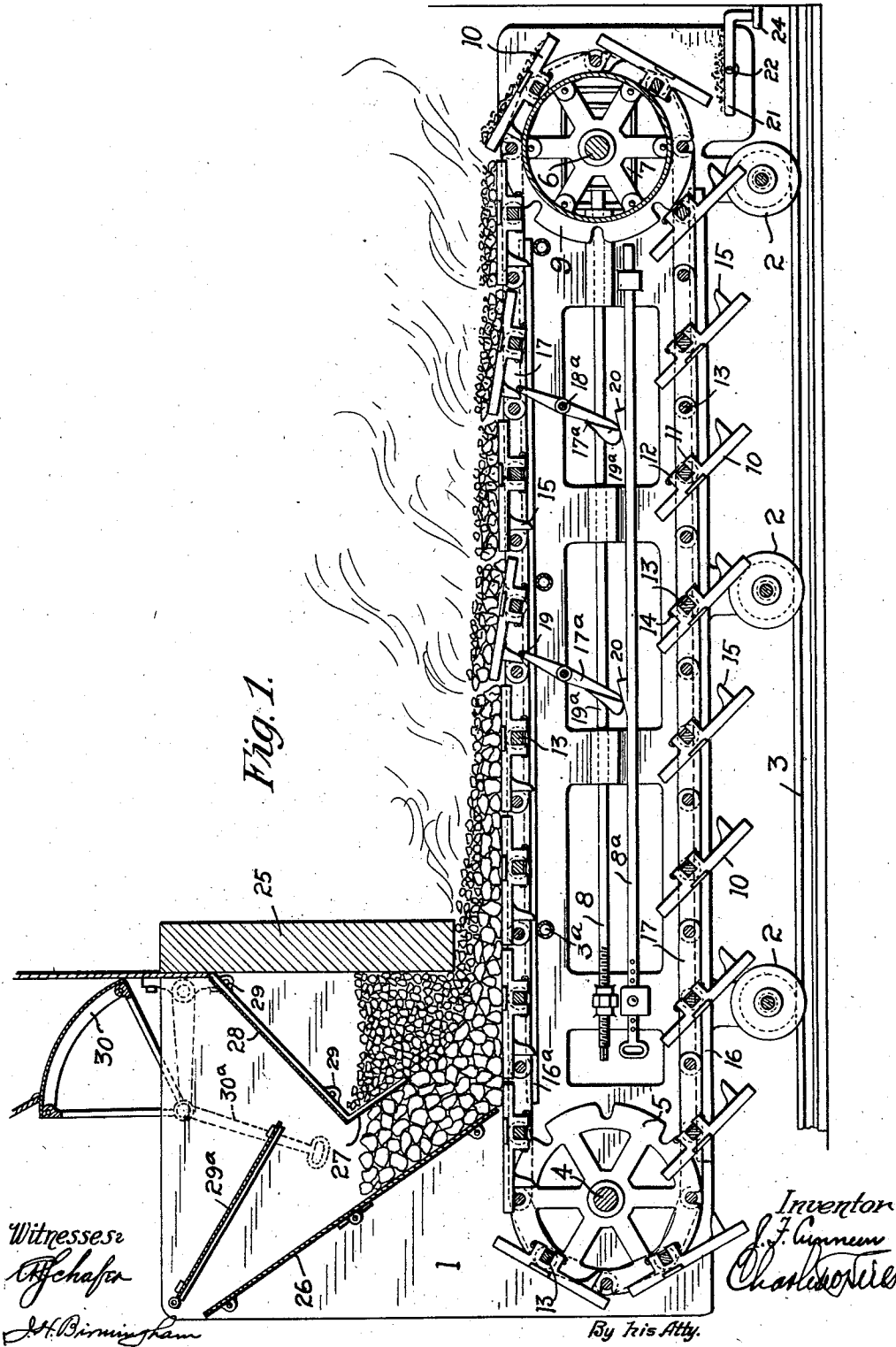


973,481.

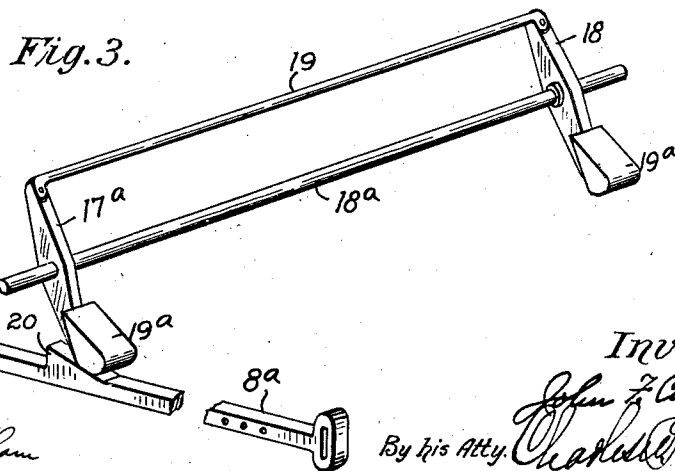
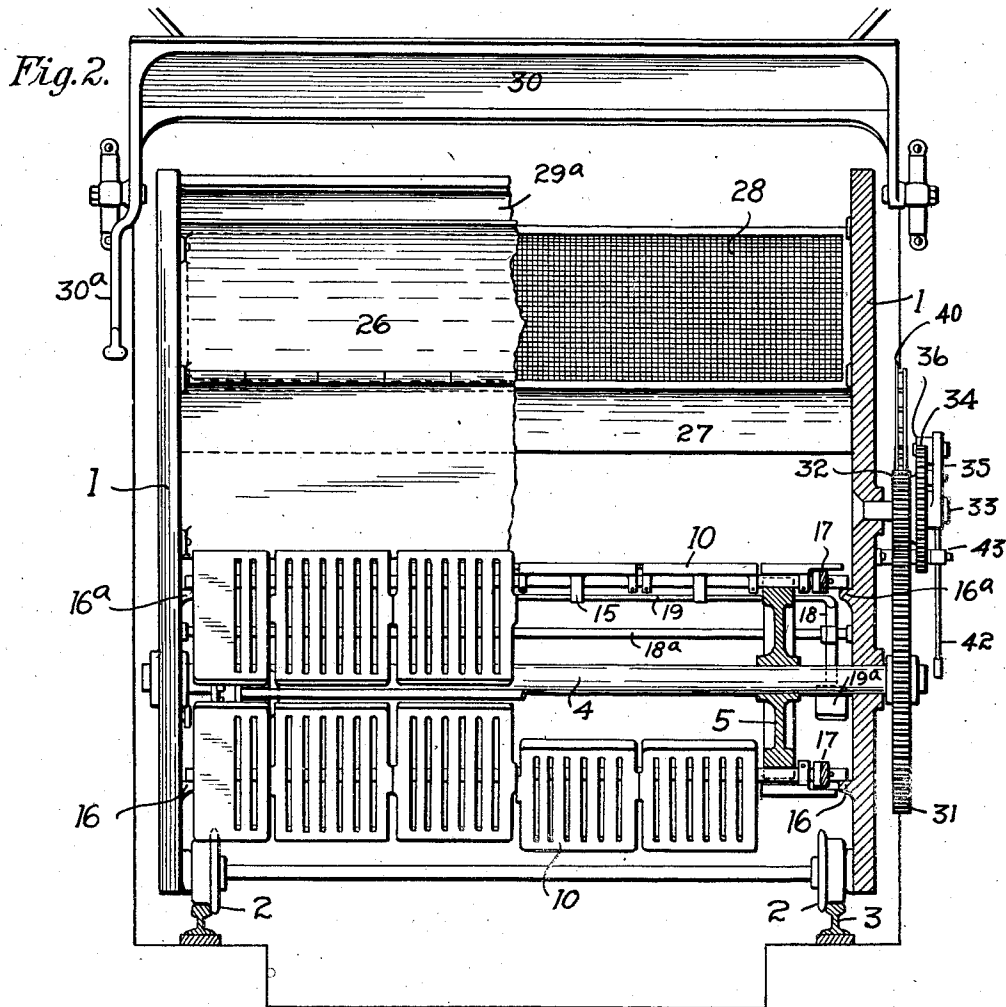


J. F. CUNNEEN.
FURNACE GRATE.
APPLICATION FILED JULY 11, 1908.

973,481.

Patented Oct. 25, 1910.

3 SHEETS—SHEET 2.



Witnesses
W. Schaefer
J. H. Birmingham

Inventor
John F. Cunneen.
By his Atty. *Charles H. Hill.*

J. F. CUNNEEN.

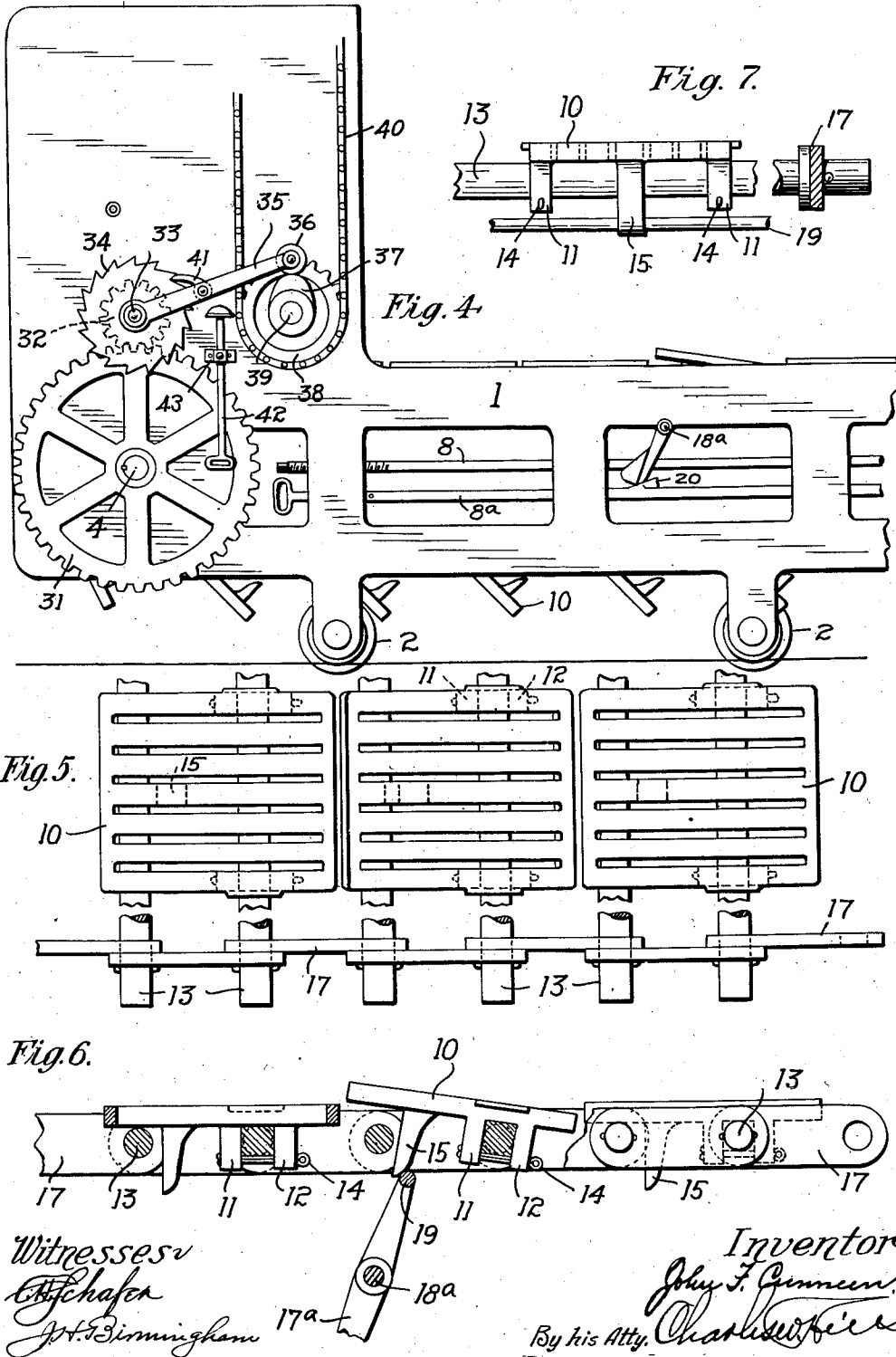
FURNACE GRATE.

APPLICATION FILED JULY 11, 1908.

Patented Oct. 25, 1910.

3 SHEETS-SHEET 3.

973,481.



UNITED STATES PATENT OFFICE.

JOHN F. CUNNEEN, OF CHICAGO, ILLINOIS.

FURNACE-GRATE.

973,481.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed July 11, 1908. Serial No. 443,353.

To all whom it may concern:

Be it known that I, JOHN F. CUNNEEN, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnace-Grates; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in traveling furnace grates of that class set forth in my prior application for patent for furnace traveling grates, filed Sept. 27, 1905, Serial No. 280,389. With grates of this class there has often been experienced great difficulty in supplying sufficient oxygen to properly support combustion with the result that much of the value of the fuel is lost. This is due in part to the fuel, such as anthracite coal, caking upon the grates preventing the air passing through and above the grate to mix with the hydro-carbon gases. It was partly the object of my prior invention to overcome this defect by agitating the grate at one or more stages in its travel to prevent caking and also to provide openings for the ingress of air. In said construction the lugs which are contacted are located in the middle or at approximately the center of gravity of the grate clips which is objectionable as it requires considerable power to elevate the loaded clips resulting in excessive wear of the operating parts.

It is an object of this invention to provide a traveling furnace grate and means for agitating or rocking the clips composing the grate a plurality of times while supporting the fuel thereby preventing caking of the fuel and successively providing air passages through the bed of fuel.

It is further an object of the invention to provide clips so constructed as to require minimum power in rocking the same and in which the wear is reduced to a minimum.

It is also an object of the invention to provide novel mechanism for actuating the grate and means for varying the rate at which said mechanism moves the grate forwardly.

It is finally an object of this invention to improve the grate construction as a whole and to improve the mechanism for rocking the grate clips.

The invention consists in the matters here-

inafter described and more fully pointed out and defined in the appended claims.

In the drawings: Figure 1 is a central longitudinal section of a device embodying my invention. Fig. 2 is a front elevation thereof with part in vertical section and parts of the grate units omitted showing the grate units in different positions in turning. Fig. 3 is an enlarged detail of the mechanism for rocking the grate clips. Fig. 4 illustrates the mechanism for actuating the grate and the means for varying the velocity thereof. Fig. 5 is a fragmentary top plan view of the grate. Fig. 6 is a fragmentary side elevation of the grate with part in longitudinal section. Fig. 7 is a fragmentary detail of the grate and the mechanism for rocking the clips.

As shown in the drawings: The grate is supported upon a movable frame composed of side sections 1, rigidly connected by stay rods 3^a, each section at the forward end thereof extends upwardly to form the side walls of the fuel hopper. Track wheels 2, are journaled to each section which support the same on the tracks 3, whereby the grate may be shifted or removed when necessary.

Journaled in the forward end of the frame is a shaft 4, having notched wheels 5, secured on each end thereof and a shaft 6, is journaled at the rear end of the frame in adjustable boxes 7, slidably secured in slots in the side sections and having wheels 9, secured thereon similarly notched. Adjusting rods 8, at one end are rotatably connected with the blocks and at their opposite ends have threaded engagement with a nut, whereby shaft 6, may be adjusted to vary the tension of the grate. Said grate comprises alternate round and square connecting rods 13, which are connected together by links 17. The square rods are round at their ends adapted together with the other rods to engage in the notches in the wheels 5 and 9, whereby said grate is moved longitudinally. Secured to each square bar 13, are fuel supporting clips 10, each of which are provided on each side thereof with lugs 11—12, one engaging on each side of the shaft and removably secured in place by a cotter pin 14, which extends through apertures in the lugs below the shaft. Guides 16—16^a, are provided, which may be integral with the frame or bolted thereto and serve to support the weight of the grate and maintain the upper and lower laps in horizontal position.

Each fuel clip 10, is provided with a projection or cam 15, secured centrally on the inner side of the clip adjacent one end thereof. Said cams 15, are curved on the forward faces adapting the fuel clips being gradually elevated and are provided with straight, flat rear faces adapting the clips to abruptly drop into place to jar the same and thereby loosening the clinkers as well as shaking down the fire bed. Shafts 18^a, are secured to the frame 1, and journaled thereon at each end adjacent the inner side of the frame sections are levers 17^a—18, which are rigidly connected at corresponding ends by means of a rod 19. Each lever is provided on its opposite end with a weight or counterbalance 19^a, adapted to hold the ends of the levers to engage the cam 20, on the adjusting bar 8^a, whereby the degree of rocking of the clips may be accurately adjusted by reciprocation of said adjusting bar or said bar may be adjusted to throw the rocking mechanism out of operative position.

A gear 31, is keyed on the end of shaft 4, outside the frame which meshes with a gear 32, journaled on a stud shaft 33, secured to the frame section. Secured to rotate with the gear 32, on said shaft 33, is a ratchet wheel 34, which is engaged by a pawl 41, pivoted on an arm 35, which is also pivoted at one end on the shaft 33. A shaft 39, is journaled in the frame parallel with the shaft 33, and a cam 37, is secured thereon which engages the friction roller 36, at the end of the arm 35, opposite the pivot whereby for each rotation of said cam the ratchet is advanced one tooth and the grate correspondingly advanced. A sprocket wheel 38, is secured on the shaft 39, around which a chain 40, is trained, which may be driven from any suitable source of power. For the purpose of varying the velocity of the grate a vertical rod 42, is adjustably engaged in a bracket 43, and is secured in any adjustment by means of a set screw. Adjusting the rod varies the amplitude of movement of the arm 35, which in turn controls the rotation of the ratchet wheel 34, through the medium of the pawl 41.

The hopper for the fuel is formed by the side walls of the frame, the front 25 of the furnace, and the sections 26, which connect the sections 1. A partition 29^a, is pivotally secured in the hopper, which delivers the fuel upon a screen 28, where the finer fuel is separated from the coarser. Said screen is secured to a suitable metallic frame provided with lugs 29, by means of which the screen is secured in place and a plate 27, integral with the frame separates the grades of fuel until near the bottom of the hopper when the finer is delivered upon the coarse fuel. A pivoted segment shaped cover is provided for cutting off the fuel supply which is operated by a handle 30^a.

The operation is as follows: The fuel is fed into the hopper and is screened as it advances therethrough, the coarser particles passing over the screen on top of the traveling grate and the finer fuel is deposited on the coarse fuel. Inasmuch as the coarse fuel is next to the grate it is obvious that even though the grate were not agitated the fuel would admit some air therethrough and the danger heretofore always existing where fine fuel is next to the grate, of forming an impenetrable bed of fuel is obviated. As the grate advances with its bed of fuel thereon it becomes more and more compact as the fuel is gradually consumed, and it is necessary in order to secure the maximum value from the fuel to supply more air above the bed than would naturally be supplied thereto. This is accomplished by means of the automatic agitating mechanism, which rocks all the clips of a row to elevate the rear ends and depress the forward ends thereby breaking up any slag or other formation at each end of the clips and providing passages of sufficient area to admit an abundant supply of oxygen above the fuel bed.

Inasmuch as the cams 15, are at the end of the clips or off center, the clips are comparatively easily operated and the wear occasioned between the cams and operating parts is exceedingly small. The weights or counterbalances 19^a, are sufficiently heavy to secure the lower ends of the levers 17^a—18, against the cams on the adjusting bars and prevent the upper ends being forced downwardly by the cams 15, on the clips, in other words, said counterweights are sufficiently heavy to overcome the inertia of the clip and the weight of the fuel carried thereon.

The linear velocity of the grate can be very accurately regulated by adjustment of the rod 42, but of course, any equivalent mechanism may be substituted to vary the arc of movement of the arm 35.

As shown in Fig. 1, the ashes from the traveling grate are emptied upon a platform 21, pivoted on the shaft 22. Said platform is supported off center and adapted when emptied to automatically swing to normal position and has a downturned end normally resting on a stop 24. When the weight of the ashes is sufficiently great they will overbalance the platform and tilt the same forwardly thereby dumping the same after which said platform returns to normal position.

Of course, the rocking or agitating mechanism may be differently constructed as may the clips and many details of construction may be varied without departing from the principles of my invention. I therefore do not desire to limit this application for patent otherwise than necessitated by the prior art.

I claim as my invention:

1. A traveling grate comprising rows of pivotally supported fuel supporting clips; a cam integral with each clip curved on the forward faces and means for simultaneously contacting all the curved faces of the cams of a row of clips for swinging the same on their pivots and said cams having flat rear faces adapting the clips to drop abruptly to jar the clips.

2. A traveling grate comprising supporting clips arranged in rows, each row comprising a plurality of clips, a pair of lugs secured to the under side of each clip, a square shaft engaged between the lugs of all the clips in the same row, a downwardly projecting cam secured adjacent the end of each clip opposite the lugs having curved faces facing the lugs and flat perpendicular rear faces and a round shaft on which the clips loosely rest at their extremities outside of the cams.

3. A traveling grate embracing a frame, shafts journaled therein, notched wheels on said shafts, alternate round and square connecting rods, said square rods rounded at the ends and adapted together with the round rods to engage in the notches in the wheels, links connecting the rods, fuel supporting clips detachably secured to the square rods and said clips adapted at corresponding ends to rest on the adjacent round rod, inwardly directed projections on said clips having curved forward faces and flat rear faces and a pivotally supported rod for engaging the projections of all the clips on each shaft as the same pass thereby.

4. A traveling furnace grate comprising a frame, a conveyer movably longitudinally thereof, fuel supporting clips detachably secured to the conveyer, a cam secured to each clip on one side of the center of gravity thereof, and means for engaging the cam, said cam being shaped to elevate the clip gradually and to quickly drop the clip to jar the clinkers loose and to shake the fuel bed down.

5. A traveling grate comprising pivotally supported clips, cams or projections secured to the clips at one end thereof, pivotally supported means for coacting with the cams to gradually elevate the clips and to abruptly drop the clips to jar the same, and

means for adjusting said pivotally supported means to vary the degree of elevation of the clips.

6. In a traveling grate a frame, notched wheels journaled thereto, a horizontally movable conveyer comprising links and alternate round and square shafts adapted to fit in the notches in the wheels, fuel supporting clips provided with lugs, one to engage on each side of the appropriate square shaft, a cam or projection on each clip extending inwardly having a curved face and means for engaging the curved face of the cam of each clip for tipping the clip upwardly, said cam having an abrupt rear face for quickly dropping the clips.

7. In a traveling grate a frame, a clip supporting conveyer, means for varying the tension thereof, clips pivotally supported, shaft secured to the frame, levers journaled thereon, means connecting the levers adapted to swing the clips on their pivot, a horizontal reciprocable bar secured to the frame and a plurality of cams integral therewith for adjusting the levers to vary the swinging of the clips and to adjust the levers out of operative position.

8. In a traveling grate a frame, a clip supporting conveyer, means for varying the tension thereof, clips pivotally supported, shafts secured to the frame, levers journaled thereon, means connecting the levers adapted to swing the clips on their pivot, reciprocal cams for adjusting the levers to vary the swinging of the clips and to adjust the levers out of operative position, means for reciprocating the cams and mechanism adjustable to vary the velocity of said traveling grate.

9. A traveling grate comprising shafts, clips secured thereto, a cam secured to each clip having a curved front face and a straight, flat rear face and mechanism for engaging the curved faces of the cams for agitating the clips.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

JOHN F. CUNNEEN.

Witnesses:

C. W. HILLS,
K. E. HANNAH.