

No. 630,916.

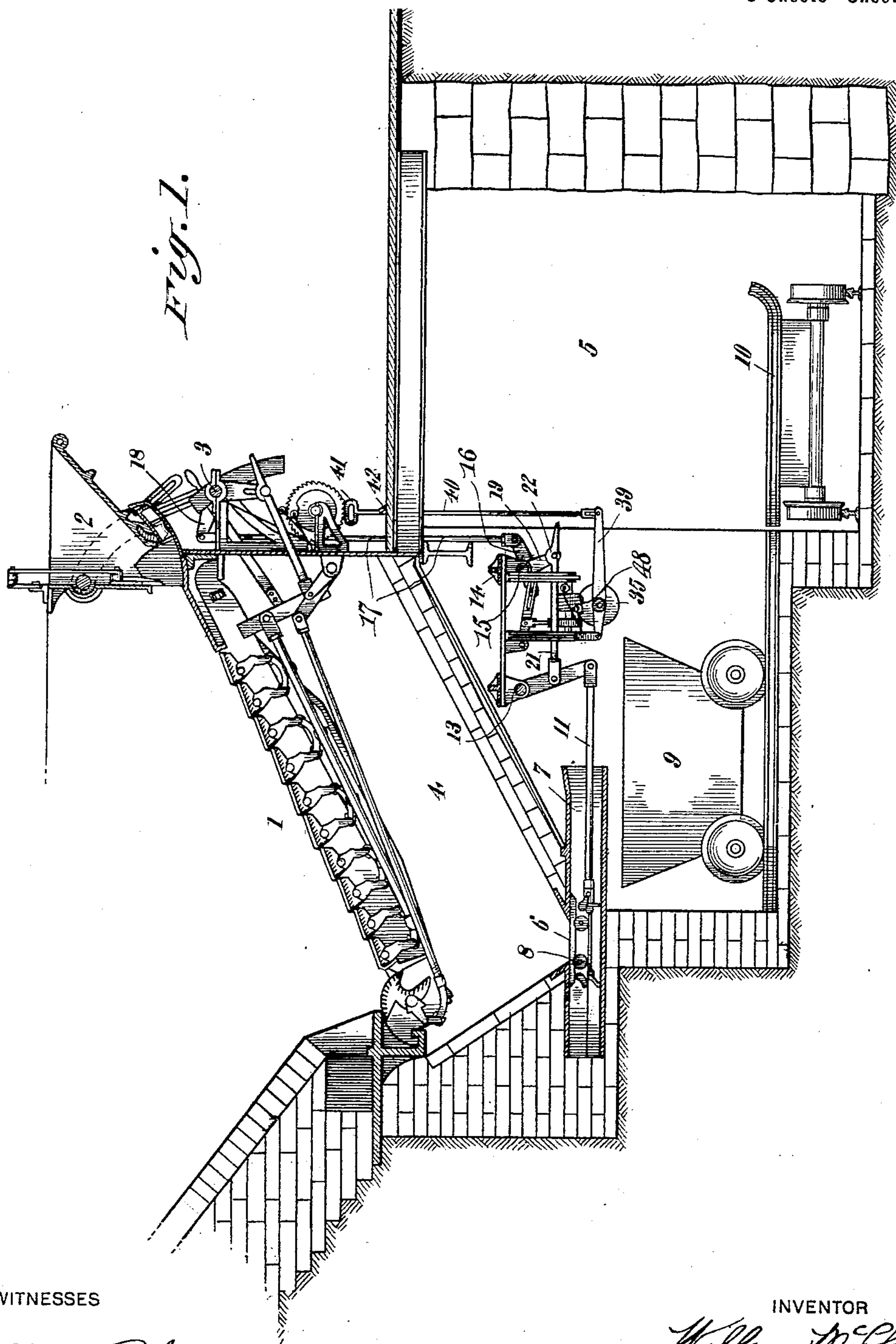
Patented Aug. 15, 1899.

W. McCLAVE.  
FURNACE.

(Application filed Dec. 24, 1898.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES

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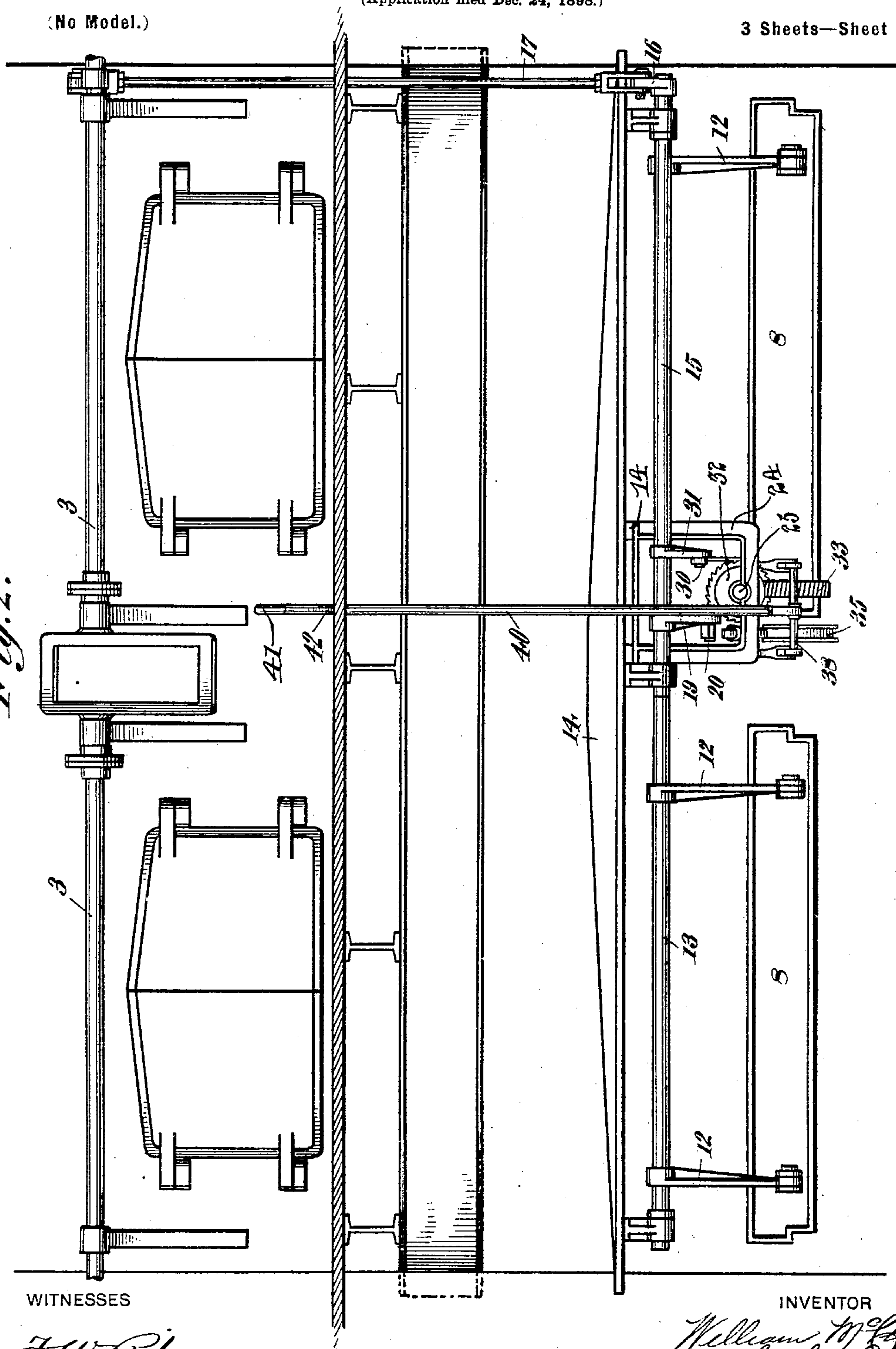
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Fig. 2.



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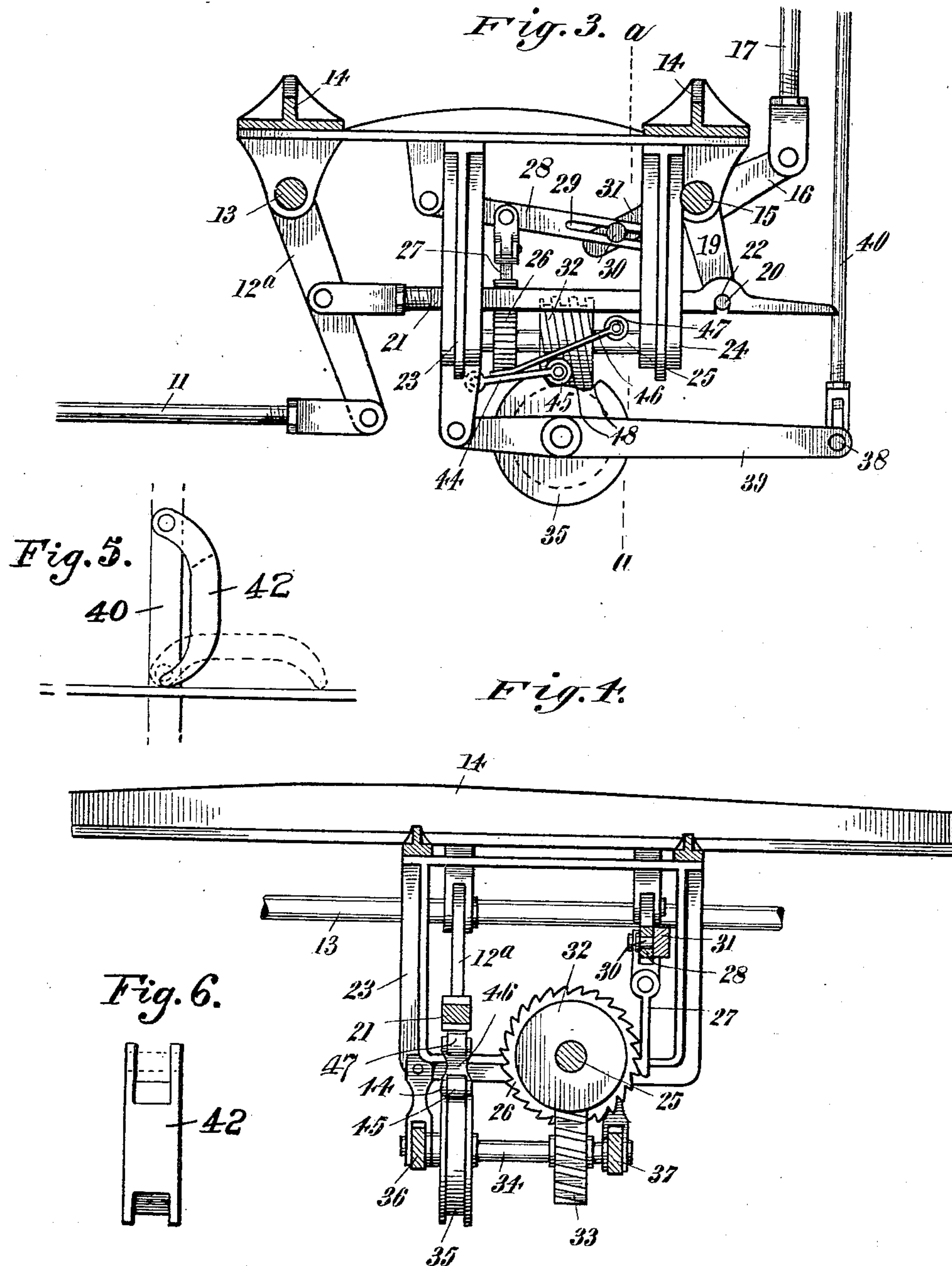
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF SCRANTON, PENNSYLVANIA.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 630,916, dated August 15, 1899.

Application filed December 24, 1898. Serial No. 700,218. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; 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 improvements in means for removing ashes from the ash-pits of furnaces, especially furnaces employing inclined grates and feed-hoppers.

The object of my invention is to provide means by which the ashes may be removed from a furnace by the application of power, the application of said power being either for a continuous actuation of the said ash-removing means or for an intermittent actuation of the same.

The invention consists in providing a furnace employing an inclined grate with an ash-pit having convergent sides, a duct for receiving ashes from the said pit, a pusher for forcing the ashes out of the duct, and mechanical means connected with the said pusher whereby it may be reciprocated by power continuously or intermittently, as may be desired.

It also consists, in a furnace having a reciprocating ash-remover, of mechanical means connected with the said remover connected with a suitable power-shaft, means for giving the said remover an intermittent operation, and means for changing the intermittent operation into a continuous one, and vice versa, as may be desirable.

It also consists in certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section through a furnace provided with an ash-pit constructed in accordance with my invention. Fig. 2 is a front elevation of the lower portion of the furnace-front, showing the ash-pit-operating mechanism. Fig. 3 represents an enlarged detail view showing the intermittent actuating mechanism in side elevation. Fig. 4 represents a detail vertical section through the

same upon the line *a a*. Fig. 5 represents a detail view of the upper part of the hand-operated rod by which the ash-removing mechanism is changed from a direct to an intermittent motion, and vice versa. Fig. 6 is a detail view of the dog for supporting the said hand-operated rod in its upper position.

In the drawings, 1 represents an inclined grate mounted in a furnace constructed in accordance with my invention. 2 represents a feed-hopper for the same; 3, a power-shaft for operating the grate; 4, an ash-pit, and 5 a tunnel for removing the ashes, located in front of the furnace below the floor-line.

The rocking grate may be made in any suitable or desired form, but is preferably provided with grate-bars which are adapted to rock back and forth for feeding fuel down the inclined grate. The hopper may also be of any desired construction so as to feed fuel at the top of the grate. In the construction illustrated in Fig. 1 the power-shaft 3 is rocked by any suitable means and is connected with the grate-bars and the hopper feed mechanism for operating both the hopper and the grate. The ash-pit 4 is preferably formed with inclined walls, which converge toward the exit or discharge opening 6 at the bottom. This opening discharges into a duct or chute, as 7, which is closed at the rear and open at the front and has mounted in it a reciprocating pusher, as 8, for forcing the ashes out through the open end of the duct. The ashes forced out of the open end of the duct preferably fall into a car, as 9, mounted upon suitable tracks, and the said car when filled may be run out upon a truck, as 10, which is adapted to run on tracks in the tunnel 5, so that the car may be removed to any suitable point for dumping the ashes. The construction of the pusher 8, the car 9, and truck 10 are described and claimed in an application filed by me on May 10, 1898, Serial No. 680,273, and need not therefore be further described in this application.

In order to operate the pusher 8 by means of mechanical power, I connect the same by intermediate mechanism with a power-shaft 3, as will now be described. As seen in Fig. 2 of the drawings, furnaces employing mechanism of this kind are preferably provided with grates of two sections, and therefore have



two sets of ash-doors and two ash-pits, one beneath each section. This mechanism, however, could be employed in a furnace using a grate of only one section, as well as in a furnace employing three or more sections. The pushers 8 are connected by rods 11 11 with arms 12 12, which are carried by a rock-shaft, as 13, supported in suitable bearings upon a frame, as 14, mounted beneath the floor of the ash-pit. The shaft 13 preferably extends in front of both sections of the furnace, and the arms 12 of both pushers are rigidly secured thereto, so as to be moved thereby. In front of the shaft 13 is mounted a counter-shaft, as 15, also having suitable bearings in the framework 14. This shaft 15 is provided with an arm, as 16, which is connected by means of a rod 17 with an arm 18, secured to the power-shaft 3, the said rod 17 passing through the floor in front of the furnace. The counter-shaft 15 thus receives a rocking movement directly from the shaft 3. Upon the said counter-shaft 15 is also secured an arm, as 19, having a wrist-pin, as 20, projecting to one side of its free end. In order to connect the arm 19 with the shaft 13, I pivotally connect a rod 21 with an arm 12<sup>a</sup>, secured on said shaft 13. The forward end of the said rod 21 is preferably provided upon its under surface with a half-bearing, as 22, which is adapted to engage the stud or wrist-pin 20, secured to the arm 19. When this bearing does thus engage the said wrist-pin, the pushers will be caused to reciprocate through the agency of the mechanism just described. This would produce a continuous motion in the pushers, which would be constantly removing the ashes from the ducts. It is, however, unnecessary and undesirable to have the pushers operating at all times, for under usual circumstances it is only necessary to remove the ashes from the pit at stated intervals. I therefore prefer to use a means for connecting the pushers with the power-shaft intermittently, so that their operation will only be accomplished with sufficient frequency to keep the ash-pit from getting too full of ashes. To the under side of the frame 14 are secured hangers 23 and 24, which carry a horizontal shaft 25. To this shaft is rigidly secured a ratchet-wheel, as 26, which is engaged by a hooked rod or pawl, as 27, pivotally hung from an arm or lever 28. The lever 28 is pivoted at its rear end to a projection on the frame 14 and at its forward end is formed with an elongated slot, as 29. This slot engages a wrist-pin, as 30, secured to an arm 31, keyed or otherwise rigidly secured to the counter-shaft 15. It will thus appear that as the shaft 15 is rocked the arm 31, moving up and down, will move the hooked pawl 27, so as to feed the ratchet forward, causing it to rotate step by step. The shaft 25 also carries a worm, as 32, which engages a worm-wheel, as 33, secured to a shaft 34 at right angles to the shaft 25, the said shaft also carrying a cam-wheel, as 35. The shaft 34 is car-

ried by a frame composed of levers 36 and 37, pivoted at their rear ends to projections upon the hanger 23. Their forward ends are connected by means of a rod or bar, as 38, thus completing the frame. The frame 39 thus formed is preferably held in its forward upper position by means of a rod, as 40, secured at its lower end to the cross-rod 38 and extending upwardly through the floor in the front of the furnace. A handle, as 41, is preferably formed upon the upper end of the said rod, and a pivoted dog, as 42, is secured to the said rod at such a point that when it engages the floor, as shown in Fig. 1, the frame 39 will be held in such a position that the worm-wheel 33 will engage the worm 32. As seen in Fig. 7 of the drawings, the dog 42 may be of simple construction, being merely a piece of metal pivoted to the rod 40, and the said dog being preferably bifurcated at its upper and lower ends, as seen in Figs. 5 and 6, so as to partially surround the said rod, the lower end striking the floor in the vertical plane of the pivotal point, so as to support the rod in its upper position. It will thus be seen that when the lower end of the dog 42 is pushed away from the rod it will allow the rod 40 to drop, whereby the frame 39 will be lowered and disengage the worm-wheel and worm 32 and 33, respectively. By this construction when it is wished to lower the said rod it will be only necessary to knock or force the dog 42 away from the rod 40 in order to permit the frame 39 to drop. When the rod is raised, the dog drops into its vertical position, and thus engages the floor to prevent the rod dropping again. Also pivoted to the hanger 23 is an arm 44, which carries at its outer free end an antifriction-roller 45, which is adapted to run upon the periphery of the cam-wheel 35. This arm 44 carries a trolley-arm, as 46, which is preferably formed of spring metal and carries a trolley or roller, as 47, which is located directly beneath the rod 21.

It will be clearly seen from Fig. 3 that the cam-wheel 35 is provided with a depressed portion, as at 48, which takes up only a comparatively short portion of the periphery of the said cam-wheel. It thus happens that when the frame 39 is in its upper position the roller 45 will engage the periphery of the said cam-wheel and be held up thereby for a greater portion of its revolution, and will thus force the trolley 47 against the under side of the rod 21 and lift the same out of engagement with the wrist-pin 20. This will disengage the pushers from the power-shaft and cause them to cease operating. When the roller 45 drops into the depression 48 of the cam-wheel, the trolley 47 will be lowered and the rod 21 will be permitted to rest upon and engage the wrist-pin 20, thus completing the connection between the pushers and the power-shaft and causing the said pushers to be reciprocated for dumping the ashes. The rod 21 is preferably extended sufficiently beyond the half-bearing 22 to enable the said



rod to always engage the wrist-pin when it is lowered and permit the said pin to slide along its under surface until it falls into the half-bearing 22. By the mechanism thus described it will be seen that through the medium of the ratchet-wheel and worm-gearing and the cam the power-shaft will be caused to actuate the pushers in the ash-duct only at intervals. Should it be necessary to quickly discharge the ashes from the ash-pit, a continuous motion can be instantly communicated to the same by disengaging the pawl 42 from the floor and permitting the rod 40 to drop, whereby the cam and worm-wheel and the trolley will be lowered sufficiently to no longer affect the operation of the rod 21 and leave it in continual engagement with the wrist-pin 20. As soon as the ashes have been completely discharged the intermittent mechanism can again be brought into engagement by lifting the rod 40 by means of its handle 41, the pawl 42 holding it in its upper position. It will thus appear that the change can be made from the intermittent to the continuous motion at a moment's notice, and the change can be made as quickly from the continuous to the intermittent motion again by the mere operation of the rod 40.

It will thus be seen that by my improved ash-remover mechanism I am enabled to secure a continuous feed for operating the same by means of power or an intermittent feed and can change from one to the other very quickly and that I am enabled to remove the ashes from the ash-pit by hand, if desired, by employing the pivoted floor.

The parts of my device can be made in a strong and simple manner and are not liable to get out of order or to break easily. They are also very effective for doing the work required.

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

1. In a furnace, the combination with a reciprocating pusher, for removing the ashes from the bottom of an ash-pit, of a power-shaft for operating the same, means connecting the power-shaft with the said pusher comprising a rock-shaft connected with the said pusher and a counter-shaft connected with the said power-shaft, a connecting-rod interposed between the said rock-shaft and counter-shaft, and means for raising and lowering the said rod for communicating an intermittent or continuous motion to the pusher, substantially as described.

2. In a furnace, the combination with reciprocating pushers for removing ashes from the ash-pit, of a power-shaft for actuating the same, a rock-shaft connected with the said pushers, a counter-shaft connected with the said power-shaft, an arm connecting the rock-shaft with a counter-shaft, and gearing also operated by the said counter-shaft for inter-

mittently causing the engagement or disengagement of the said connecting-rod with the counter-shaft, substantially as described.

3. In a furnace, the combination with reciprocating pushers of a power-shaft on the furnace-front for operating the same, a rock-shaft having arms secured thereto and connected directly with the said pusher or pushers, a counter-shaft forward of the rock-shaft for actuating the same, said counter-shaft also carrying arms, one of which is connected by a link with an arm on the power-shaft and the other, of which carries a wrist-pin, a connecting-rod secured to one of the arms on the said rock-shaft and having a half-bearing formed in its under surface for engaging said wrist-pin, a ratchet-wheel mounted in suitable proximity to the counter-shaft, a pawl for operating the same actuated by the said counter-shaft, a worm rotated by the said ratchet and engaging a worm-wheel secured to a suitable shaft, a cam-wheel also secured to the latter shaft and a trolley-carrying arm interposed between the said cam-wheel and the under side of the connecting-rod, the construction being such that when the trolley-carrying arm engages a depressed portion of the periphery of the cam-wheel, it will permit the connecting-rod to engage the wrist-pin and thereby communicate motion to the pusher or pushers and when the trolley-carrying arm engages the remaining portion of the cam-periphery, the trolley will lift the said rod out of engagement with the said wrist-pin and thus stop the movement of the pusher or pushers, substantially as described.

4. In a furnace, the combination with a reciprocating pusher, of means for connecting the same with a power-shaft comprising suitable shafting and a connecting-rod, a ratchet-and-worm mechanism also operated by the power-shaft, a pivoted frame supporting said ratchet-and-worm mechanism, a cam-wheel supported in the pivoted frame, means operated by the said cam for causing the connecting-rod to engage with or to be disengaged from the power-shaft, to give an intermittent motion to the pusher, a hand-operated rod supporting the forward end of the pivoted frame and extending through the floor and means for engaging the floor to hold the rod in its uppermost position, the construction being such that when the rod is lifted an intermittent feed movement will be communicated to the pushers and when it is dropped, the intermittent feed movement will be discontinued and a continuous reciprocating feed motion will be given to the pushers, substantially as described.

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

WILLIAM MCCLAVE.

Witnesses:

JOHN L. FLETCHER,  
EDW. H. JONES.