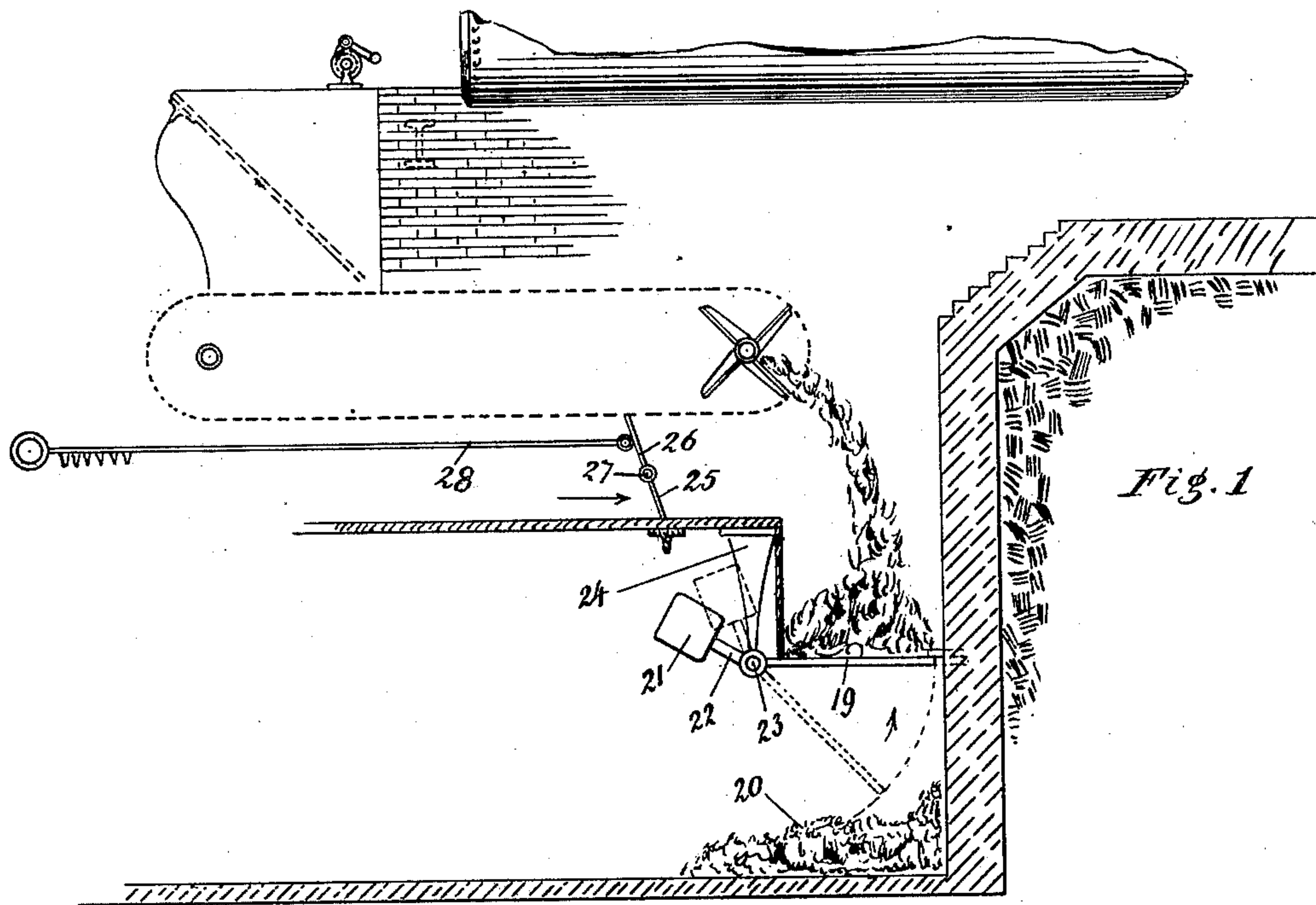


Fig. 1

Fig. 2.

Fig. 3

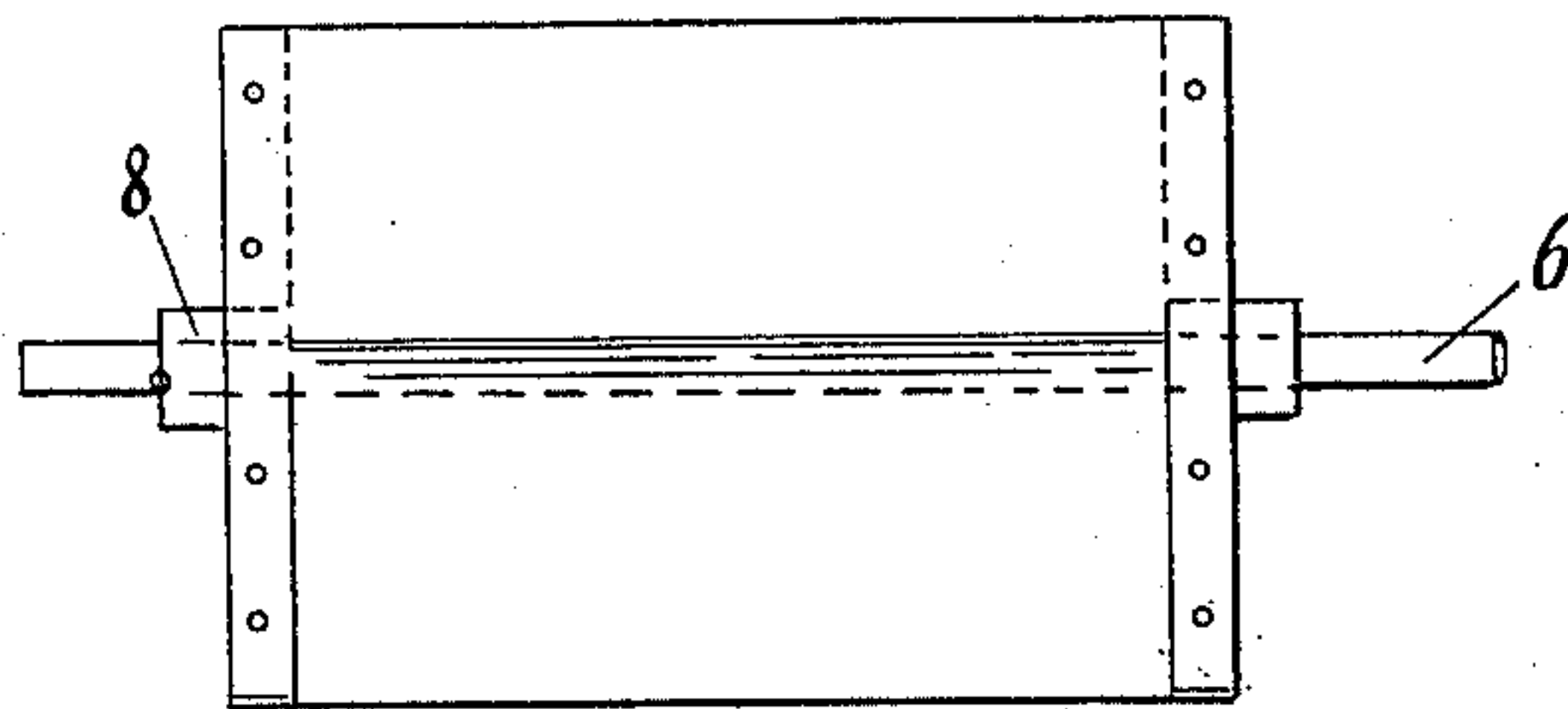
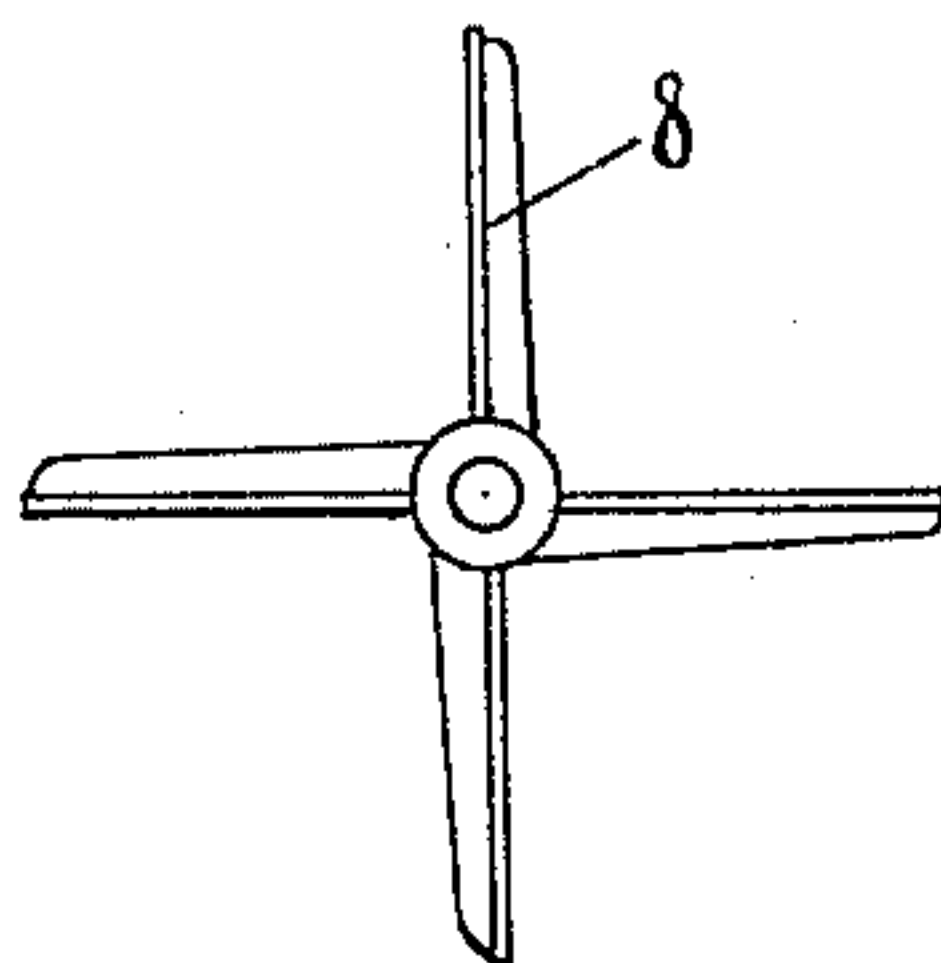
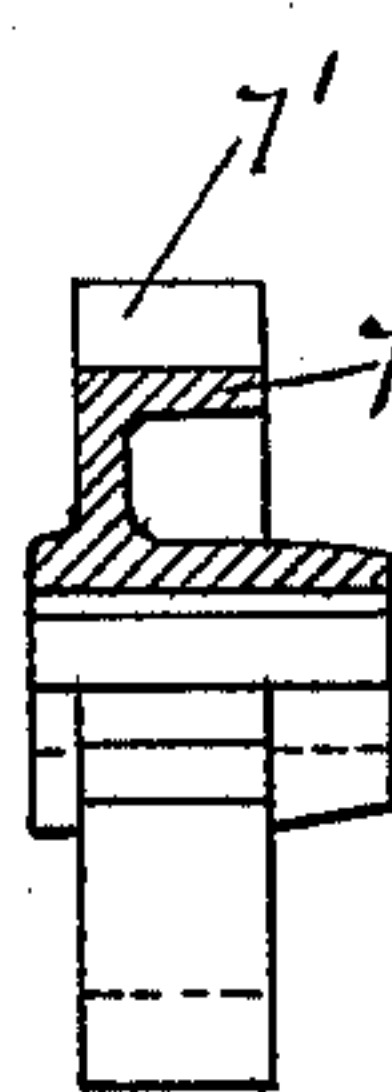
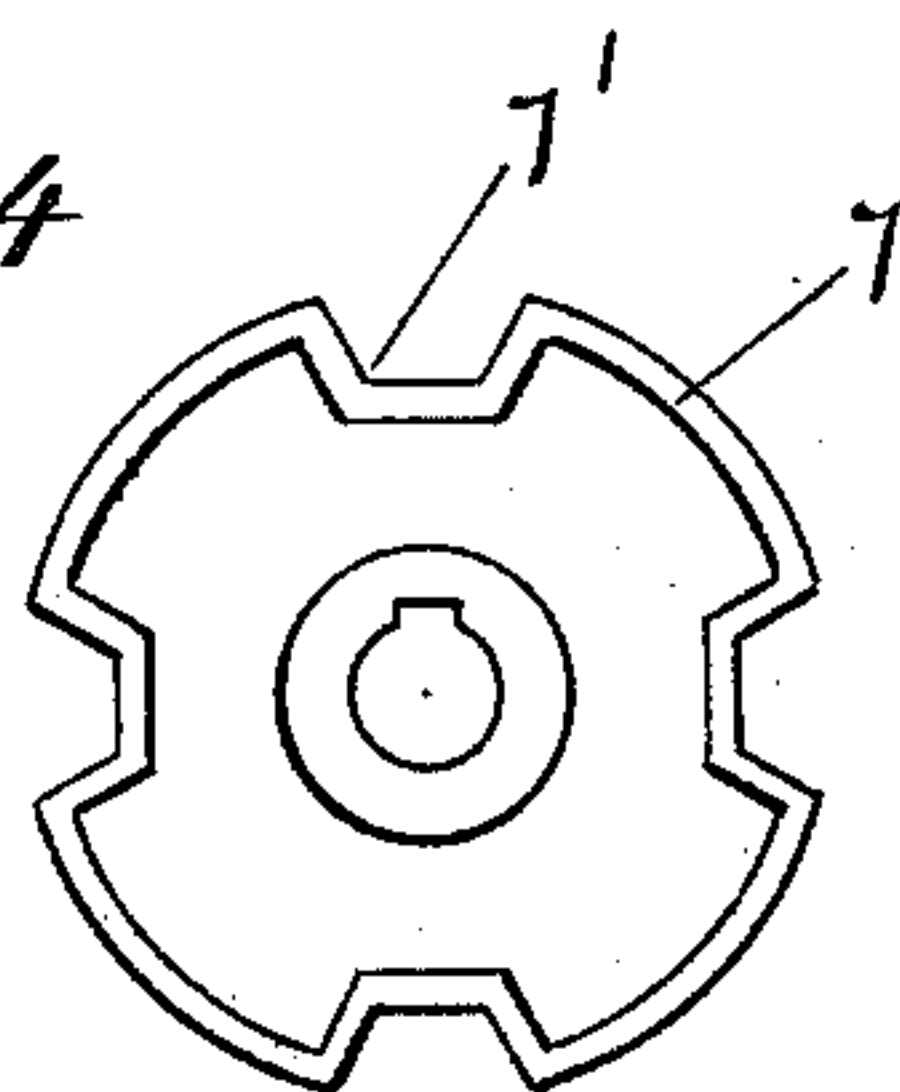


Fig. 4

Fig. 5



WITNESSES:

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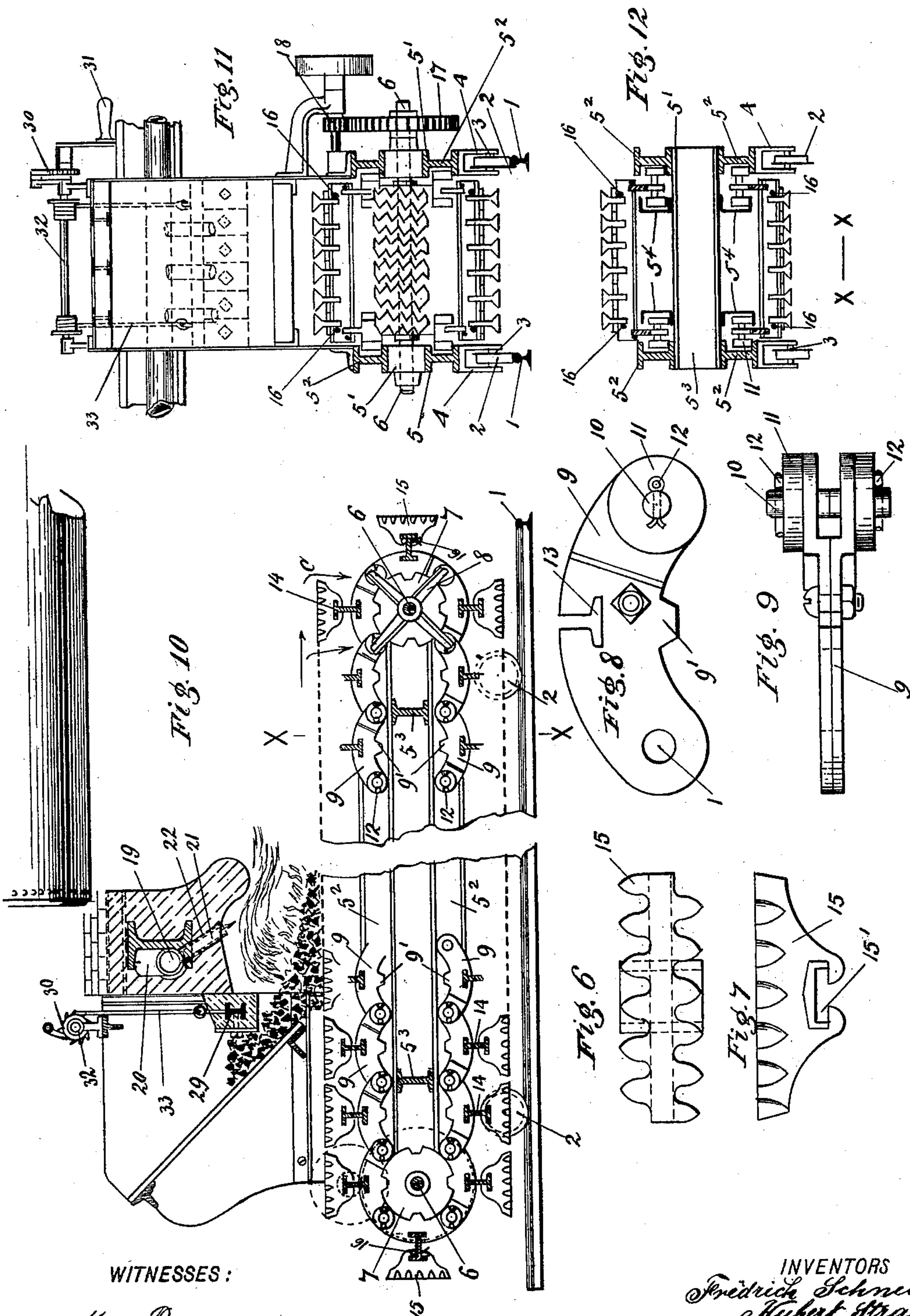
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2 Sheets—Sheet 2.



WITNESSES:

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HUBERT STRAETEN AND FREDRICK SCHNECK, OF CHICAGO, ILLINOIS.

GRATE FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 706,275, dated August 5, 1902.

Application filed March 3, 1902. Serial No. 96,724. (No model.)

To all whom it may concern:

Be it known that we, HUBERT STRAETEN and FREDRICK SCHNECK, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grates for Boilers; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Our invention relates to grates for boilers, and particularly to such grates which continually travel over the entire length of the grate area, automatically dropping ashes and cinders and also admitting air to the fire-box in such a manner that the fumes and smoke which are created through the burning of fuel are blown into the flames of the fire and consumed.

Our object is also to conveniently replace the different grate-bars while all of the grates are in motion and without the necessity of stopping the revolving mechanism. We attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a general sectional view of a fire-box below a boiler, showing the general arrangements of the traveling grate, the intake for the fuel, the air-passages, the ash-dropping device, and receptacle for ashes. Fig. 2 is a front elevation of the spider used in running the traveling grates. Fig. 3 is an end elevation of Fig. 2. Fig. 4 is a front elevation of a cam employed in turning the connecting-links of the grate-bars. Fig. 5 is an end view of Fig. 4. Fig. 6 is a top view of one of the grate-bars. Fig. 7 is an end view of Fig. 6. Fig. 8 is a side view of a grate-carrying link. Fig. 9 is a top view of Fig. 8. Fig. 10 is a sectional view of our mechanism, showing the smoke-consuming device, the arrangements for lowering and raising the fuel-admitting block, and the traveling-grate mechanism. Fig. 11 is an end view of Fig. 10, and Fig. 12 is a sectional view taken on the line *x x* of Fig. 10.

Similar figures refer to similar parts throughout the several views.

Placed and running on a suitable number of rails 1, situated in front and below the grate-bar-carrying mechanism, are the wheels 2. Said wheels 2 revolve on a short axle or pin 3, which turns in a fork-like channel 4, and which is again fastened to the members 5. Said members 5 consist of four center pieces 5', four channels or I-beam-like bars 5², at both ends of which the center pieces 5' are situated, and the separators 5³, which tend to keep the channels 5² in a relative parallel position to each other. Passing through said center pieces 5' are shafts 6. Rigidly secured to said shafts 6 are the cam-wheels 7 and the spider 8. Passing over said cam-wheels 7 and engaging the recesses 7' is an endless chain of links 9, engaging said recesses 7' with the aid of a tooth 9', extending inwardly toward the center like the tooth of an internal gear-wheel. The endless chain is formed with the aid of pins 10, one end of one link being formed like a fork, so as to receive the single end of the next link. Said links are preferably made in two halves, as shown. On both sides of the forked ends of the links 9 and running on the pins 10 are rollers 11, secured to and prevented from coming off the pins 10 by split pins or cotters 12. Said rollers 11 are made to roll upon the lower and inner surfaces of the channel-like bars 5² and angle-plates 5⁴. Transversely through the links 9 and passing through the apertures 13 of said links are channel-like members or cross-rods 14, which reach across and are attached to the links on the other side of the mechanism in the same manner. Sliding over and fastened to said cross-rods 14 are the grate-bars 15, a suitable number of same being attached to the cross-bars in such a manner that said grate-bars form a continuous grate-surface. Said grate-bars also have an aperture 15', through which the cross-rod 14 is passed. At each side of the two outer grate-bars pins are inserted, so as to prevent the grate-bars from coming off the cross-rod. It will be seen that the taking out of said pins will allow the operator to remove all of the grate-bars easily, slide on new ones in their place, and again secure the row of grate-bars by simply inserting the pin 16. The shafts 6 are perfectly brought in motion through the aid of the gear-wheels 17 and 18.

Directly over the surface of said moving and endless chain of grate-bars and passing through the fire-arch transversely is a steam-pipe 19, with an air-passage 20 above and
 5 around said pipe. Nipples of pipe 21 are inserted at intervals along and across the grate-surface, leaving an air-space 22 around said pipes or nipples. The steam and air discharged in a downward course from above
 10 will naturally strike the fumes and smoke created through the burning of fuel on top of the grate-surface, and our object is to drive said smoke and said fumes with the aid of the combined steam and air draft into the
 15 flames of the fire, said smoke and fumes being thereby consumed. After the fuel has been slowly moved in the direction of the ash-trap, it being understood that the speed of the grate-surface is in proportion to the
 20 time it requires to consume a certain amount of fuel, and after the fuel, having been changed into ashes and cinders in the meantime, has arrived over the spider 8 said ashes will drop down onto a trap-door 19, the weight
 25 of the ashes automatically opening said trap-door, and after the ashes have dropped down into the pit 20 said trap-door 19 will again automatically close itself through the aid of the counterweight 21, the lever 22, and the fulcrum-pin 23, said fulcrum-pin 23 being carried by the bracket 24. It will be seen that the air in the pit 20 will be kept out of the fire-box at all times, no back draft being created. A similar mechanism 25 is shown directly below the lower part of the traveling grate with a shutter-plate 26, fulcrumed at 27 and moved into the desired position through the aid of rod 28. Said arrangement is made to admit back draft to the fire-box
 40 in case of too much draft or too hot burning fire in the fire-box. The admission of air and fuel is also regulated through a block 29, which is vertically movable by the aid of a ratchet-wheel 30, handle 31, shaft 32, and
 45 vertical rods 33.

It will now be seen that the operator, being desirous of getting up steam in his boiler and having thoroughly cleaned his grate-bars in front of the boiler, the traveling grate having
 50 been moved out of its operating position for that purpose, he again rolls the traveling grate back to its proper position under the fire-box of the boiler through the aid of the wheels 2, running on the rails 1. He is then
 55 ready to start his fire, admitting air and fuel through the opening regulated by the block 29, burning the fumes and smoke created with the assistance of the air and steam blown into the smoke through the steam-pipes 19
 60 and 21 and air-passages 20 and 22. After a certain amount of fuel has been burned and presently been changed into ashes said ashes will be taken up and carried down onto the trap-door, the weight of same automatically
 65 opening the passage for the ashes to fall into the pit and again automatically closing the trap-door, preventing any back draft from

coming into the fire-box. In case the heat under the boiler should be too great the air-admitting shutter 26 can be opened and by
 70 the current of air admitted the heat can be reduced. Supposing some of the grate-bars have been burned while exposed to a very hot fire, the operator is in the position to easily slip off said burned grate-bar as soon as
 75 it has moved back to the front of the boiler by simply taking out the split pin 16, replacing the burned grate-bar with a new one, and putting the split pin back into its former place, all this having been easily carried out
 80 while the grate-bar mechanism is running.

It is easily understood that the advantages are very great, and it will be seen that the details of our invention can be altered in many ways without departing from the spirit
 85 of our invention, and we therefore do not confine ourselves to such details; but

What we claim, and desire to secure by Letters Patent, is—

1. In a combustion-chamber, the combination in a chain-grate stoker, of the grate-bars having locking-recesses 15' on their under
 90 sides the I-beam grate-carriers having upper flanges to engage said locking-recesses, the two-piece arched link-sections 9 hinged together at one side of the middle of said link,
 95 the larger section thereof having an inverted-T slot 13 to interlockingly engage the lower flanges of said I-beam grate-carrier and suitable upper and lower tracks and guideways
 100 for said links and rollers to support same in both their forward and rearward travel, substantially as described.

2. In a traveling grate, the combination of the individual grate-bars, each having the
 105 webbed upper surfaces and a base, said base having interlocking apertures or openings adapted to engage the flanges of the I-beam grate-carrier and hold said carrier against vertical movement, the I-beam grate-carrier
 110 having flanges engaging said interlocking apertures or openings 15', the arched two-section flexing links, each having in the upper side of one section thereof the inverted-T
 115 slots for engaging the opposite flanges of said I-beam grate-carriers to hold said carriers against movement in a vertical direction, and having on their under sides the lugs or teeth directly opposite to said T-shaped apertures,
 120 the chain-cams 7 for engaging said lugs, and the antifriction-rollers in the ends of said two-section links, substantially as described.

3. In a traveling grate, the combination with the stoking-furnace and the grate-carriage of the flanged and apertured removable
 125 grate-sections, the grate-bar carriers 14 adapted to interlock with said grate-sections, the curved two-section links provided with the short forked ends adapted to receive the shank of the adjoining link and containing the anti-
 130 friction-rollers, said links being provided with the long shank-section 9 and the short section provided with the inverted-T-shaped aperture 13 interlocking with the lower flanges of

the grate-carrier 14, and also provided with the tooth or lug 9' engaging cams 7, and the I-beam rails and angle-plates upon which said rollers travel, substantially as described.

5 4. In a traveling grate, the combination of the grate-bars 15 having T-shaped openings 15' interlocking with the upper flanges of the grate-bar carriers, the grate-bar carriers hav-
 10 ing flanges on their upper sides engaging said openings and also having engaging flanges on their under sides, the antifriction-roller links having two sections hinged together, one there-
 15 of being larger than the other, said larger section having the T-shaped opening interlock- ing with the grate-carrier flanges, the cams 7 engaging the teeth 9' on the under side of
 20 said links, and the I-beam rails and angle- plates supporting said grate, substantially as described.

20 5. In a traveling grate the combination of the grate-bars having openings 15', the I-beam grate-carriers, having upper and lower flanges, the upper thereof being adapted for interlock-
 25 ing engagement with said openings 15', the arched, two-part hinged links having open- ings 13 on their upper sides adapted to engage
 30 said lower flanges, said links being provided with the lugs or teeth on their under sides, the rollers pivoted on the ends of said hinged
 35 links, and the I-beam rails between and on the upper and lower flanges of which said rollers travel, substantially as described.

6. The combination of the series of grates,

movable over and around the movable frame-
 work, the individual roller-links 9 attached 35
 to said grates and moving therewith to sup-
 port all of said grate-sections on an equal
 level, the I-beam and angle-plate guides 5², 5⁴
 for said rollers preventing their movement in
 a vertical direction, the interlocking means 40
 13, 14 and 15' provided in and between said
 grate-sections and links, and the means for
 moving said series of grates over and around
 said framework, substantially as described.

7. The combination of the series of grates, 45
 movable over and around the movable frame-
 work, the individual supporting-links 9 for
 each of said grate-sections and movable there-
 with to support the entire upper and lower
 surfaces of said grate on a level, the guiding- 50
 rails 5², 5⁴ in said framework coacting with
 said supporting means, the interlocking aper-
 tures and flanges 13, 14 and 15' in said grate-
 sections, links and grate-carriers, the spider
 provided at the rear end of said chain-grate 55
 stoker to prevent the products of combustion
 from falling inside of same, and means for
 moving said grate and spider, substantially
 as described.

In testimony whereof we have affixed our 60
 signatures in presence of two witnesses.

HUBERT STRAETEN.

FREDRICK SCHNECK.

Witnesses:

MAX BAUM,

ROBT. KLOTZ.