

No. 609,020.

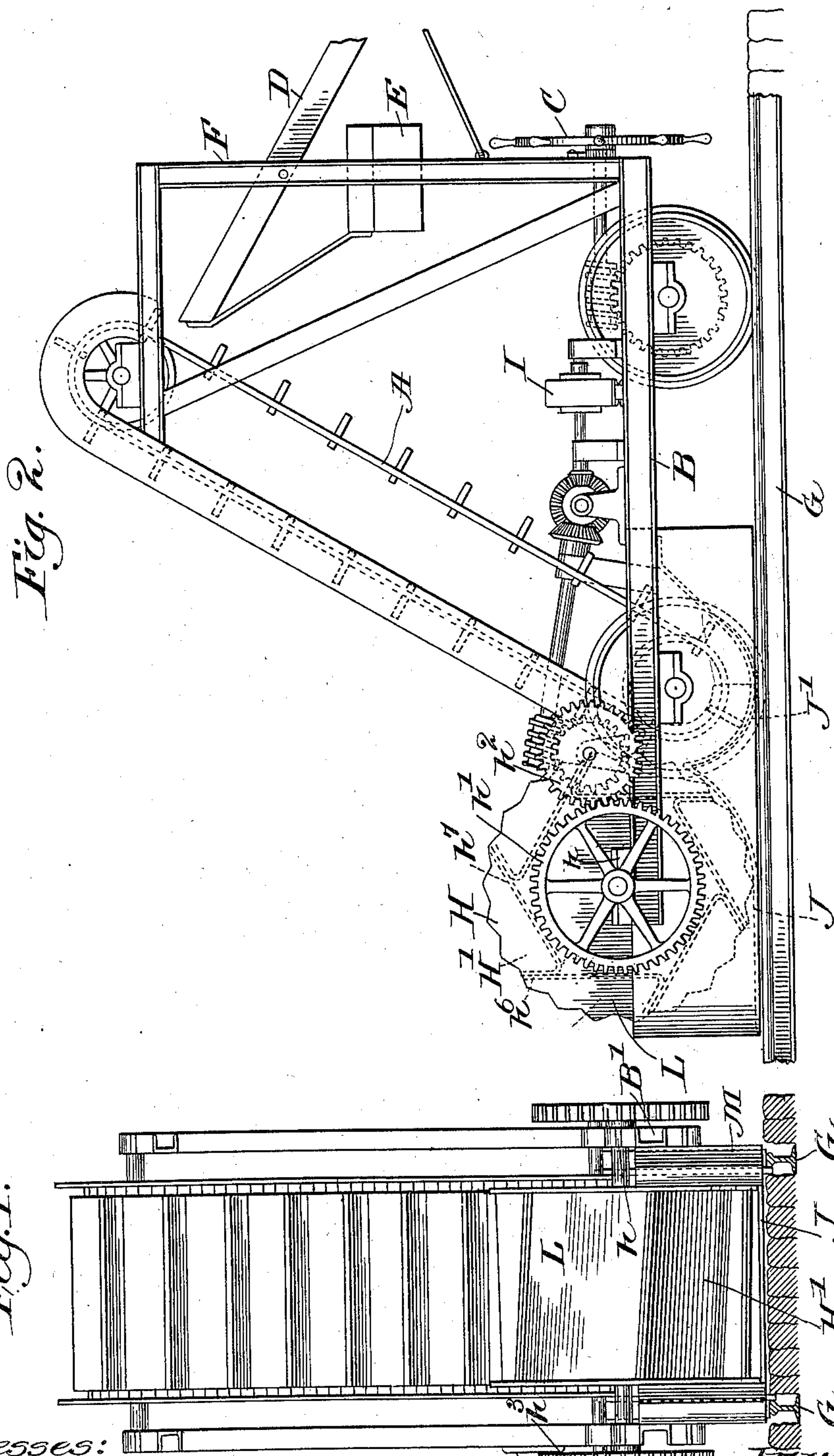
Patented Aug. 16, 1898.

R. C. GREENERD.
APPARATUS FOR HANDLING COAL.

(Application filed Feb. 15, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
A. C. Harmon
Thomas F. Drummond

Inventor
Robert C. Greenerd
by Crosby & Company attys

No. 609,020.

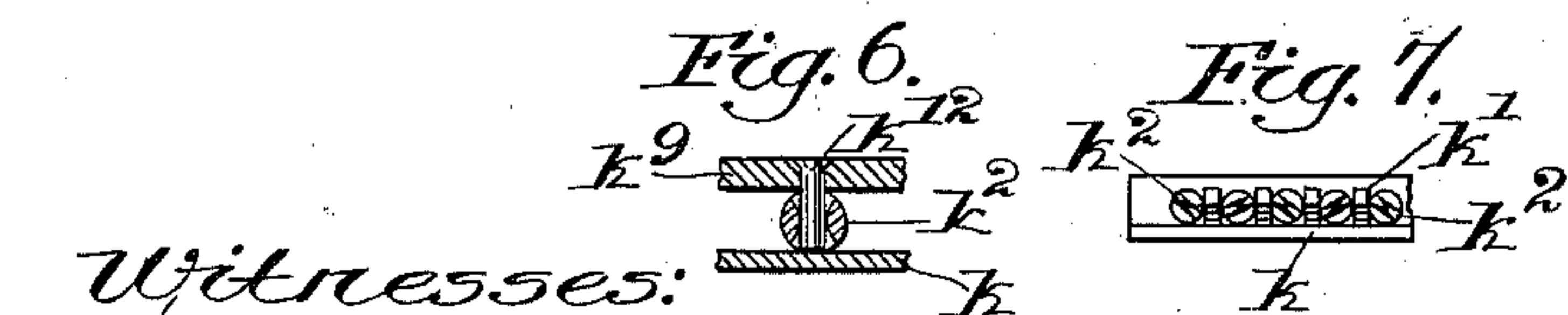
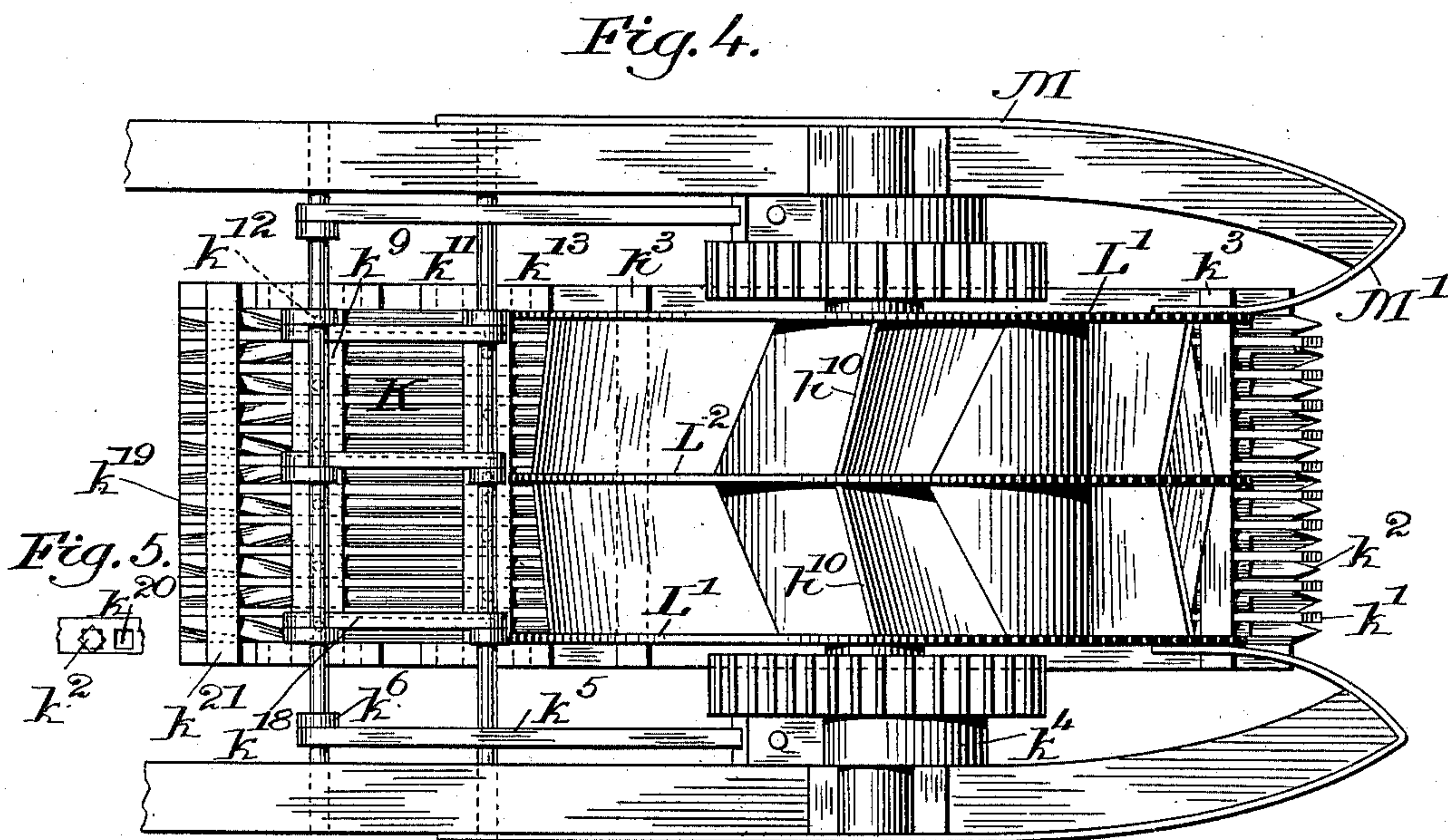
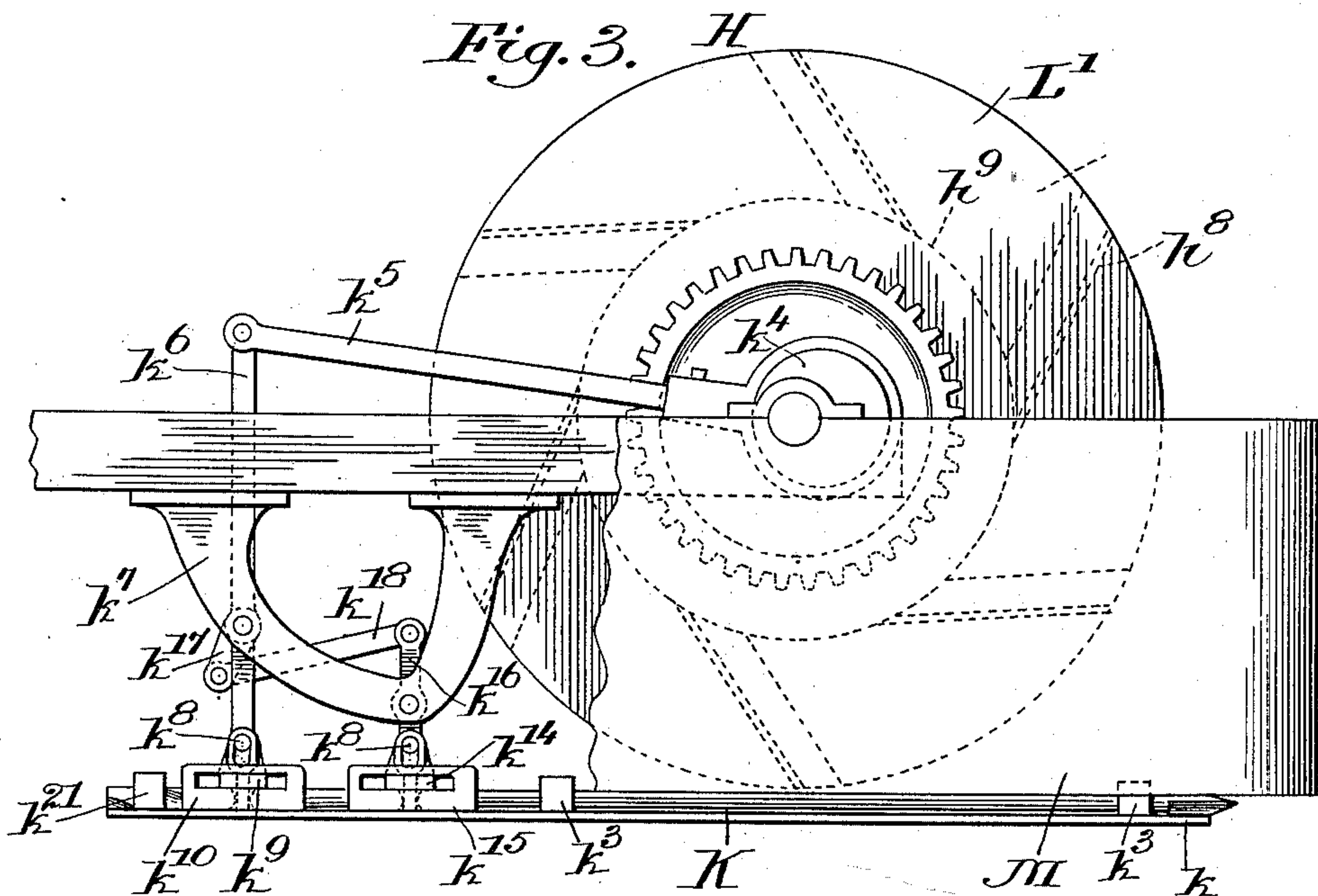
Patented Aug. 16, 1898.

R. C. GREENERD.
APPARATUS FOR HANDLING COAL.

(Application filed Feb. 15, 1897.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:
A. C. Hammond,
Thomas Drummond.

Inventor.
Robert C. Greenerd.
by Crosby & Engle,
Attys.

No. 609,020.

Patented Aug. 16, 1898.

R. C. GREENERD.
APPARATUS FOR HANDLING COAL.

(Application filed Feb. 15, 1897.)

(No Model.)

3 Sheets—Sheet 3.

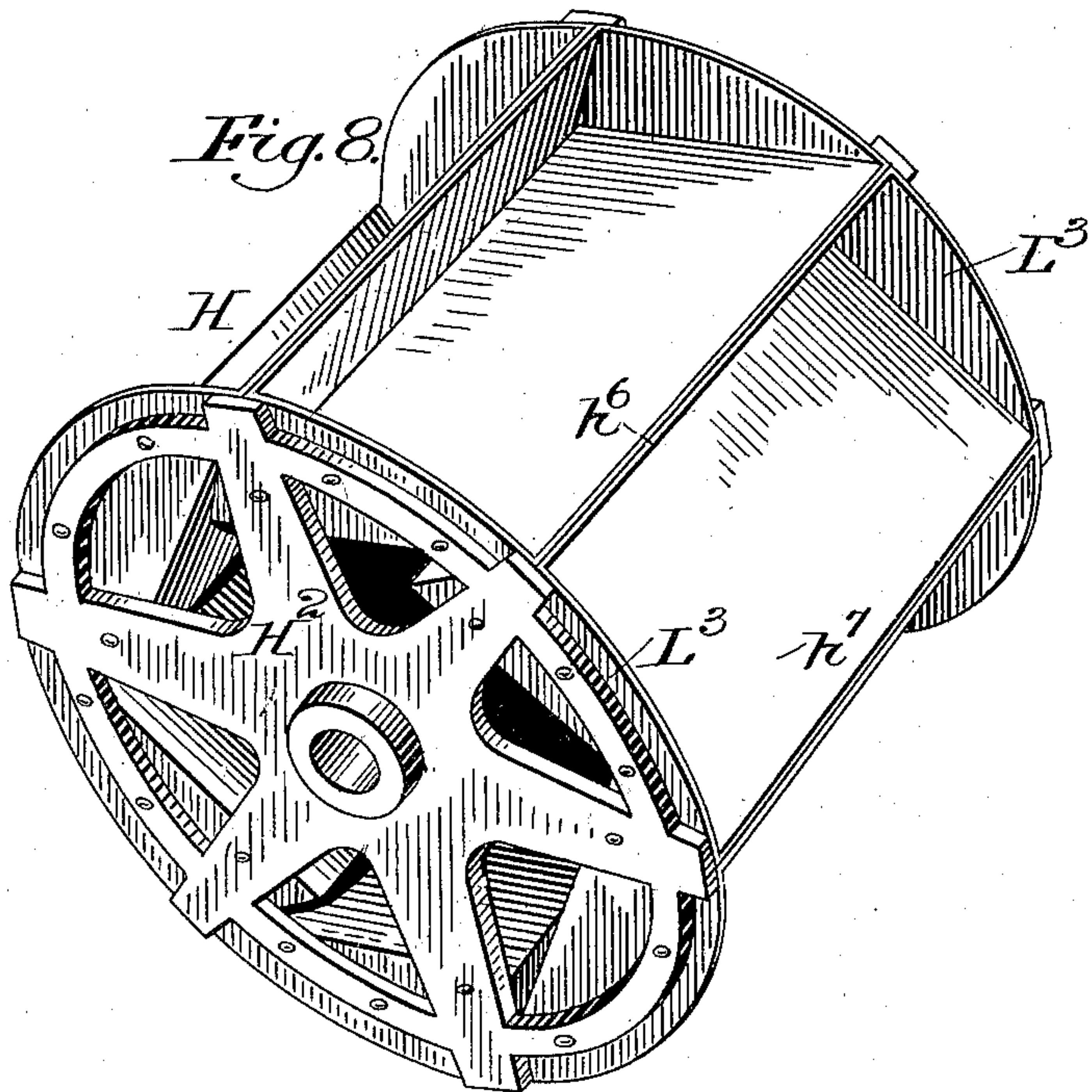


Fig. 9.

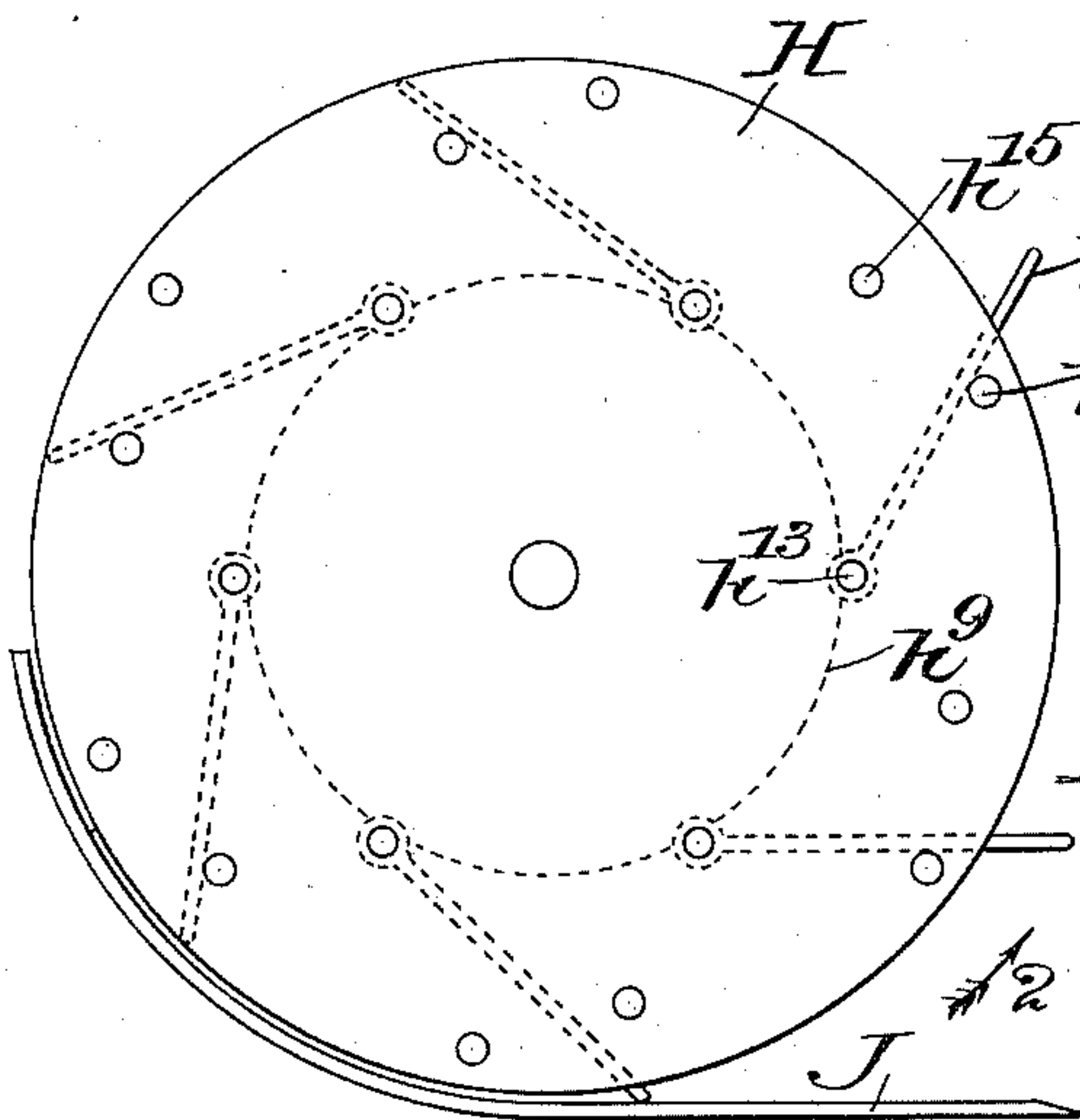


Fig. 10.

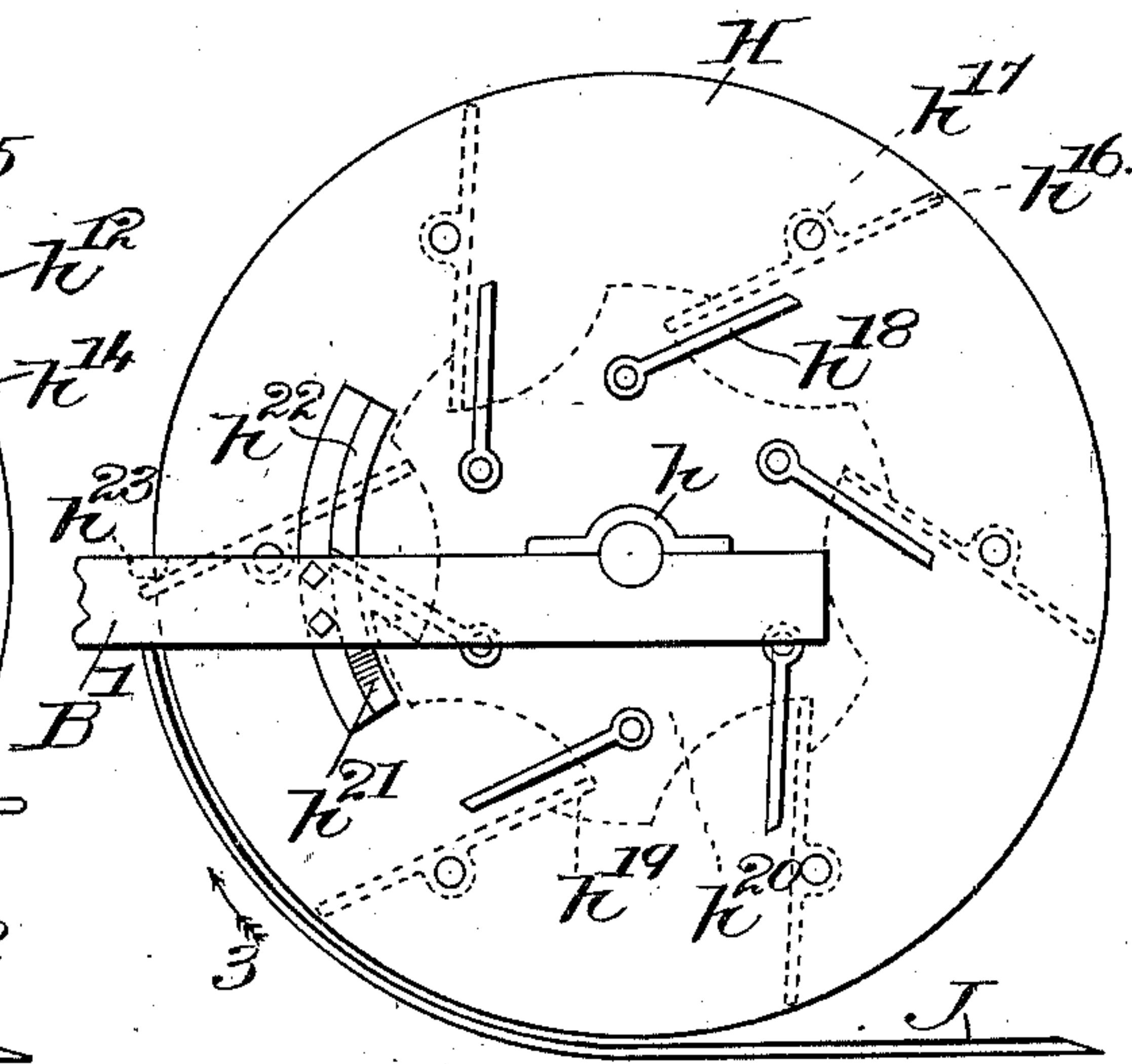


Fig. 11.

Witnesses:

A. C. Hammond,

Thomas J. Drummond,



Fig. 12.



Inventor:

Robert C. Greenerd.

by Crosby & Langley
attys.

UNITED STATES PATENT OFFICE.

ROBERT C. GREENERD, OF BOSTON, MASSACHUSETTS.

APPARATUS FOR HANDLING COAL.

SPECIFICATION forming part of Letters Patent No. 609,020, dated August 16, 1898.

Application filed February 15, 1897. Serial No. 623,381. (No model.)

To all whom it may concern:

Be it known that I, ROBERT C. GREENERD, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Apparatus for Handling Coal, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The great difficulty in handling coal rapidly by machinery, particularly in operating a coal-elevator in a yard, is in working the shoveling devices into the comparatively solid mass or heap of coal and in effectually and rapidly loading and unloading them. There is a constant and enormous expenditure of power required to make the shoveling apparatus dig into the coal and to keep it up to its work; and it is accordingly the primary object of my present invention to render the handling of coal much easier, reduce the cost, lessen the power required, and make it feasible to handle the coal more rapidly and effectually.

To this end I have provided an improved rotary shovel or feeder carried ahead of the conveying apparatus and cooperating with special loosening devices for working into the coal-heap.

The details of my invention will be more fully set forth in the course of the following description, taken in connection with the accompanying drawings, and the scope thereof will be defined in the appended claims, forming a part of this specification.

In the drawings, Figure 1 is a front elevation, and Fig. 2 is a side elevation, of a coal-conveyer embodying my improved apparatus for handling the coal. Figs. 3 and 4 are respectively a side elevation and a top plan view, enlarged, of the feeder-loosening devices and adjacent parts of the apparatus. Fig. 5 is a fragmentary view in rear elevation of one means to rock the looseners. Fig. 6 is a sectional view of the reciprocator. Fig. 7 is a front end view of the looseners in operative position. Fig. 8 is a view in perspective of one form of feeder. Figs. 9 and 10 are end elevations of other forms of feeders. Figs. 11 and 12 are detail views of the automatic locking device embodied in the feeder shown in Fig. 10.

For convenience and clearness of understanding I have shown my improvements in connection with a conveyer comprising an endless elevator A, supported on a wheeled truck B, driven by a hand-wheel C, and carrying a screen D and screenings-chute E on a frame F, the whole moving on rails G, let into a paved yard. Any other varieties of apparatus may be substituted as desired. At its forward end the conveyer is provided with my improved rotary feeder H, suitably journaled in boxes h on the side beam B' of the truck and rotated over to the right, Fig. 2, by any means, as by gears h' h^2 , worm-wheel h^3 , and shaft h^4 from an electric motor I on the truck. Below the feeder H, I arrange a breast of metal J, preferably sheet-steel, bent upwardly at the rear of the feeder, close to the peripheral path thereof, and thence bent at J' around the lower end of the elevator A. As the coal is carried over by the feeder whatever coal fails to lodge on the elevator will fall on the plate J J' and be immediately carried along out of the way by the wings or blades of the feeder or by the buckets of the elevator. Beneath the plate J, I provide a forwardly-projecting shoe K, having preferably a rocking and reciprocating slat bottom L, which I regard as a very important feature of my invention.

Referring to Figs. 3, 4, and 7, it will be seen that the shoe K has a bottom plate k , provided on its upper side with a plurality of longitudinal ribs k' , between which are a number of rods or looseners k^2 , flattened and pointed at their front ends and held in place by cross-bars k^3 . These rods are reciprocated either together or in sets by any suitable means, so as to be worked or dug into the coal.

I have shown eccentrics k^4 on the shaft of the feeder, which are connected by rods k^5 to oscillate levers k^6 , pivotally mounted in hangers k^7 , the levers k^6 being loosely connected at k^8 to a transverse bar k^9 , held at its ends in guide-brackets k^{10} and provided with a plurality of pins k^{12} in loose engagement with alternate rods k^2 . (See Figs. 4 and 6.)

In order to reversely reciprocate the remaining alternate rods, I have connected them in similar fashion by pins k^{13} and bar k^{14} , held in guide-brackets k^{15} and operated

by oscillating levers k^{16} , cranks k^{17} , and connecting-links k^{18} . The rods k^2 are squared and reversely twisted at their rear ends k^{19} and passed through correspondingly-squared holes k^{20} in a fixed bar k^{21} . Thus it will be evident that as the levers k^6 are pulled forward by their eccentrics the rods k^2 , to which they are connected, will be moved backwardly and slightly rotated, while at the same time the other rods k^2 will be moved forward by their levers k^{16} and slightly rotated. This movement will be reversed and rapidly repeated, the loosening-rods digging and twisting into the coal, so as to rapidly loosen it and render the forward movement of the truck easy and rapid.

My invention is not limited in any wise to the details of mechanism which I have specified above, inasmuch as various substitutes may be used, nor is it essential that the rods should be shaped as shown or extended back of the front part of the shoe. In fact, all that is essential is that means shall be provided for interrupting the front edge of the shoe by a backward and forward movement. When this part of the invention is used or when the other feature thereof is employed, it is essential merely that the front edge of the shoe shall be provided with a rocking or screwing and loosening rolling movement. My invention contemplates employing either or both of these movements, and it includes reciprocating the bars or their substitutes at the front edge in sets alternately or all together, and it further includes rocking all or a part of the reciprocating members either all together or not and in one direction or in several directions, the idea being to disturb and loosen the coal.

I prefer a serrated edge made up of a plurality of flattened and movable members acting as a number of feelers or fingers working and prying into the embedded mass of coal which is being transferred; but I wish it understood that my invention is not limited in this respect.

Referring now to the feeder, which is also a main part of my invention, it will be noted that it comprises a cylinder or cylindrical frame rotating on a central axis and provided with a plurality of peripheral shoveling and lifting pockets, each pocket having a tangential bottom. Before this I have invented a feeder having radial wings or scrapers—that is to say, my previous feeder had pockets whose bottoms were on the lines of radii of the cylinder—and the result has been that more or less coal would be carried beyond the elevator-buckets and dumped on the ground or shoe and also that the coal would not dump out of the pockets until the latter were below a horizontal alinement with their cylinder-axis. Accordingly I have obviated these objections by my present invention, in which I construct the bottoms of the pockets on tangential lines instead of on radial lines. All of the pockets herein shown have relatively

long or deep bottoms and short or shallow backs meeting in an acute angle.

In Fig. 2 it will be seen that the pockets are formed by bending sheets of metal to constitute backs h^6 and bottoms h^7 , being secured between the closed and preferably serrated ends L of the feeder, the short or shallow back h^6 being riveted or otherwise secured to the under front edge of the bottom h^7 of the next-following pocket.

In Figs. 3 and 4 the pockets are shown as formed between the ends L' by plates h^8 , set obliquely to a central drum h^9 , a middle strengthening-rib L^2 being interposed and the front edges h^{10} , Fig. 4, being shown as reversely diagonal to shear into the coal-heap as they are rotated forward.

I am aware that railway snow-plows have been proposed having conoidal plates rotating obliquely forward, said plates being provided with somewhat tangential knives to shear or cut away the snow and whirl it back to be removed from the track, and I am also aware of the various forms of water-wheels; but my invention has nothing whatever in common with such devices and should not be confused therewith. The snow-plows rotate rapidly and have no pockets, and in the water-wheels the blades are simply driving means therefor, there being no lifting or carrying pockets, whereas in my feeder the motion is slow to enable the pockets to dig or scrape into the coal, and then they carry the coal up and over to be dumped by gravity as soon as the longer or bottom side thereof has rotated into a position downwardly inclined toward its front edge.

Fig. 8 represents a feeder somewhat like that shown in Fig. 2, excepting that instead of the annular ends L each pocket has its own separate ends L^3 , the pockets being bolted to end spiders H^2 .

While for many reasons it is desirable that the bottoms of the pockets (and by the term "bottom" I mean the plate or portion on which the coal rests just prior to being dumped) should be fixed and rigid, yet it is preferable in some instances to have them otherwise.

Referring to Figs. 9 and 10, it will be seen that the bottoms of the pockets are pivotally mounted, the former of said figures showing its bottom plates h^{12} pivoted at h^{13} on the drum h^9 to swing between the stops h^{14} and h^{15} , this construction permitting the edges of the swinging bottoms to scrape along the plate J as they are revolved in the direction of arrow 2, and thereby gather in all the finer coal, also facilitating and accelerating the dumping of the coal.

In Fig. 10 the bottoms h^{16} are pivoted at h^{17} , preferably forward of their centers, and are normally held by a spring-bolt or other fastener h^{18} against a shoulder h^{19} of a drum h^{20} , the bolt h^{18} being automatically released by a cam-plate h^{21} .

As the feeder rotates in the direction of ar-

row 3, Fig. 10, the spring-bolts h^{18} come successively into contact with the inclined face of the cam-plate h^{21} and are thereby disengaged from their bottom plates, being held out of engagement by the prolonged way h^{22} of the cam-plate. Further rotation of the feeder engages the front edge of the adjacent bottom plate with a stop bar or lug h^{23} on the side beam B' , which causes the bottom plate to tip on its pivot h^{17} and forcibly dump the pocket.

As soon as the pocket is emptied and the plate h^{16} has traveled free from the stop h^{23} its heavier rear end causes it at once to swing back into engagement with its shoulder h^{19} , in which position it is again locked as the spring-bolt h^{18} slips off from the upper end of the cam-surface h^{22} . This construction permits the bottom plates to be radial or at any inclination desired.

M designates a fender to keep the coal from falling around the truck-wheels, being provided to prevent the latter from getting blocked. The fender extends to the rear a considerable distance, as shown in Fig. 2, and meets a plow or deflecting-plate M at its front end to scrape the coal from the rails ahead of the traction-wheels and to direct the coal onto the shoe K.

The general operation of my invention is as follows: The machine is advanced on the tracks G by turning the hand-wheel C or by other means. The elevator A is started by means not shown, and the feeder H and looseners are set in operation by the motor I or other power. As the machine advances the front edge of the shoe is worked into the coal or other substance to be conveyed away, being agitated back and forth and upheaved in the mass of coal, so that it very readily and rapidly loosens up and tumbles the coal forward, especially in the case of embedded soft coal. The loosened coal is at once fed to the elevator or other conveyer by the feeder H, the latter easily digging into the coal and lifting it because of the slanting or tangential inclination of the bottom, this feature also enabling the lifted coal to slide out of the pockets of the feeder at a sufficient height to readily fall into the buckets of the elevator A, thereby fulfilling one of the prime objects of my invention and constituting one of its most important features. If, however, any coal should chance to fall outside of the buckets of the elevator, it is at once deflected forward by the plate J or deflected into the buckets by the plate J'. The machine may be forced rapidly into the coal and run freely back without getting clogged or blocked by the coal, the fenders and plow effectually keeping the coal back from the truck-wheels.

I have herein suggested various changes and substitutions that may be made in the mechanical details of my invention, and I wish it to be understood that many other variations and changes in combinations, rela-

tions, and details of parts are within the scope of my invention.

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

1. In an apparatus for handling coal, the combination with a conveyer, of a shoe extending forwardly therefrom, and means to reciprocate the entering edge of said shoe backward and forward relatively to said conveyer, to facilitate the entrance thereof into the coal, substantially as described.

2. In an apparatus for handling coal, the combination with a conveyer, of a shoe extending forwardly therefrom, said shoe being provided at its front edge with a plurality of movable members extending longitudinally of the shoe, and means to reciprocate certain of said members lengthwise, relatively to the conveyer, substantially as described.

3. In an apparatus for handling coal, the combination with a conveyer, of a shoe extending forwardly therefrom, said shoe being provided at its front edge with a plurality of movable members extending longitudinally of the shoe, and means to reciprocate said members lengthwise reversely in sets, substantially as described.

4. A shoe provided on one side with longitudinal ribs, and having movable bars extending forwardly between said ribs to constitute an entering edge, and means to move said bars, substantially as described.

5. In a coal-handling apparatus, a shoe provided with a plurality of movable members mounted thereon lengthwise thereof at its front edge, and means to rock said members axially, whereby the coal is loosened next the edge of said shoe and said shoe is enabled to readily enter the coal, substantially as described.

6. In a coal-handling apparatus, a shoe having thereon a plurality of movable members lengthwise thereof at its front edge, said members having flattened front ends, and means to move said members axially, whereby the coal is loosened immediately in front of said front edge and said shoe is thereby enabled to readily enter the coal, substantially as described.

7. In a coal-handling apparatus, a shoe provided with a plurality of movable members lengthwise thereof at its front edge and means to move said members axially and reversely in sets, whereby the coal is loosened and said shoe is enabled to readily enter the coal, substantially as described.

8. In a coal-handling apparatus, a shoe provided with a plurality of movable members lengthwise thereof at its front edge, said members being individually movable longitudinally and also axially to loosen the coal along the front edge of said shoe, means to move said members longitudinally, and means to move them axially, substantially as described.

9. In an apparatus for handling coal, the

combination with a conveyer, of a shoe extending forwardly therefrom, a feeder above said shoe and back of the front edge thereof, and a deflecting-plate extending along said shoe and beneath said feeder and said conveyer, said plate being intermediately bent upwardly between said feeder and conveyer into close proximity to each of them, said bent portion terminating at a height to permit the coal from said feeder to fall by gravity into said conveyer, as and for the purpose set forth.

10. An apparatus for handling coal, comprising a power-shaft or other driving mechanism, and a rotary feeder positively driven thereby, said feeder being provided about its periphery with a number of lifting and carrying pockets, each pocket being open to dig into the coal and having a closed bottom and back and closed ends, the bottom extending tangentially forward in the direction of rotation of the feeder, the latter being rotated slowly by said driving mechanism to carry up the coal and deliver it by gravity, substantially as described.

11. In an apparatus for handling coal, a rotary feeder, and driving mechanism connected therewith to positively rotate said feeder and cause the latter to dig into the coal and lift it as desired, said feeder having coal-lifting pockets about its periphery, each pocket being provided with a relatively long tangential bottom and a short back meeting in an acute angle, and each bottom lapping onto and terminating even with the back of the next preceding pocket for the delivery of the coal, said pockets having closed ends and being rotated slowly to carry up the coal and deliver it by gravity, substantially as described.

12. In a coal-handling apparatus, a rotary feeder having a plurality of peripheral pockets, said pockets being provided with tangential bottoms extending forwardly in the direction of rotation of the feeder, said bottoms

being pivotally mounted, substantially as described.

13. In a coal-handling apparatus, a rotary feeder having a plurality of peripheral pockets, said pockets being provided with tangential bottoms extending forward in the direction of rotation of the feeder, said bottoms being pivotally mounted, forward of their middle lines, substantially as described.

14. In a coal-handling apparatus, a rotary feeder having a plurality of peripheral pockets, said pockets being provided with tangential bottoms extending forward in the direction of rotation of the feeder, said bottoms being pivotally mounted, and means to tip said bottoms for dumping purposes, substantially as described.

15. In a coal-handling apparatus, a rotary feeder having a plurality of peripheral pockets, said pockets being provided with tangential bottoms extending forward in the direction of rotation of the feeder, said bottoms being pivotally mounted, and means to lock said bottoms in their coal-retaining position, releasing means therefor, and means to tip said bottoms for dumping purposes, substantially as described.

16. A rotary feeder and its supporting-frame, said feeder having a plurality of peripheral pockets, and said pockets having pivoted bottom plates, combined with a stop on said frame to engage the pivoted bottom plates and thereby dump the pockets, locking devices normally locking said bottom plates against movement, and a releasing device to unlock said bottom plates to permit the pockets to be dumped, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT C. GREENERD.

Witnesses:

GEO. H. MAXWELL,
ALBERT C. SAWYER.