(No Model.) 4 Sheets—Sheet 1.

J. A. MONTGOMERY.

COMBINED COKE DRAWING, CLEANING, SPRINKLING, AND LOADING MACHINE.

No. 563,781. Patented July 14, 1896.

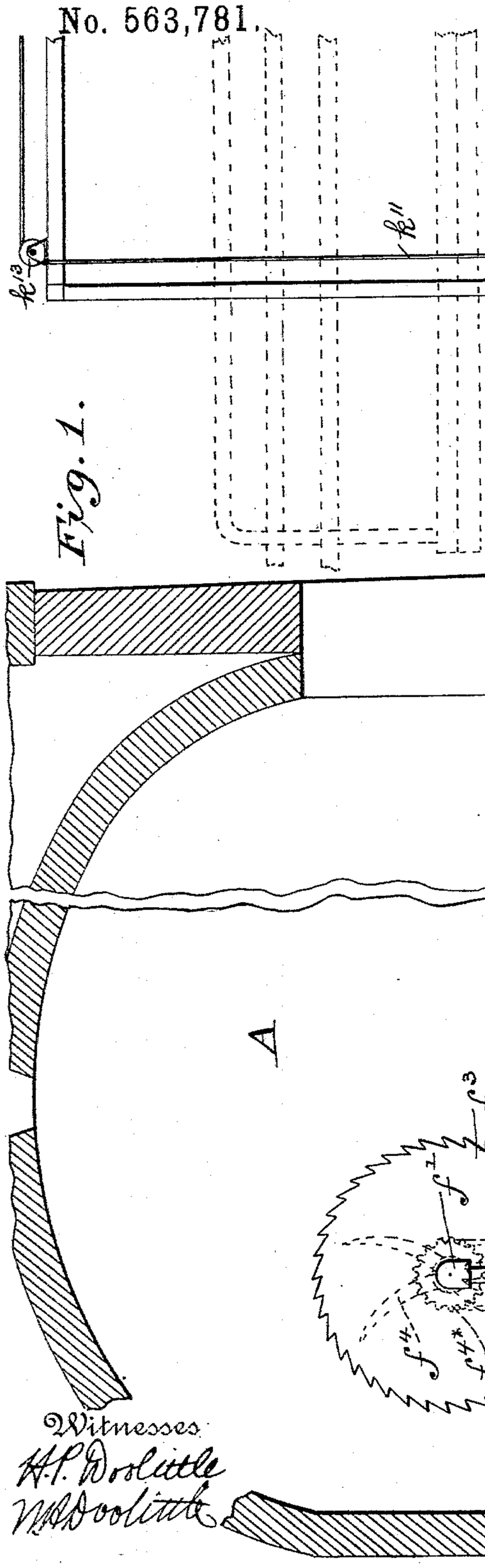

Fig. 1.

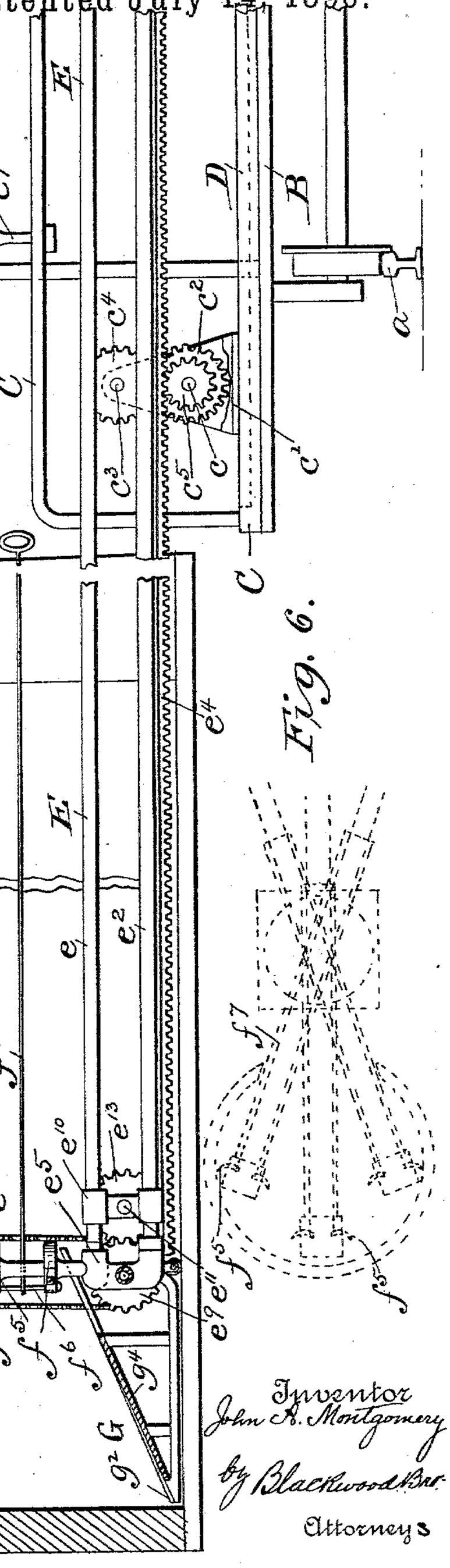

Fig. 6.

Witnesses:
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(No Model.) 4 Sheets—Sheet 2.

J. A. MONTGOMERY.

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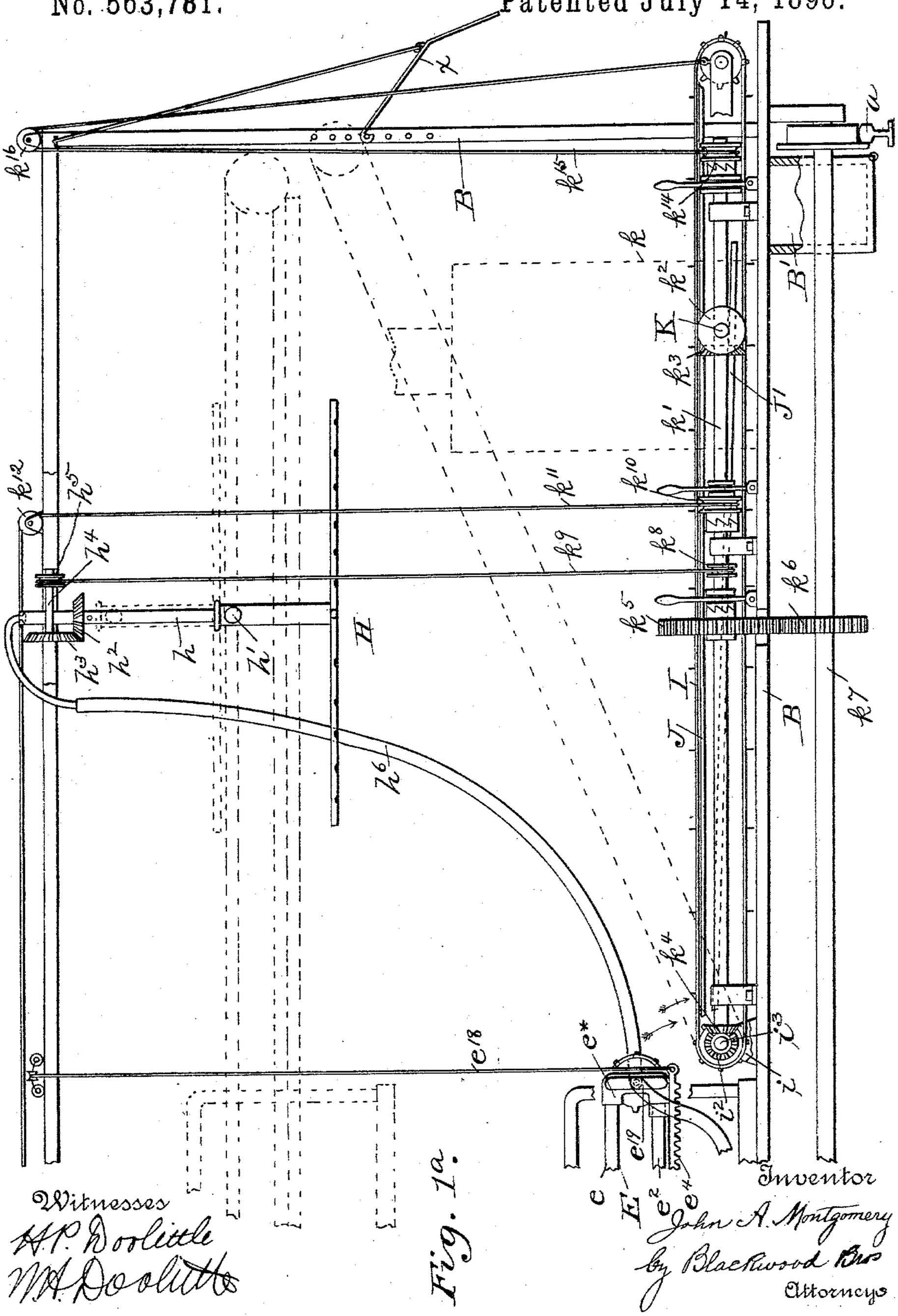

Fig. 1a.

(No Model.) 4 Sheets—Sheet 3.

J. A. MONTGOMERY.

COMBINED COKE DRAWING, CLEANING, SPRINKLING, AND LOADING MACHINE.

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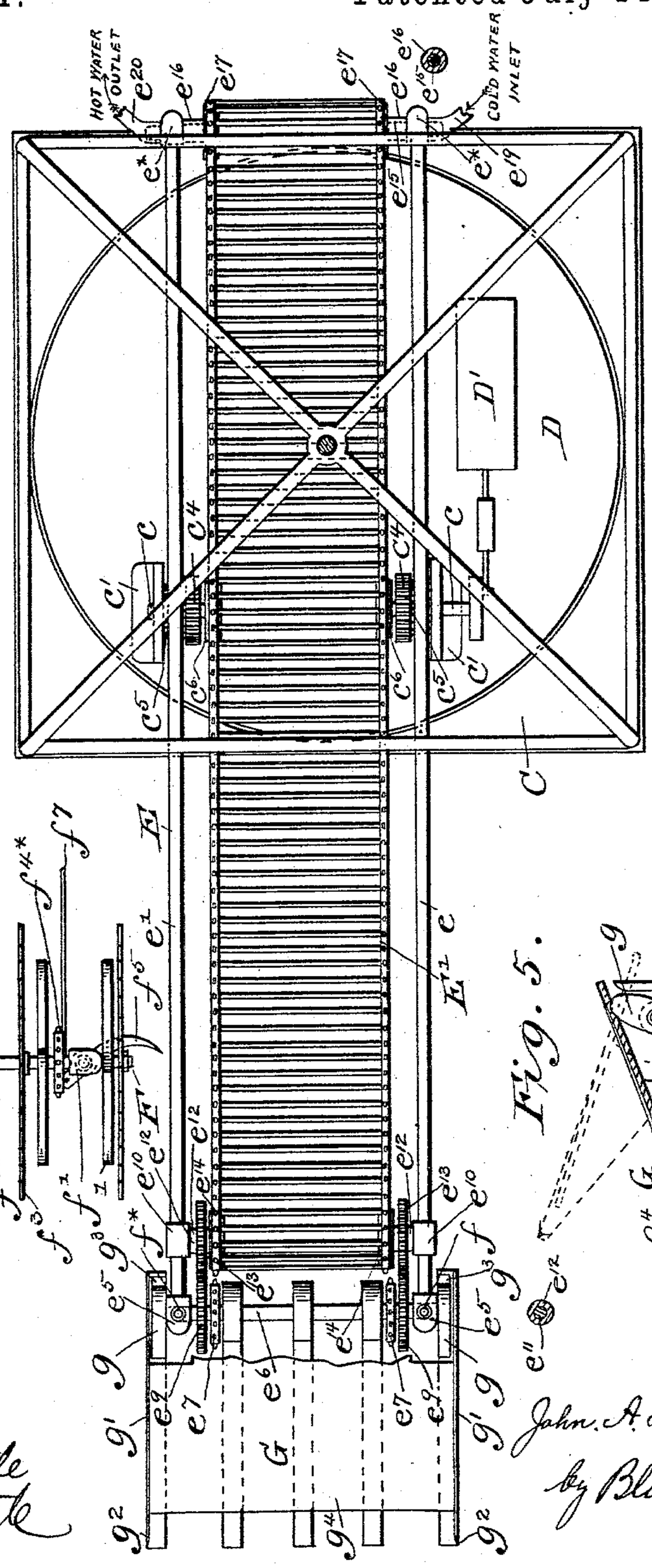

Fig. 2.

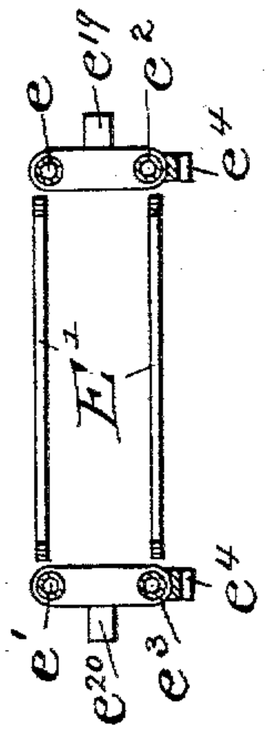

Fig. 7.

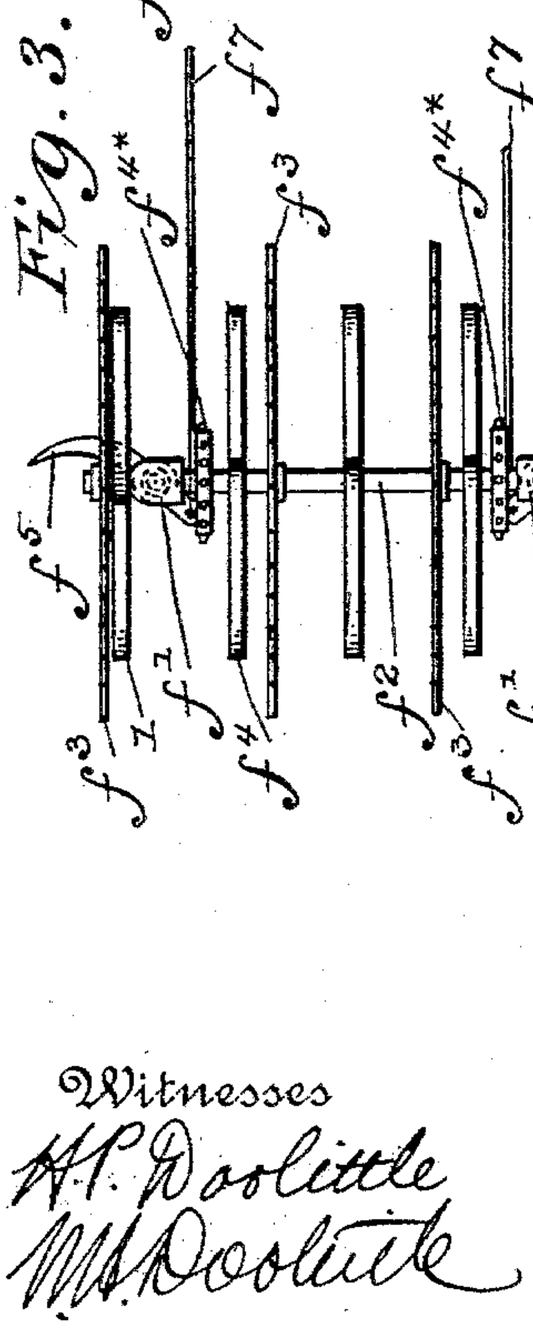

Fig. 3.

Fig. 4.

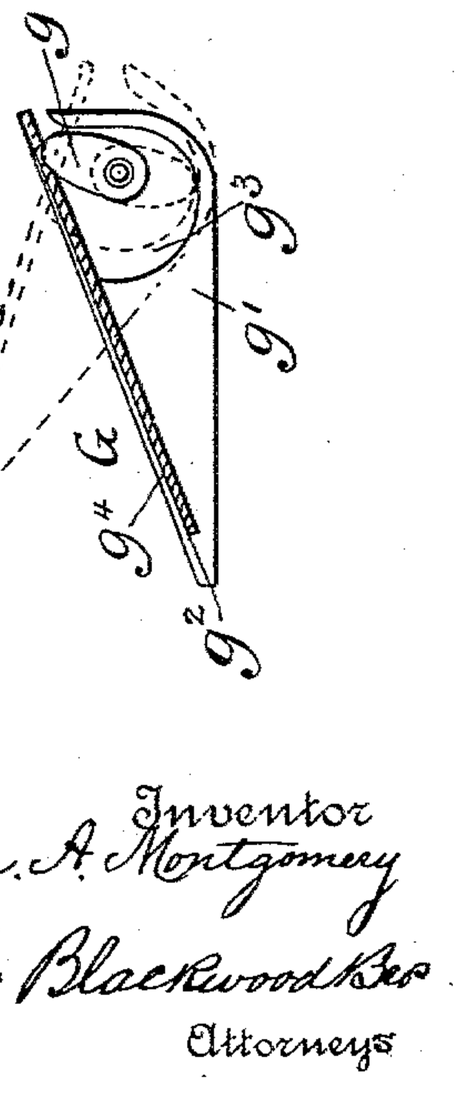

Fig. 5.

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(No Model.) 4 Sheets—Sheet 4.

J. A. MONTGOMERY.

COMBINED COKE DRAWING, CLEANING, SPRINKLING, AND LOADING MACHINE.

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Fig. 8.

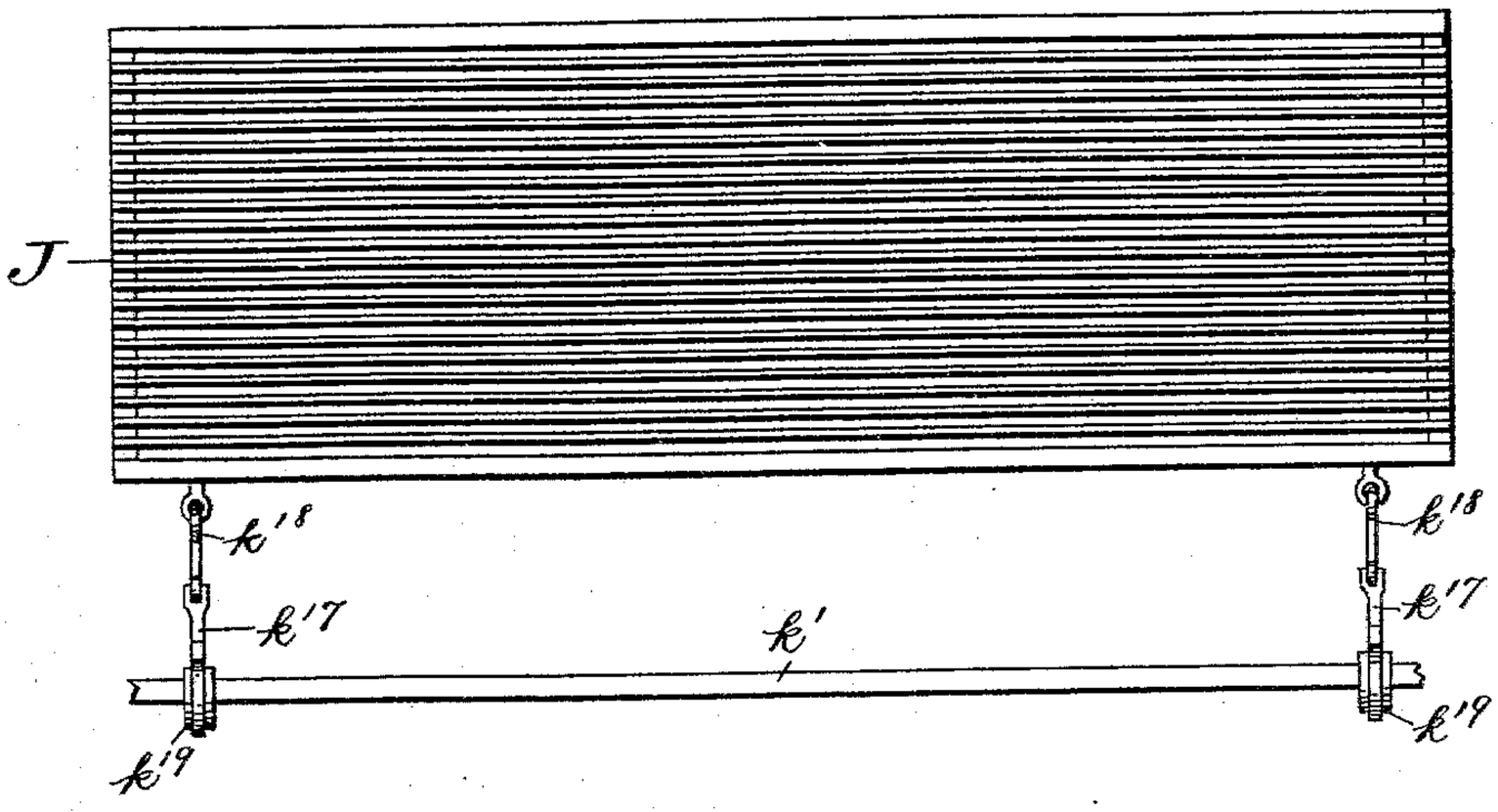


Fig. 9.

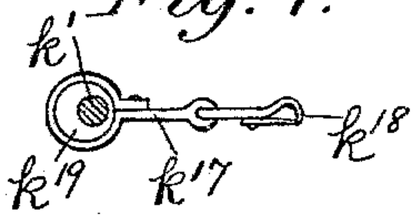
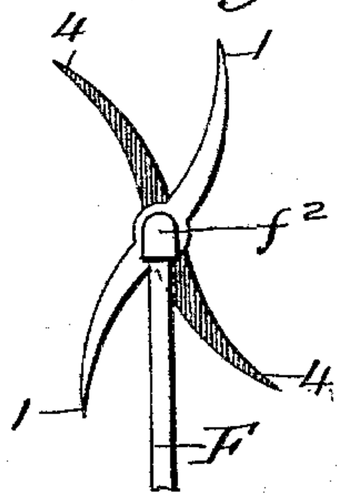


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHN A. MONTGOMERY, OF BIRMINGHAM, ALABAMA, ASSIGNOR TO SILAS B. MASON, OF LEWISBURG, WEST VIRGINIA.

COMBINED COKE DRAWING, CLEANING, SPRINKLING, AND LOADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 563,781, dated July 14, 1896.

Application filed August 10, 1895. Serial No. 558,844. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. MONTGOMERY, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in a Combined Coke Drawing, Cleaning, Sprinkling, and Loading Machine; and I do hereby 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.

My invention relates to an improvement in combined coke drawing, cleaning, sprinkling, and loading machines.

The object of my invention is to provide an apparatus which is simple and inexpensive in construction, effective in operation, and adapted to conveniently withdraw coke or charcoal from the furnaces or ovens in which it is made, screening, cleaning, sprinkling, and quenching the same, and finally elevating and loading it directly onto railroad-cars or carts without the necessity of any extra handling, thereby reducing the labor required in handling the coke and saving the waste resulting from breakage, the power for operating the same being furnished by steam-engines, motors, or other suitable source.

My invention consists in the construction and combination of parts, as hereinafter more fully pointed out in the claims.

In the accompanying drawings, in which like letters and numerals of reference denote like parts, Figures 1 and 1ª are side elevations of the entire machine, some of the parts being broken away to more clearly show the details of construction. Fig. 2 is a top plan view of the coke-drawer and the mechanism for operating the same, the saws and fingers and their supporting-standards being removed to more clearly show the parts immediately under the same. Fig. 3 is a top plan view of the saws and fingers and their supporting-standards; Fig. 4, a detail plan of one of the horizontal fingers and the means of attachment; Fig. 5, a detail side view, partly in section, of the coke-drawing breaker and shovel and its operating-cam. Fig. 6 is a diagram of a coke-oven with my coke-drawer therein in some of the positions it assumes in removing the coke; Fig. 7, a cross-section of the coke-drawer frame and endless conveyer; Fig. 8, a detail view of one of the shaking-screens and its cam-operating mechanism; Fig. 9, a detail view of one of the cams.

In the drawings, A is one of a series of coke or charcoal ovens, preferably of the well-known beehive construction.

a a are tracks extending along in front of the ovens, and B is a suitable car adapted to move along said tracks, carrying the coke drawing, cleaning, sprinkling, and loading apparatus.

C is a frame resting on the floor of the car on the side next to the oven and adapted to be elevated to the top of the car.

D is a turn-table mounted and adapted to revolve in said frame C.

c is a drive-shaft mounted in suitable bearings or supports *c'* on said turn-table.

C^2 are cog-wheels mounted on the shaft *c*; c^3, a shaft located directly above shaft *c*, also supported in the bearings *c'*; c^4, cog-wheels mounted on shaft c^3, adapted to gear with cog-wheels c^2. c^5 are pinions, also mounted on the shaft *c*. c^6, Fig. 2, are sprocket-wheels mounted on shaft c^3.

E is the coke-drawer, the frame of which is made preferably of tubular or hollow pipes or bars.

e e' are the upper pipes, and e^2 e^3 the lower pipes.

e^4 are rack-bars attached by means of straps or otherwise to the under side of the lower pipes e^2 e^3, said rack-bars e^4 being adapted to engage the pinions c^5 and reciprocate the frame E.

e^5 e^* are hollow elbows which connect the ends of the pipes *e* e^2 on one side and *e'* e^3 on the opposite side at the forward and rear ends of the frame E, respectively.

F is a frame composed of vertical pipes *f* *f**, which extend upward from the elbows e^5 at the forward end of the frame E.

f' are hollow elbows on the upper ends of the pipes *f f**.

f^2 is a hollow shaft, the ends of which are mounted and revolve in the elbows *f'*.

f^3 are a series of saws, and f^4 and 1 a series of vertical fingers, both of which are mounted

on the shaft f^2, the fingers f^4 being located between and operating in advance of side fingers 1.

f^{4*} are sprocket-wheels also carried by shaft f^2.

f^5 are horizontal fingers, two of which are mounted on each of the pipes $f f^*$.

f^6 is a bolt connecting the fingers together on each side.

f^7, Fig. 1, are rods connected to bolts f^6, by which the fingers are operated. These rods f^7 are preferably operated by hand, but may be operated by any other means.

e^6, Fig. 2, is a hollow shaft journaled in the elbows e^5 at the forward end of the machine.

G is a coke breaker or shovel loosely mounted on shaft e^6.

g are cams fixed to the opposite ends of the shaft e^6.

g' are the side plates of the shovel, provided with cutting edges g^2, and g^3, Fig. 5, are cam-grooves on the inside of the said side plates, with which the cam engages for the purpose of lifting or elevating the shovel.

g^4 is an inclined plate which connects the side plates g' together.

e^7 are sprocket-wheels on shaft e^6, connected to sprocket-wheels f^{4*} by a sprocket-chain e^8, by means of which the saws and vertical fingers are operated.

e^9 are cog-wheels also mounted on shaft e^6.

e^{10}, Fig. 2, are bearings supported by pipes e e^2 on one side of frame E and e' e^3 on the opposite side. e^{11}, Fig. 1, is a shaft, the ends of which are held in said bearings e^{10}. e^{12} is a sleeve mounted to revolve on said shaft, and e^{13} are cog-wheels mounted on sleeve e^{12} and adapted to gear with the cogs e^9 and thereby transmit motion to the shaft e^6.

e^{14} are sprocket-wheels also mounted on sleeve e^{12}.

e^{15} is a pipe connecting the elbows e^* together, e^{16} a sleeve to revolve on said pipe, and e^{17} sprocket-wheels on sleeve e^{16}.

E′ is an endless conveyer which runs over sprocket-wheels e^{14} and e^{17} and is driven by means of the sprocket-wheels c^6.

D′ represents a steam, air, or other engine for driving the shaft c, and thereby reciprocating the coke-drawer, while also running the endless conveyer E′.

e^{18} is a wire or other rope for the purpose of supporting the rear end of the frame E.

e^{19} is an inlet for feeding cold water to the pipes e e^2.

e^{20} is an outlet-pipe for the exit of hot water from the pipes e' e^3.

H is a revolving sprinkler adapted to be adjusted vertically on a pipe h by means of a set-screw h'.

h^2 h^3 are bevel gear-wheels through which motion is transmitted from the shaft h^4 by pulley-wheel h^5.

h^6 is a flexible pipe which supplies hot water from the coke-drawer to the sprinkler.

I is the coke-loader, comprising an endless conveyer pivoted at i.

J J′ are side-shaking screens for the purpose of cleaning the coke, located between the endless conveyer-belt and connected by links k^{17} and snap-hooks k^{18} to the cams k^{19} on shaft k', by which the said screens are operated. Although cams are shown for operating the shaking screens, they may be operated by eccentrics or any other suitable means.

B′ is a box for receiving the braize or small coke from the screens.

K is the drive-shaft from any suitable engine k, which transmits motion through bevel-gears k^2 k^3 to the shaft k'.

k^4 is a bevel-gear on shaft k', adapted to engage bevel-gear i^2 on shaft i^3 and thereby impart motion to the endless conveyer of the coke-loader.

k^5 and k^6 are cog-wheels through which the axle k^7 of car B is driven.

k^8 is a pulley-wheel on shaft k', and k^9 is a rope which runs over and transmits motion from pulley k^8 to pulley h^5 on shaft h^4, Fig. 1ª.

k^{10} is a drum on shaft k', provided with a suitable clutch.

k^{11} is a wire rope, one end being connected to said drum and then run up and over suitable pulleys k^{12} k^{13}, and the other end connected to a swivel-hook c^7, by which means the frame carrying the turn-table and coke-drawer is elevated to any desired height, as indicated in dotted lines in Fig. 1ª.

k^{14} is a drum with a suitable clutch on shaft k'.

k^{15} is a rope having one end attached to the drum and then passing over a pulley k^{16}, and having its opposite end fastened to the loader, by which means the outer end of the loader can be elevated for the purpose of loading the coke onto the cars or carts, as indicated by dotted lines in Fig. 1ª.

A suitable adjustable apron or aprons x may be attached to the car B at the discharge end of the loader.

It will be seen by reference to Fig. 6 that the coke-drawer can be manipulated by means of the turn-table to different positions so as to remove the coke from all parts of the oven, and by means of the horizontal fingers facilitate the removal of the coke from the sides of the oven. It will also be seen that by circulating cold water through the pipes and journals the coke-drawer frame will be cooled and the water running therethrough will become heated, and after being so heated will be delivered through the pipe h^6 to the sprinkler and distributed on the coke on the loader, and thus lessen hydrocrystallization.

The operation is as follows: The entire machine being brought to the proper position in front of the oven-door, the engine D′ is set in motion in the proper direction, which transmits motion to the shaft c, and thereby to pinions c^5, cog-wheels c^2 c^4, and sprocket-wheels c^6. The pinions c^5 engage the racks e^4 and drive the coke-drawer E forward into the oven, and the breaker or shovel is accordingly driven under the mass of coke therein.

The sprocket-wheels e^6 drive the endless conveyer E', and the conveyer E' drives the cog-wheels e^{13}, which in turn engage and drive the cog-wheels e^9, the sprockets e^7, and the cams g, all mounted on shaft e^6, Fig. 2. The cams operating to lift the breaker or shovel elevate and deliver the coke to the conveyer E'. The sprockets e^7 e^8 transmit motion to the saw f^3 and vertical finger f^4, which saw the coke and draw it toward the conveyer. The central fingers f^4 are in advance of the end fingers 1 for the purpose of pulling the central mass of coke first, thus avoiding breaking or crushing the coke, by which the easy operation of the machine will be prevented. The saws and fingers may be used separately or in combination, as desired. The saws are specially adapted to be used when the coke is watered inside the oven, for the purpose of sawing the coke into blocks and preventing breakage.

The endless conveyer E' carries the coke and delivers it onto the endless carrier of the loader, beginning to deliver it at the outer end of the loader and gradually working along over the top to the inner end thereof. Thus it will be seen that the coke is distributed evenly over the surface of the loader in position to be more easily sprinkled and quenched. After the loader has been filled, the sprinkler is raised up and held by means of the set-screw h'. By reversing the engine D' the coke-drawer is then drawn out of the oven and onto the turn-table. The engine k is then set in motion, and by the rope k^{11}, Fig. 1^a, raises the coke-drawer to the top of the car, and at the same time raises the loader to the proper position to load the coke onto a car or cart and operates the endless carrier I, which elevates the coke and drops it by means of the aprons onto the cars.

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

1. In a machine for drawing coke from ovens, the movable supporting platform or car, the reciprocating and laterally-moving frame mounted thereon adapted to be inserted into an oven, the conveyer carried by said frame, and the breaker or shovel located on the end of the frame for the purpose of loading the coke onto the conveyer, said conveyer adapted to continuously convey the coke from the oven, substantially as described.

2. In a machine for drawing coke from ovens, the reciprocating and laterally-moving coke-drawing frame, the conveyer carried by said frame, the cams mounted on a shaft at the end thereof and means for operating the same, and the breaker or shovel loosely mounted on said shaft and adapted to be operated by said cams, substantially as described.

3. In a machine for drawing coke from ovens, the coke-drawing frame, the breaker or shovel mounted on the end thereof, and the circular saws and rotary fingers mounted on the front of the coke-drawing frame, substantially as described.

4. In a machine for drawing coke from ovens, the coke-drawer provided with a cam-operated shovel, vertical saws and fingers and horizontal fingers, substantially as described.

5. In a machine for drawing coke from ovens, the hollow coke-drawing frame provided with hollow journals and shafts to permit cold water supplied through a suitable inlet-pipe to circulate therein and cool the same and finally to become heated, in combination with a rotary sprinkler adapted to receive the heated water therefrom through a suitable outlet-pipe and sprinkle the same on the coke as it comes from the oven, substantially as described.

6. In a machine for drawing coke from ovens, the reciprocating and laterally-moving coke-drawer provided with a breaker or shovel, vertical saws and vertical and horizontal fingers, substantially as described.

7. In a machine for drawing coke from ovens, the reciprocating and laterally-moving coke-drawing frame provided with a conveyer, a breaker or shovel, and a series of circular saws mounted on a frame rising from the coke-drawing frame, for the purpose of sawing the coke and thus preventing the breakage, thereof, substantially as described.

8. In a machine for drawing coke, the coke-drawer provided with a series of rotary coke-drawing fingers mounted thereon, the center fingers being located in advance of the side fingers for the purpose of pulling the coke first in the center and then on the sides, and thus preventing the breakage of the coke, substantially as described.

9. In a machine for drawing coke from ovens, the reciprocating and laterally-moving coke-drawing frame provided with the endless conveyer, the coke-drawing breaker or shovel, the vertical saws, and the vertical and horizontal fingers and their supporting-frame, and the racks on the coke-drawing frame, in combination with a frame having a rotary turn-table provided with an engine having a drive-shaft and pinions thereon which engage the said racks by means of which the coke-drawer is reciprocated, and the sprocket-wheels to engage and operate the conveyer, substantially as described.

10. In a machine for drawing coke from ovens, the movable platform, the coke-drawing frame mounted thereon provided with a conveyer, the breaker or shovel carried on the end of said frame, in combination with a coke-loader provided with a conveyer, and pivoted at one end to allow the opposite end to be elevated to the proper position to load coke onto a car or other receptacle, substantially as described.

11. In a machine for drawing coke from ovens, a coke-drawer in combination with a pivoted coke-loader provided with an endless open conveyer and shaking-screens located one above the other and between the endless conveyer-belt, substantially as described.

12. In a machine for drawing coke from

ovens, the coke-drawing frame, the vertical frame thereon, the horizontally-pivoted coke-drawing fingers mounted on each side of said vertical frame, and rods for operating said fingers whereby the coke is removed from the sides of the oven, substantially as desribed.

13. In a machine for drawing coke from ovens, the reciprocating and laterally-moving coke-drawing frame, the vertical frame thereon, the pivoted coke-drawing fingers on each side of said vertical frame, the bolts for connecting the fingers together on each side, and the rods connected to said bolts for operating said fingers, substantially as described.

14. In a machine for drawing coke from ovens, the breaker or shovel provided with side plates having vertical and horizontal cutting edges, intermediate plates having cutting edges, and an inclined top plate connecting said side and intermediate plates, terminating a short distance from the front edges of said plates, substantially as described.

15. In a machine for drawing coke from ovens, the supporting-platform, the suspended vertically-adjustable frame on said platform, the rotary turn-table on said frame, the reciprocating and laterally-moving coke-drawer on said turn-table provided with means for breaking the coke and loading it on said coke-drawer, and means for elevating said frame, and thereby elevating the coke-drawer, substantially as described.

16. In a machine for drawing coke from ovens, the movable supporting-platform or car, the coke-drawing frame mounted thereon provided with a conveyer, the breaker or shovel carried on the end of said frame, in combination with a coke-loader provided with a conveyer, and pivoted at one end to allow the opposite end to be elevated, and the adjustable apron opposite the discharge end of the coke-loader for the purpose of delivering coke from the loader to a car or other receptacle, substantially as described.

17. In a coke-drawing machine, the reciprocating and horizontally-moving coke-drawer, the hollow coke-drawing frame provided with hollow journals and shafts, and inlet and outlet pipes for water, the endless conveyer, the coke-drawing breaker or shovel, the vertical saws, the horizontal and vertical fingers and their supporting-frame, the racks on the coke-drawing frame, in combination with a frame located on a car having a rotary turn-table provided with an engine having a drive-shaft and pinions and cog-wheels thereon, the said pinions engaging the racks, and the cog-wheel engaging cog-wheels carried on a shaft located above said drive-shaft for the purpose of imparting motion thereto and to sprocket-wheels thereon which engage and impart motion to the endless conveyer, the pivoted coke-loader provided with shaking-screens, and the sprinkler secured to the frame of the car above said coke-loader supplied with hot water from the coke-drawer by means of a hose-pipe connection, substantially as described.

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

JOHN A. MONTGOMERY.

Witnesses:
H. P. DOOLITTLE,
JAS. L. SKIDMORE.