

(No Model.)

2 Sheets—Sheet 1.

P. L. CROWE.
REVOLUBLE GRATE.

No. 454,841.

Patented June 30, 1891.

Fig. 1.

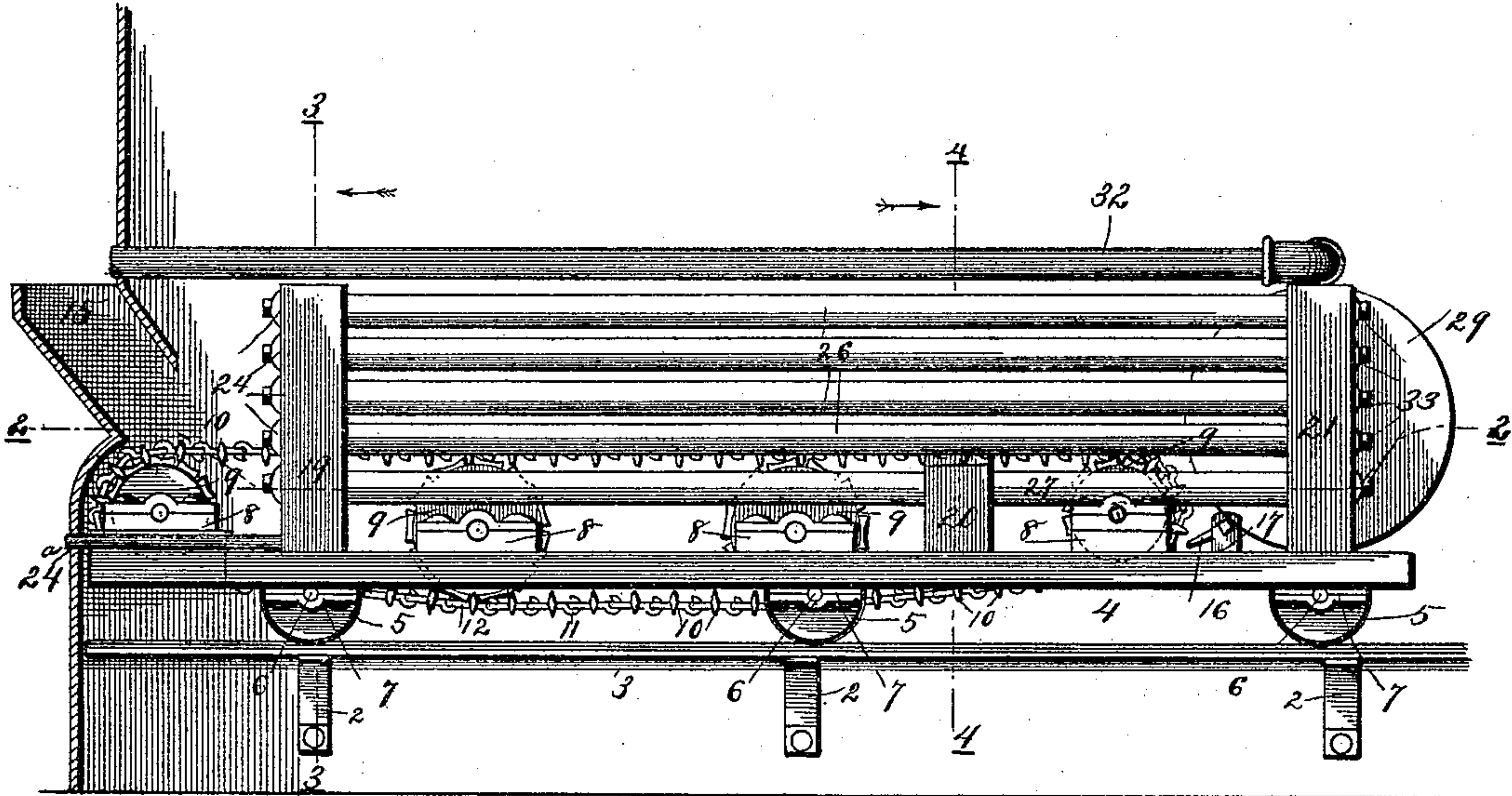
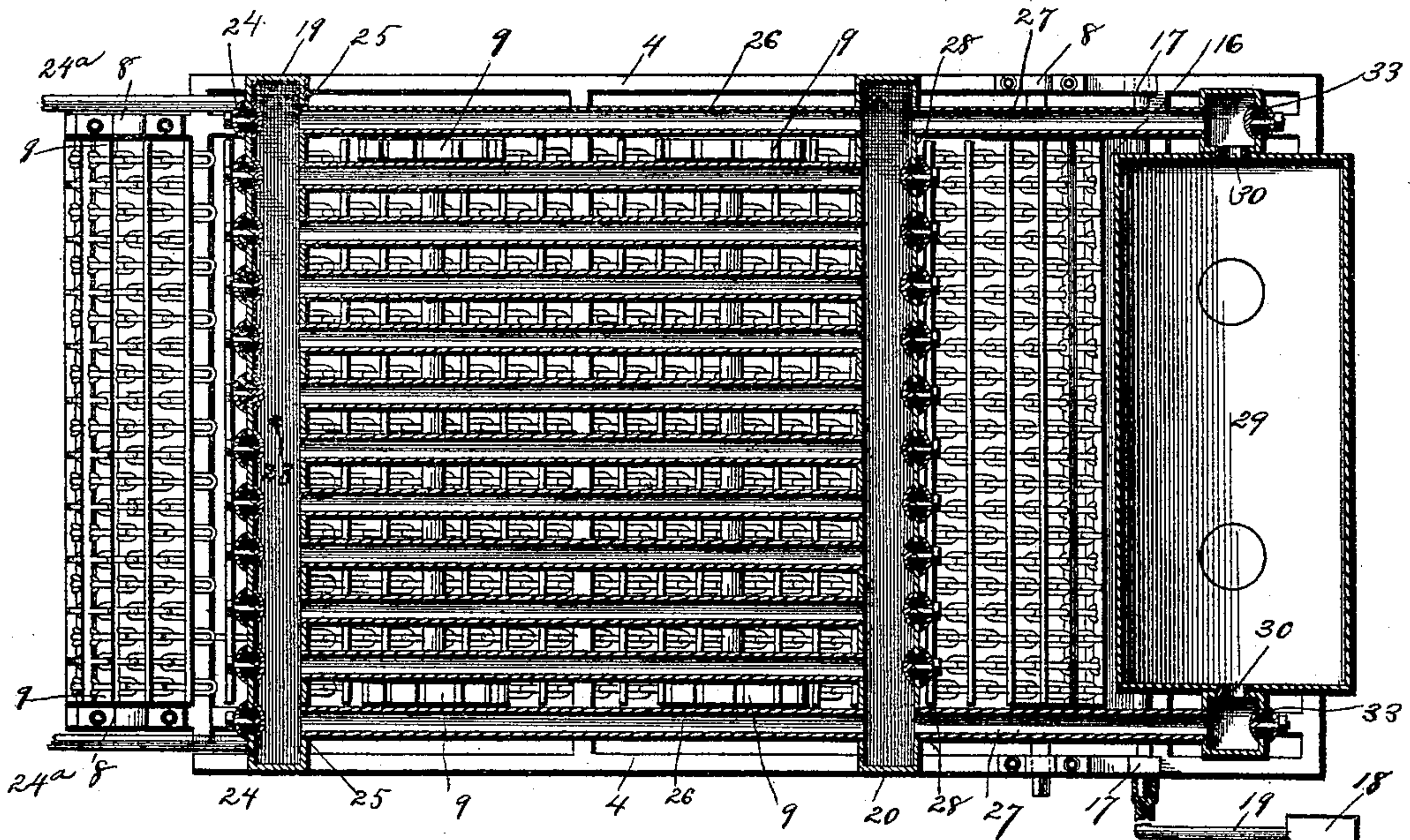


Fig. 2.



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Fig. 5.

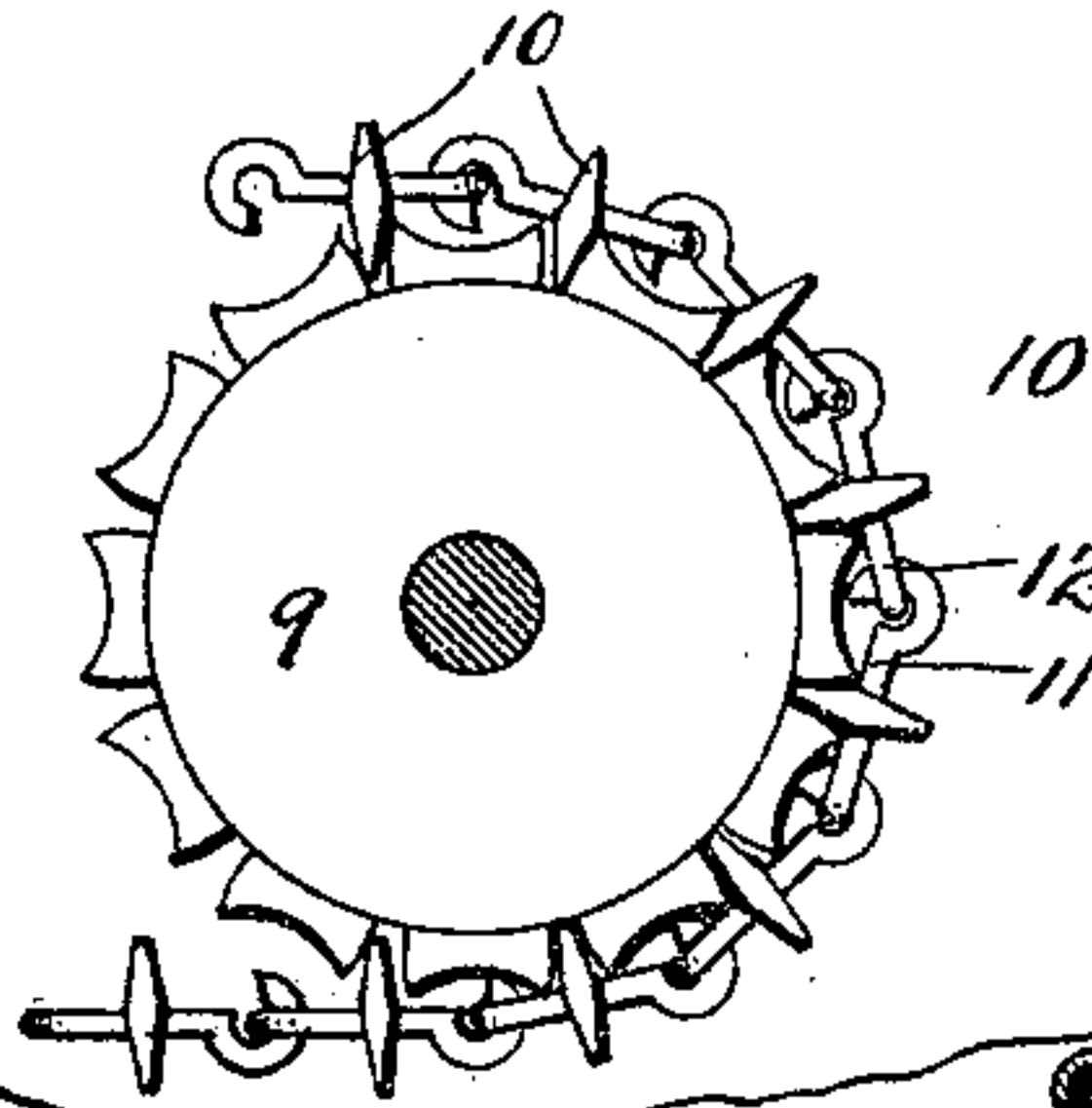


Fig. 3.

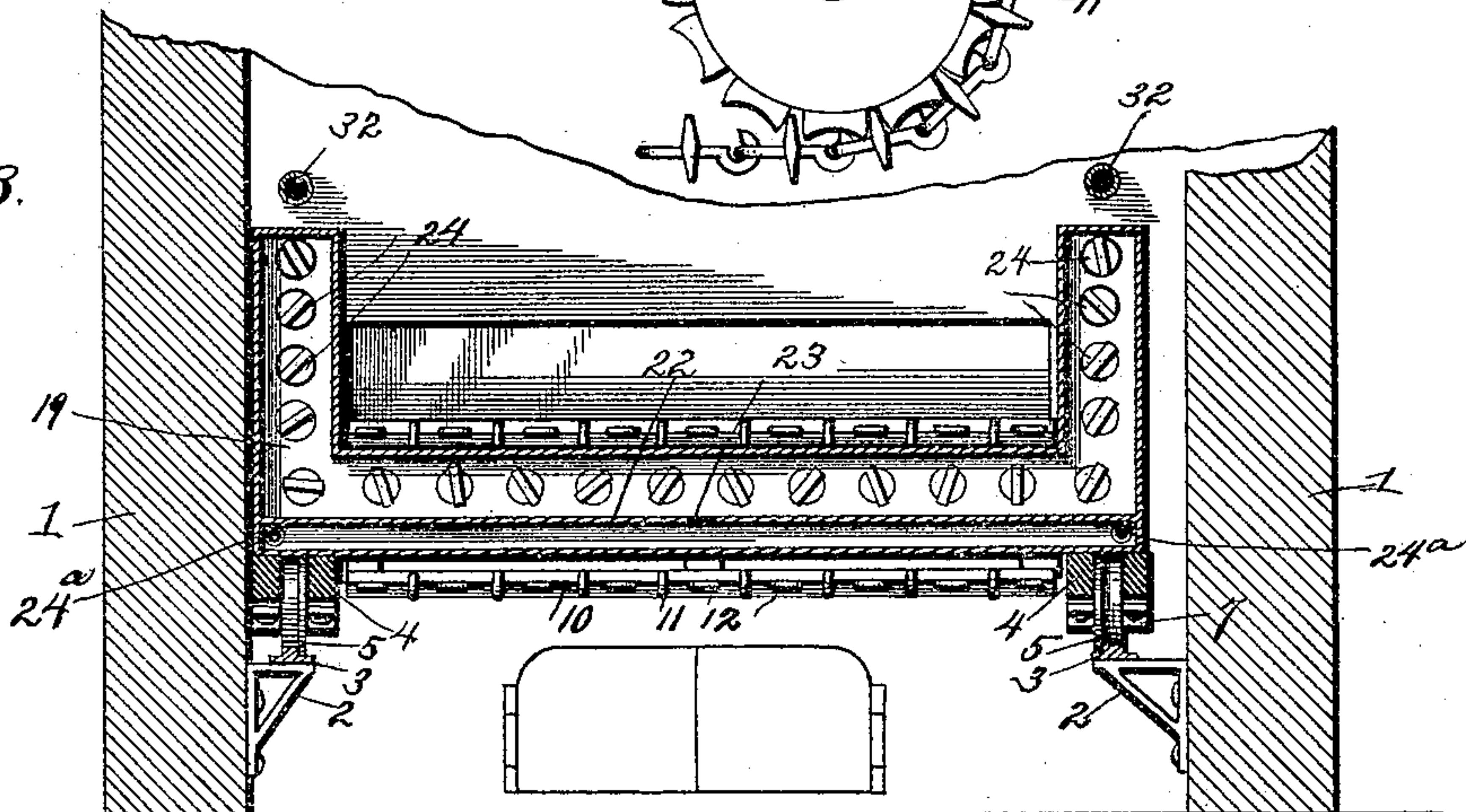


Fig. 4.

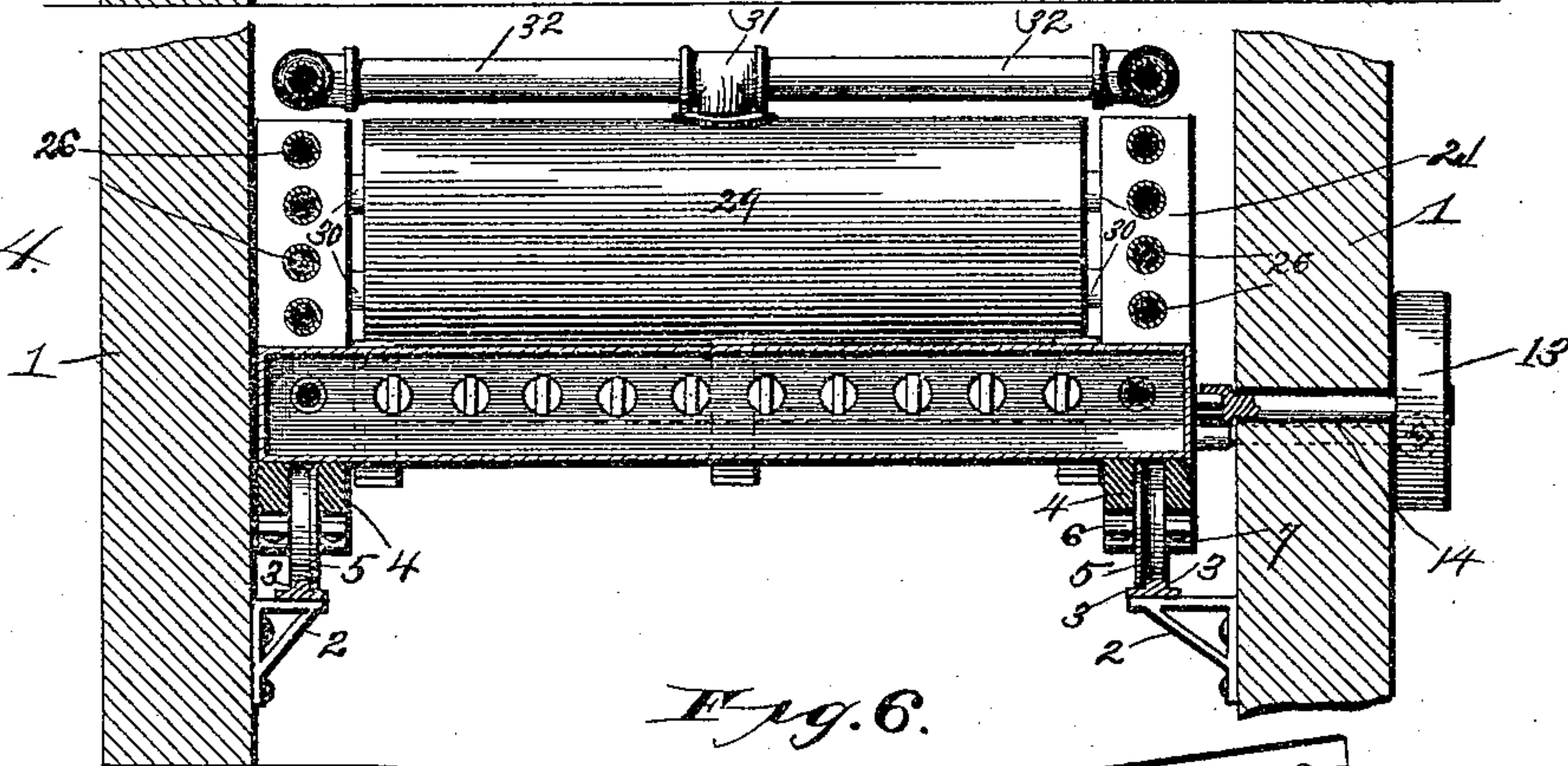


Fig. 6.

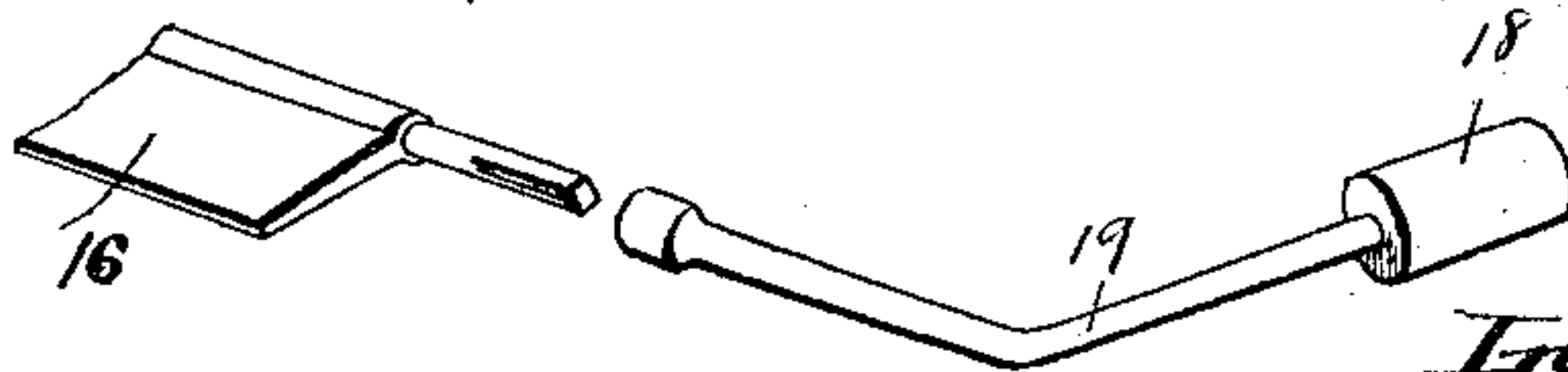
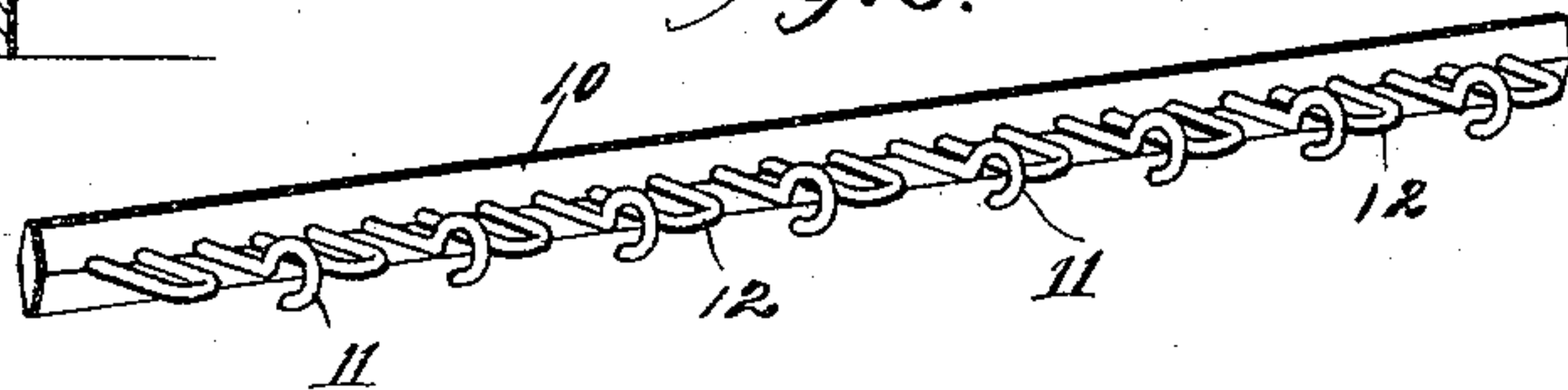


Fig. 7.

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UNITED STATES PATENT OFFICE.

PAUL L. CROWE, OF KANSAS CITY, MISSOURI.

REVOLUBLE GRATE.

SPECIFICATION forming part of Letters Patent No. 454,841, dated June 30, 1891.

Application filed February 9, 1891. Serial No. 380,756. (No model.)

To all whom it may concern:

Be it known that I, PAUL L. CROWE, of Kansas City, Jackson county, Missouri, have invented certain new and useful Improve-
5 ments in Revoluble Grates, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to traveling grates for
10 steam-boiler furnaces, also to tubular feed-water heaters designed to operate in conjunction with such grates, the objects of my invention being, first, to provide a self-feeding traveling grate which shall be simple,
15 durable, and inexpensive in construction, and which shall also be well open in its construction, so as to afford the utmost freedom of air-circulation and thereby insure a thorough combustion of the fuel. Furthermore, to pro-
20 duce a tubular feed-water heater which shall be adapted to effectively operate in connection with a traveling grate, and which shall be so constructed as to insure a rapid constant flow of water, so as to increase the ca-
25 pacity of the heater, and which shall be also so arranged as to facilitate the cleaning of the flues and thus insure the fullest effective action of the heat at all times.

To the above purpose my invention con-
30 sists in certain peculiar and novel features of construction and arrangements, as hereinafter described, and pointed out in the appended claims.

In order that my invention may be fully
35 understood I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a traveling grate and feed-water heater constructed in
40 accordance with my invention. Fig. 2 is a horizontal cross-section of the same on the line 2 2 of Fig. 1. Fig. 3 is a transverse vertical section of the same on the line 3 3 of Fig. 1. Fig. 4 is an irregular transverse ver-
45 tical section of the same on the line 4 4 of Fig. 1. Fig. 5 is a detached view, partly in side elevation and partly in vertical longitudinal section, of a portion of the grate and its actuating devices. Fig. 6 is a detached perspective
50 view of a portion of the grate. Fig. 7 is a detached perspective view of the counter-weight

for the damper and the adjacent portion of the latter.

Referring to the said drawings, 1 in Figs. 3 and 4 designates a portion of the side walls of
55 the furnace-setting, and 2 in Fig. 1 also designates a number of brackets or supports, which are suitably secured to the inner sides of the walls 1, and which are either of the form shown or of any other suitable or preferred type
60 applicable to the purpose to be hereinafter explained. These brackets 2 sustain a pair of rails or tracks 3, which also are of any suitable or preferred type, and which rest
65 horizontally upon the brackets 1 parallel with each other. It is to be understood that these rails and their supports extend within the fire-chamber of the furnace, so that the grate and feed-water heater, to be hereinafter de-
70 scribed, are normally inclosed within said fire-chamber. It is also to be understood that the boiler (not shown) is of any preferred type and occupies any suitable position rela-
75 tively to and in communication with the fire-chamber.

Upon the rails or tracks 3 is movably sup-
ported an open or skeleton frame 4, which is preferably of rectangular form, as shown, and which is provided with a number of carrying-
80 wheels 5, arranged to travel upon the tracks 3, and having each short axles 6, journaled in boxes 7, attached to the under sides of the frame 4. Upon the upper side of the frame 4 are mounted a suitable number of bearing-
85 boxes 8, (there being eight of such boxes shown, arranged four at either side of the frame,) and in each of these boxes is jour-
naled the axle of a sprocket-wheel 9. (See Fig. 5.) The endless traveling grate runs
90 over these sprocket-wheels 9, and said grate consists of a number of metal bars 10, extending parallel with each other transversely of the frame 4, and connected together securely, but detachably, by alternate interlocking-
95 hooks 11 and staples or eyes 12. (See Fig. 6.) The hooks 11 are shown as alternating with the staples or eyes 12 on the same side of each bar 10, and a staple 12 on one side of said bar is shown as extending directly opposite from
100 a hook 11 on the opposite side of said bar. This is the preferred relative arrangement of the hooks and staples or eyes, and it will be

seen that this manner of connecting the bars operatively together not only permits the grate as a whole to be readily lengthened and shortened, as required, but renders the grate very open for the free passage of air. This latter advantage is important, inasmuch as it insures a free and perfect combustion of fuel upon the grate. During the time that the grate is in use in the furnace it is intended to be kept constantly in motion from its front toward its rear, and this is accomplished by mounting a suitable belt pulley or wheel 13 upon the outer end of an axle 14, the inner end of the said axle being preferably detachably connected to the outer end of the axle of one of the wheels 9. The fuel is received upon the front end of the grate through a chute 15, leading from a suitable hopper which is mounted at the front of the boiler, and as the grate travels away from said chute the fuel is gradually consumed until the rear end of the grate-frame is reached. At this rear end of the grate-frame the fuel will have been thoroughly consumed and reduced to ashes, which will filter downward through the grate. A suitable damper 16 is located beneath the grate at or adjacent to the rear end of the grate-frame, and said damper is preferably pivotally supported in end standards 17, mounted upon the frame 4, while a counter-weight 18 is mounted upon an arm 19, suitably connected to one end of the damper. The arrangement is such that the weight 18 normally holds the damper open, while the ashes from the moving grate drop and accumulate upon the damper and close it against the action of the weight. Thus the action of the damper is rendered automatic and an economical consumption of fuel is insured.

Immediately upon the frame 4 are placed three water legs or reservoirs 19, 20, and 21. The reservoir or leg 19 is located at the front end of the frame 4 and is of approximately U shape, as shown. The lower horizontal portion of this leg is divided into an upper and a lower compartment by a horizontal longitudinal partition 22, (see Fig. 3,) through the middle of which is formed an opening 23. Inlet-pipes 24^a are tapped into the ends of the lower portion of this reservoir, so as to communicate with the ends of the compartments below the partition 23. Thus the water is compelled to fill the lower compartments before it can escape upward into the upper parts of the reservoir, and hence a very even flow and distribution of the water are insured.

The upper compartment of reservoir 19 communicates with the interior of the vertical parts of the same, and the front walls of said upper and vertical compartments are pierced with openings, which are closed by removable covers 24. The rear walls of these parts of the reservoir 19 are formed with a number of openings 25, into which are set the front ends of a corresponding number of tubes 26. These tubes extend backward horizontally and par-

allel with each other to their points of connection with the reservoirs 20 and 21.

The reservoir 20 is set somewhat rearward of the middle of the frame 4, and consists simply of a horizontal chamber, the front wall of which is provided with openings, into which the rear ends of the lower series of tubes 26 are set, while the rear wall of said reservoir is formed with a like number of similar openings, into the two end ones of which the front ends of a pair of end tubes 27 are set. The rear ends of the upper set of tubes 26 are set into openings in the front walls of the rear reservoirs 21, and in the intermediate openings in rear wall of the reservoir 20 are set a number of removable caps 28, similar to the caps 24, before referred to.

By reference to Fig. 4 it will be seen that there are two of the reservoirs, each of which is simply a vertical reservoir. Between these two reservoirs is interposed, above the rear end of the frame 4, a feed-water drum 29, which communicates at its ends, through short pipes 30, with the interiors of the reservoirs 21. From the middle of the upperside of the drum 29 leads a T-coupling 31, which is connected to two oppositely-extending pipes 32, which in turn communicate with the water-space of the boiler. (Not shown.)

From this description it will be seen that the water-heating apparatus is so constructed as to operate with peculiar effectiveness in connection with a traveling grate of the type above described, and that the location of the various parts of the heater is such as to most effectively receive the heat from the furnace, while the course of the water through the several parts of the heater is such as to insure a constant and undivided flow or current through the heater and into the boiler. It will also be observed that the arrangement of the removable caps 24 28, above referred to, is such that when the heater is not in use and the caps are removed a direct way is provided for cleaning the tubes of scale, sediment, and other impurities. This result is further insured by means of similar removable caps 33, which are set in openings in the rear walls of the reservoir 21.

The structure as a whole is simple, durable, and comparatively inexpensive, and requires but little care in its operation. When desired, the entire feed-water-heating apparatus can be readily run out of the furnace, and thus the cleaning and inspection of the apparatus are greatly facilitated.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. An improved traveling grate comprising a series of bars provided with alternating and interlocking hooks and eyes or staples for detachably connecting said bars together, substantially as set forth.

2. An improved traveling grate comprising a wheeled frame, a number of sprocket-wheels

5 journaled thereon, and an endless movable grate running over said sprocket-wheels and composed of a number of bars having alternating and interlocking hooks and eyes for detachably connecting said bars together, substantially as set forth.

10 3. An improved traveling grate comprising a wheeled frame, a number of sprocket-wheels journaled on said frame, a driving wheel or pulley connected with one of said sprocket-wheels, and an endless movable grate running over said pulleys and composed of a number of bars provided with alternating and interlocking hooks and eyes or staples, substantially as set forth.

15 4. An improved attachment for boiler-furnaces, comprising a wheeled frame, a number of water-receptacles mounted thereon, and tubes connecting said receptacles and extending longitudinally of the frame, substantially as set forth.

20 5. An improved attachment for boiler-furnaces, comprising a movable frame, a number of water-receptacles mounted thereon, a number of these tubes connecting said receptacles, and a number of removable caps set in openings in the walls of said receptacles and disposed oppositely to the ends of said tubes, substantially as set forth.

30 6. An improved attachment for boiler-fur-

naces, comprising a movable frame, a number of water-receptacles mounted on said frame, a number of tubes connecting said receptacles, a drum or reservoir communicating with one of said receptacles, and pipes connecting said drum with the water-space of a boiler, substantially as set forth. 35

7. An improved attachment for boilers, comprising a movable frame, a receptacle of approximately U shape mounted upon the front end of said frame, a horizontal receptacle located about midway of said frame, two oppositely-disposed vertical receptacles located at the rear end of said frame, and tubular connections communicating with the interior of the said receptacles, substantially as set forth. 40 45

8. An improved attachment for boiler-furnaces, comprising a number of water-receptacles having tubular connections establishing communication between their interiors, one of said receptacles being approximately of U shape and having a horizontal partition in its lower portion provided with an opening between its ends, substantially as set forth. 50

In testimony whereof I affix my signature in presence of two witnesses. 55

PAUL L. CROWE.

Witnesses:

G. E. WILLSON,
H. E. PRICE.