No. 626,232. Patented June 6, 1899.

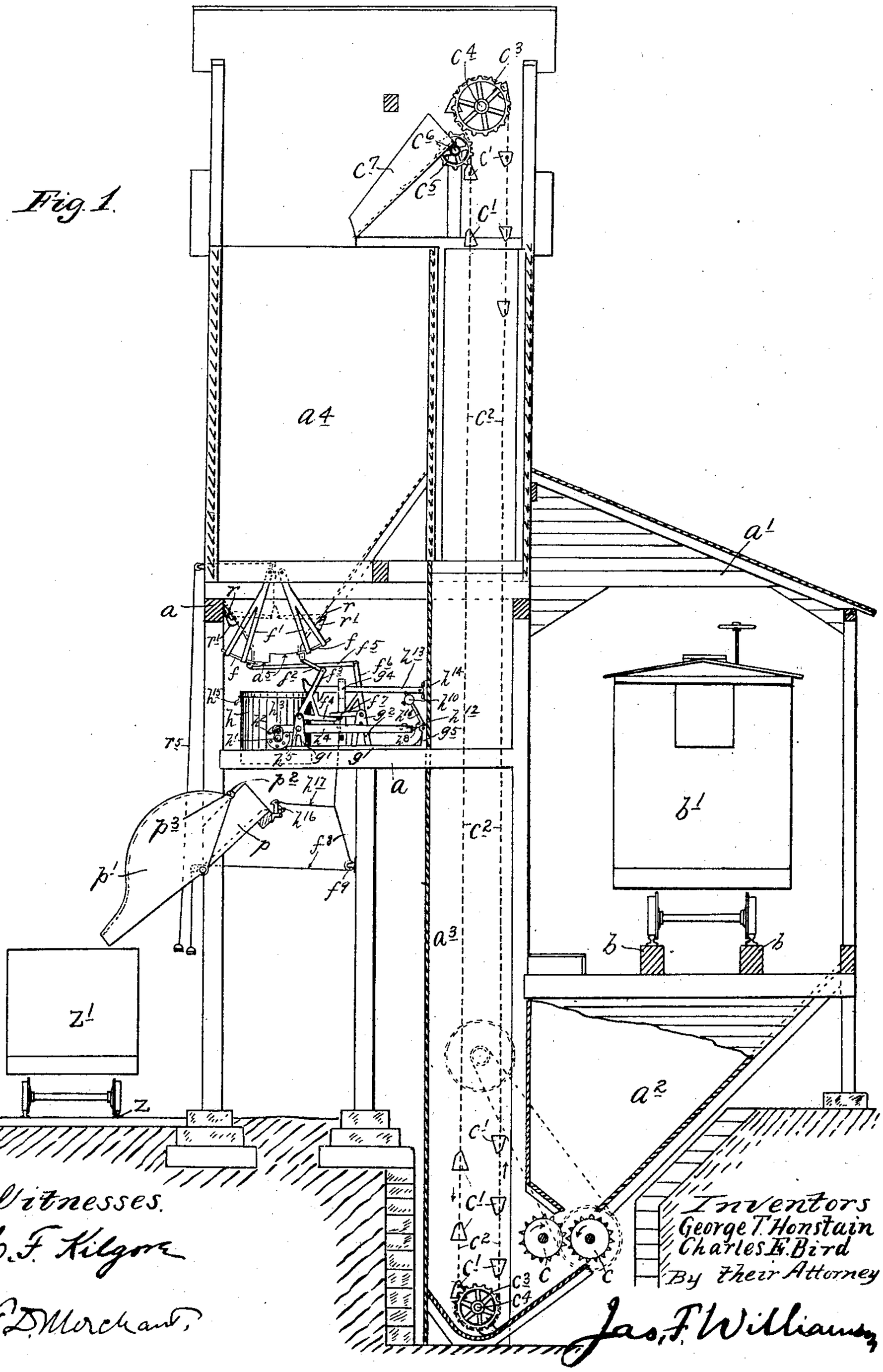
G. T. HONSTAIN & C. E. BIRD.

COALING STATION.

(Application filed Dec. 31, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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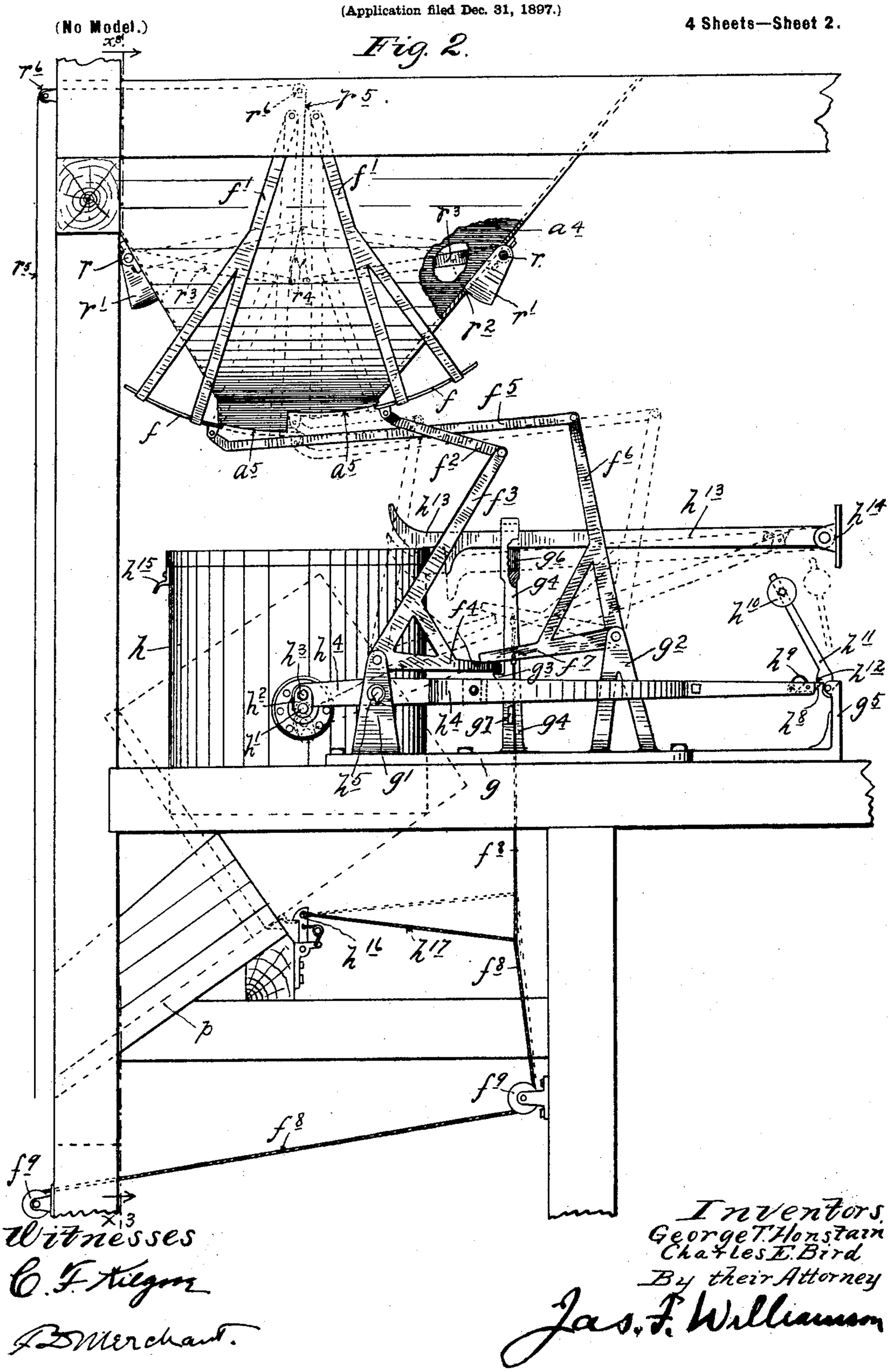
(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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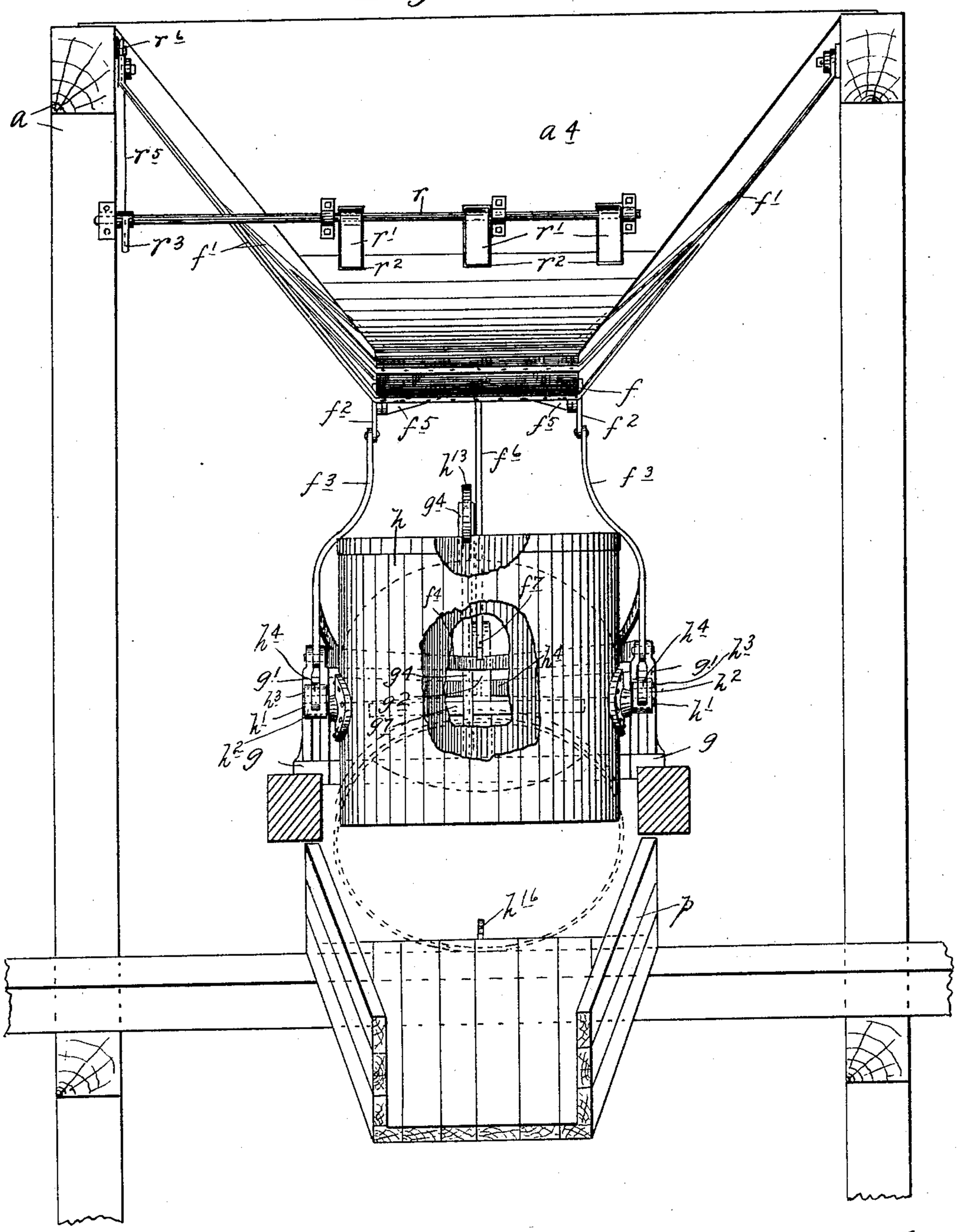
(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 4.

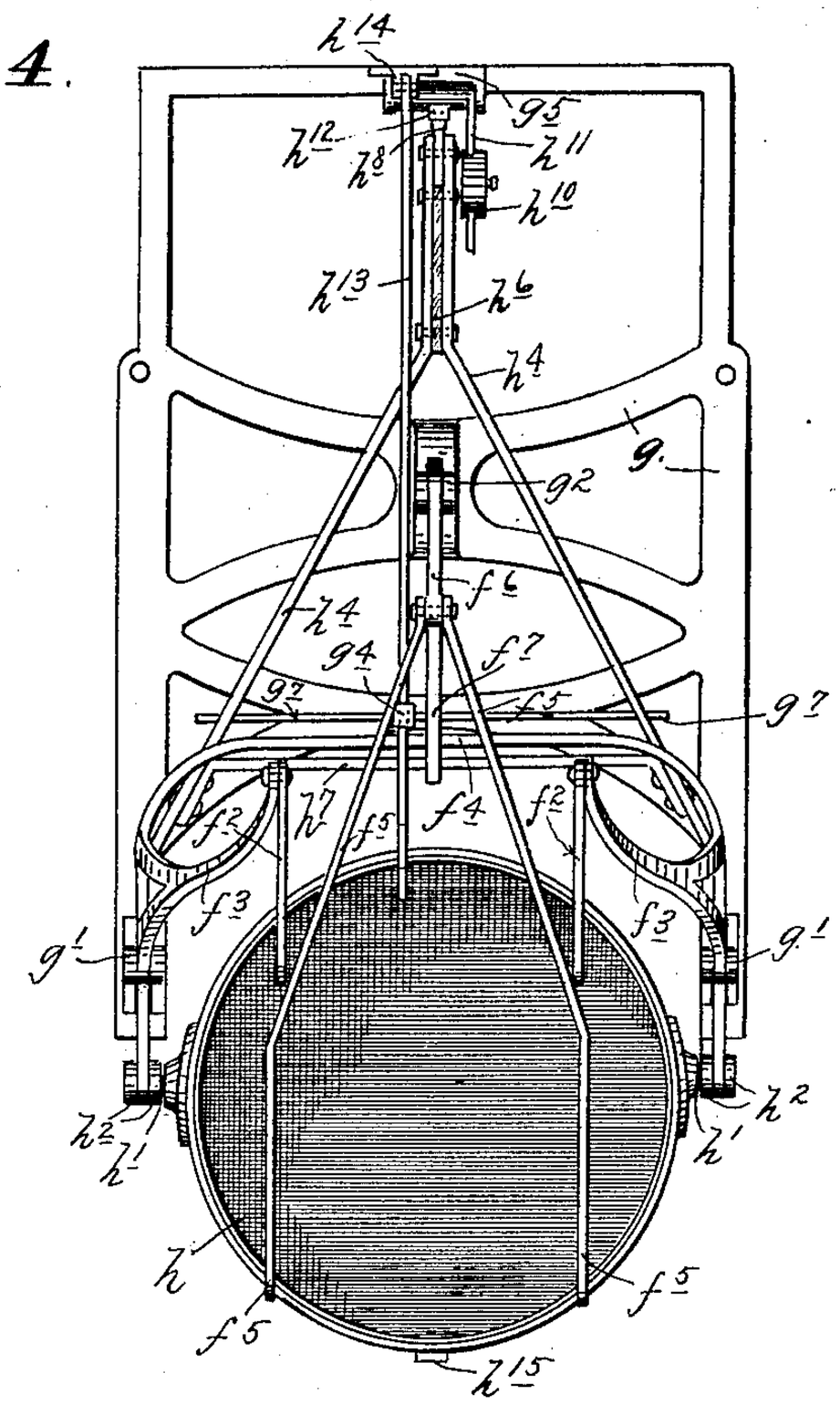


Fig. 7.

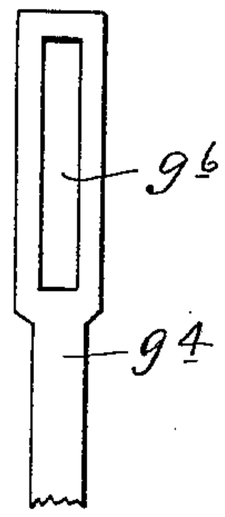


Fig. 6.

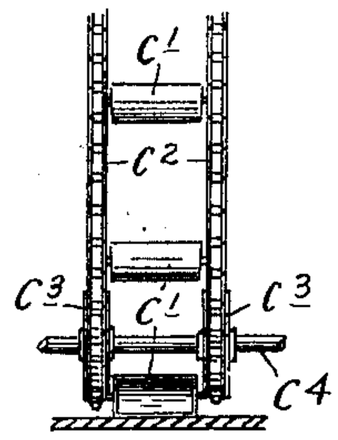
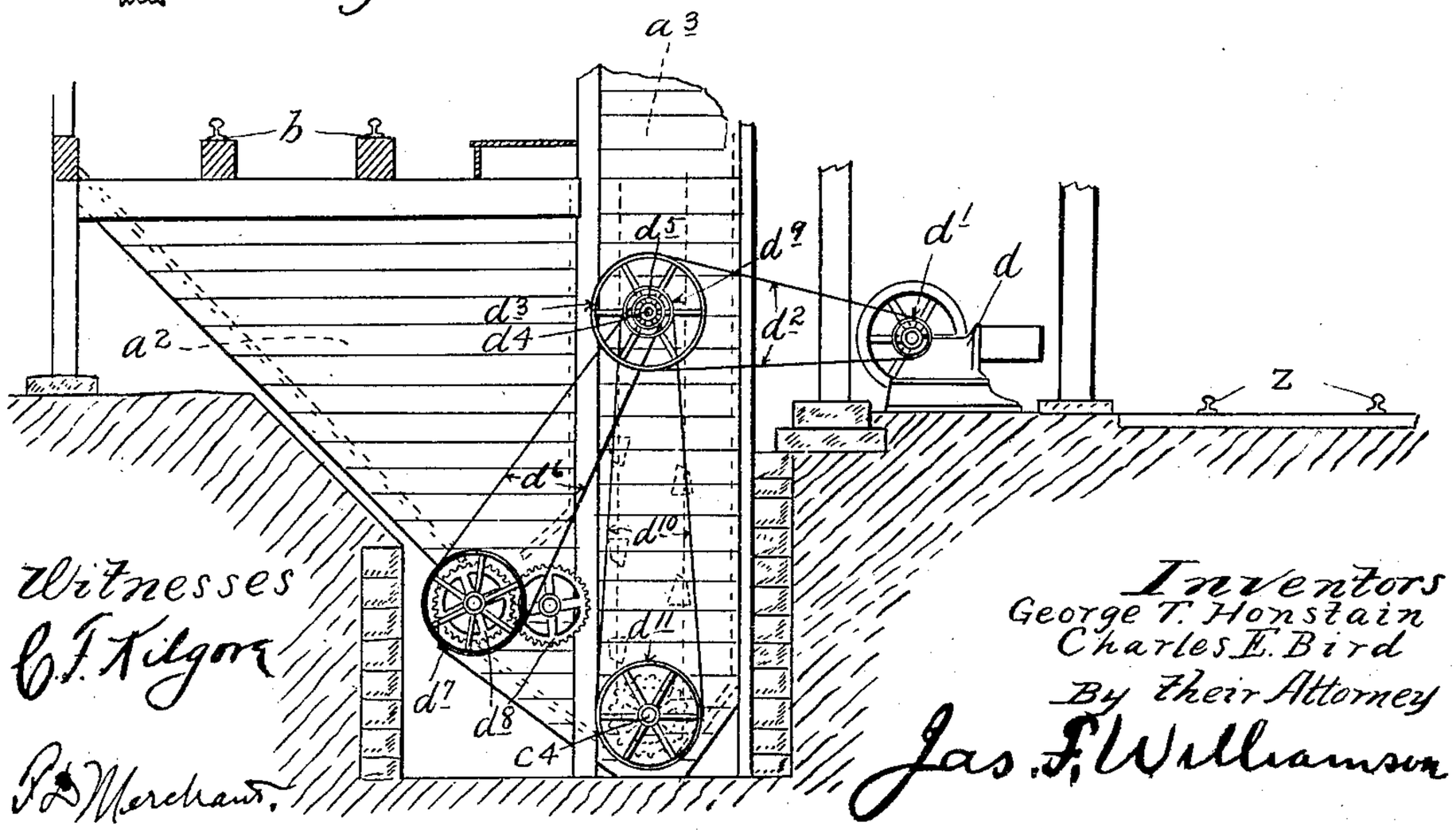


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE T. HONSTAIN AND CHARLES E. BIRD, OF MINNEAPOLIS, MINNESOTA; SAID BIRD ASSIGNOR OF ONE-THIRD OF HIS RIGHT TO SAID HONSTAIN.

COALING-STATION.

SPECIFICATION forming part of Letters Patent No. 626,232, dated June 6, 1899.

Application filed December 31, 1897. Serial No. 665,118. (No model.)

To all whom it may concern:

Be it known that we, GEORGE T. HONSTAIN and CHARLES E. BIRD, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Coaling-Stations; and we 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.

Our invention has for its special object to provide an improved coaling-station, although the same is capable of use for some other kinds of material.

To this end our invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

In our improved station the coal is received from the cars into a pit or hopper located below the track, is passed from the receiving pit or hopper through suitable crushing-rollers to the foot of an elevator, is raised by the said elevator into a suitable elevated storage-bin, and from the storage-bin is delivered at will through an automatic weighing and loading device under the action of gravity into a car or other receptacle located below the same.

Our invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

Figure 1 is a vertical cross-section through our improved station and the adjacent tracks, with some parts shown in elevation and others broken away. Fig. 2 is a view in the same plane as Fig. 1, but showing the automatic weighing and loading mechanism on a larger scale, the full lines showing the parts as they appear when the bucket is being filled and the dotted lines showing the same as they appear when the bucket is being dumped. Fig. 3 is a vertical section on the line $x^3 x^3$ of Fig. 2 with some parts broken away. Fig. 4 is a plan view of the weighing mechanism detached. Fig. 5 is a view showing part of the building in side elevation with some portions broken away for illustrating the driving connections to the moving parts. Fig. 6 is a detail showing certain portions of the elevator. Fig. 7 is a detail showing the guide for the bucket latch-lever.

The building a is of suitable form for housing the coal or other material stored therein and for supporting the various mechanisms used in handling the same. As shown, the building affords a car-shed a', a receiving pit or hopper a^2, an elevator-trunk a^3, and an elevated storage-bin a^4. The car-shed a' is, as shown, at the back of the building and is provided with a suitable track b for receiving the loaded cars b' in proper position to drop the coal therefrom into the receiving-hopper a^2. At the front of the building is located the main or other track z for the locomotive-tenders z' or other cars or receptacles into which the coal is to be delivered from the station.

From the receiving-hopper a^2 the coal passes between a pair of toothed crushing-rollers c, by which the large lumps are crushed and reduced to the proper size for handling by the elevator. From the crushing-rollers c the coal passes to the foot of the elevator-trunk a^3 and becomes subject to the action of the elevator-buckets c', by which the same is elevated and delivered into the storage-bin a^4. The elevator-buckets c' are pivoted between pairs of chains c^2, as best shown in Fig. 6, which pass over suitable sprockets c^3, located on shafts c^4 at the foot and head of the elevator-trunk. At the head of the elevator and on the delivery side of the same the chains c^2 are subject to the action of guide-sprockets c^5 on a shaft c^6, which deflect the chains to bring the buckets c' into dumping position over a chute c^7, delivering to the storage-bin a^4.

The crushing-rollers c and the parts of the elevator just noted may of course receive motion from any suitable source through any suitable drive. As shown, the power is afforded from a gas-engine d, which has its driving-pulley d' connected by belt d^2 to a pulley d^3 on a counter-shaft d^4, from which all the other parts receive motion, as best shown in Fig. 5. Said counter-shaft d^4 has a pulley d^5 connected by belt d^6 to a pulley d^7 on one of the crushing-rollers c. The crushing-rollers c have gear-wheels d^8, which engage with each other. The crushing-rollers

c are thus made to turn toward each other, as shown by the arrows in Fig. 1. The countershaft d^4 has another pulley d^9, which is connected by a belt d^{10} with a pulley d^{11}, located on the bottom member of the elevator-shaft c^4, for imparting motion to the moving parts of the elevator.

By the mechanism so far described it is obvious that the coal from the loaded cars b' may be dropped into the receiving pit or hopper a^2, that in passing from said receiving-pit a^2 to the foot of the elevator-trunk a^3 the coal will be subjected to the action of the crushing-rollers c, thereby reducing the large lumps to proper size for handling by the elevator, and that by the elevator the coal will be raised and delivered into the storage-bin a^4.

Attention will now be directed to the mechanism for weighing and delivering the coal from the storage-bin into cars or other receptacles located below the same. The said storage-bin a^4 has a hopper-like bottom, and the walls of the hopper-outlet are stepped in the vertical plane to afford offset or staggered seats a^5 in the vertical plane for coöperation with cut-off valves f to close the outlet of the hopper, as will later more fully appear. Said cut-off valves f are carried by hangers f', pivoted to the framework of the building. These hangers f' are of proper shape and are properly disposed to embrace the hopper and clear the walls of the same in their swinging action, and their pivots are so located that the said cut-off valves tend to close under the action of gravity. The inner member of the cut-off valves f is connected by links f^2 to the upper arms f^3 of a bell-crank lever $f^3 f^4$. The lower arm f^4 of this bell-crank lever $f^3 f^4$ is in the form of a bail, as best shown in Fig. 4, and is pivoted to a pair of bearing-brackets g', rising from the base-plate g of the scale. The outer member of the cut-off valves f is connected by links f^5 to the upper arm f^6 of a bell-crank lever $f^6 f^7$, which is pivoted at its elbow to a bearing-bracket g^2, rising from said bed-plate g of the scale. The lower arm f^7 of the bell-crank lever $f^6 f^7$ overlaps the lower or bail-arm f^4 of the other bell-crank lever $f^3 f^4$, as best shown in Fig. 2, and the downward movement of both of said bell-crank levers may be limited by a common stop, shown as in the form of a shoulder g^3 on a standard g^4, which rises from the scale bed-plate g. To the lower arm f^7 of the bell-crank lever $f^6 f^7$ is attached a pull-rope or other flexible connection f^8, which passes over suitable guide-sheaves f^9 to the exterior of the building into position to be conveniently reached by an operator for throwing the cut-off valves f into their open position whenever so desired. The said cut-off valves f are automatically thrown into their closed position under the action of the weighing mechanism, which will now be described.

A suitable bucket h is provided below and outward its center of gravity when loaded with trunnions h', which rest in short links h^2, carried by the knife-edged bearings h^3, which project from the outer arms h^4 of the scale-beam. The scale-beam arms are properly disposed to afford clearance for the tilting action of the bucket h and are provided with knife-edged trunnions h^5, which have their bearings in the two brackets g', rising from the base-plate g of the scale. The scale-beam arms h^4 converge to a point of junction rearward of the bearing-bracket g^2 and then extend parallel to each other throughout the remainder of their length. The parallel portions of the scale-beam arms h^4 are bolted or riveted together through a suitable spacing-block h^6, as best shown in Fig. 4. The outer portions of the scale-beam arms h^4 are suitably spaced apart and tied together by cross-brace h^7, as best shown in Fig. 4. At its rear end the scale-beam is provided with a one-way spring-pawl h^8, free to turn upward against its retracting-spring h^9, but constructed to interlock with the spacing-block h^6 to limit its downward pivotal motion, as best shown in Fig. 2. A scale-weight h^{10} is adjustably mounted on a suitable lever h^{11}, which is pivoted to a bearing-bracket g^5, rising from the scale base-plate g, and this lever h^{11} is provided with a shoulder h^{12}, adapted to overreach and engage with the spring-pawl h^8 when the scale-beam is in its horizontal or weighing position, as shown in Figs. 1 and 2. A latch-lever h^{13} is pivoted to a bracket h^{14}, secured to the fixed structure, and said latch-lever h^{13} extends forward through a guide-slot g^6 in the standard g^4 and is of hook shape at its outer end, adapting the same to engage over the rim of the bucket for holding the bucket in its upright or filling position, as best shown in Fig. 2. The outer end of the latch-lever h^{13} is cam-shaped for permitting the bucket to act thereon with a camming action for causing the latch to engage with the bucket when the latter returns to its upright position. The guide-slot g^6 in the standard g^4 holds the latch-lever h^{13} in proper working position and limits the downward movement thereof in respect to the bucket when the bucket is lowered into its dumping position. The divergent parts of the scale-beam arms h^4 underlie the lower or bail-like arm f^4 of the bell-crank lever $f^3 f^4$ for causing the scale-beam to operate both of the bell-crank levers $f^3 f^4$ and $f^6 f^7$ to throw the cut-off valves f into their closed position in the weighing action, as will presently more fully appear. A stop-bar g^7 limits the return motion of the scale-beam h^4.

We do not by any means limit ourselves to the specific constructions and arrangements of the scale-weight h^{10}, lever h^{11}, and spring-pawl h^8, above described. We consider it to be novel with our device to provide a scale-beam and a scale-weight arranged to normally resist the movement of said beam under the weight of its load and then to be tripped out of ac-

tion on the said beam or other part movable therewith when the said load reaches or exceeds a predetermined weight.

When the bucket h is in its dumping position, as shown in dotted lines in Fig. 2, its outer end overreaches the upper end of a fixed chute p, and a catch-lug h^{15} is engaged by a spring-latch h^{16} for holding the bucket in its dumping position. The spring-latch h^{16} is connected by a branch cord or flexible connection h^{17} with the main pull-rope f^8 for releasing the bucket from the latch h^{16} when the bucket is emptied. The fixed chute p extends into a pivoted chute p', which coöperates therewith when in its lowered position to direct the coal into the car z' or other receptacle below the same, but which pivoted chute p' may be turned up into an idle position, so as to be out of the road of passing trains. The downward pivotal motion of the chute p' is limited in any suitable way. As shown, the side walls of the chute p' are provided with lugs p^2, which engage with a stop-rod p^3, secured to the fixed structure.

Having regard now to the action of the above-described weighing and loading devices, let it be assumed that all the parts are in the position best shown in Fig. 2 in full lines. In this position of the parts the cut-off valves f are in their open position, thereby permitting the coal to flow by gravity from the storage-bin a^4 into the bucket h. Whenever the predetermined weight is reached in the bucket h for which the scale is set to trip, the weighted trip-lever h^{11} will be thrown backward by the scale-beam into its dotted-line position, as shown in Fig. 2, thereby permitting all the other parts to assume their dotted-line positions, as shown in the said view. At the initial part of the scale-beam's movement, after the release from the trip-lever h^{11} the long arm of the scale-beam will strike the lower or bail-like member f^4 of the bell-crank lever $f^3 f^4$, and thereby rock both of the bell-crank levers $f^3 f^4 f^6 f^7$ into their uppermost position, thereby causing the same to throw the cut-off valves f into their closed position. Meantime the bucket h is lowering on the short arms of the scale-beam, but remains upright until the latch-lever h^{13} strikes the bottom of the slot g^6 in the standard g^4. When this occurs, the latch-lever h^{13} is intercepted, while the bucket continues to lower away from the latch. This affords time for completely closing the cut-off valves f before the bucket h begins to turn. As quick as the bucket h has lowered sufficiently far to clear the latch-lever h^{13} it will instantly turn outward and downward, under the action of gravity, into its dumping position, as shown in dotted lines in Fig. 2, in virtue of the fact that its trunnions h' are located below the center of gravity of the bucket, as hitherto described. The said bucket being in its dumping position, as shown in dotted lines in Fig. 2, the same will be caught and held by the spring-latch h^{16} until the latter is released by operating the pull-rope f^8. When in dumping position, the bucket stands at such an angle as to insure the flowage of the coal therefrom under the action of gravity. As soon as the bucket h is dumped the operator will, if more coal is desired, manipulate the pull-rope f^8, and thereby first release the bucket h from the catch h^{16} and then throw the cut-off valves f into their open position. Before the cut-off valves f can thus be thrown into their open position by the operator, however, the bucket h will have returned to its upright position on the scale-beam and be relocked to the latch-lever h^{13} and that the scale-beam will have returned to its normal or weighing position and be reëngaged by the trip or weighted lever h^{11}. The parts will then all again be in their normal or weighing position ready for the next action. These actions of filling the bucket and dumping the coal therefrom into the chutes which lead to the car may be repeated over and over again until the desired load is secured. The amount of load required to dump the bucket having been predetermined at the setting of the scale, it is of course obvious that it is an easy matter to keep track of the total weight of the load. If so desired, any suitable automatic tallying device might be arranged to coöperate with the weighing mechanism for keeping a record of the number of buckets of coal handled by the weighing mechanism.

It should perhaps be noted that while the cut-off valves f are so mounted that they tend to close by gravity, the bell-crank levers $f^3 f^4$ and $f^6 f^7$ are of such weight and so mounted that under the action of gravity they will hold the cut-off valves f in their open position.

In order to prevent any clogging of the coal in the outlet-hopper from the storage-bin a^4, we provide means for agitating and loosening up any coal which may accumulate therein. For this purpose we have shown a pair of rock-shafts r, having short arms or tumblers r', which work through slots r^2 in the walls of the hopper for loosening up the coal. The rock-shafts r are provided with lever-arms r^3, to which are attached divided sections r^4 of a pull-rope r^5, which passes over suitable guide-sheaves r^6 to the exterior of the building within convenient reach of an operator for manipulating the same whenever so desired. By means of these agitators or clearing devices it is obvious that the clogging of the outlet from the storage-bin a^4 may be avoided.

The staggered relation of the cut-off valves f in the vertical plane prevents any bite therefrom on the chunks of coal in their closing action. Otherwise stated, said cut-off valves f will seldom strike the same chunks of coal at the same time, and when they do they will act thereon with a rolling or tilting action, thereby forcing the coal out of their paths. This construction therefore insures the required closing action of said cut-off valves f.

By actual usage we have demonstrated the efficiency of the mechanism herein disclosed

for the purposes had in view. By actual test it has been found that the automatic weighing and loading mechanism disclosed herein is reliable and quick in its action. Of course for this class of material precision or exactness of weight to a fine point of nicety is not required.

It will be understood, of course, that the parts may be made of any desired materials and proportions, according to the quantities intended to be handled in any given action, and, further, that the details of the mechanism may be changed without departing from the spirit of our invention.

The plant herein described is of comparatively low cost for the functions performed and enables the coal to be handled in the manner desired from such stations at a minimum expense.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a weighing device, the combination with a scale-beam of a scale-weight arranged to normally resist the movement of said beam under the weight of its load, and to be tripped out of action when said load has reached a predetermined weight, and a one-way pawl for permitting said scale-weight and scale-beam to resume normal relations, substantially as described.

2. The combination with a scale-beam having a dumping-bucket, of a scale-weight arranged to normally resist the movement of said scale-beam under the weight of its load, and to be tripped out of action when said load has reached a predetermined weight, and a one-way pawl for permitting said scale weight and beam to resume normal relations, substantially as described.

3. The combination with the elevated storage-bin, of the cut-off valves f arranged as described, the scale-beam having the links suspending the dumping-bucket, as described, the weighted trip-lever and one-way pawl, for controlling the scale-beam, as described, the bucket latch-lever, operating as described, the pair of oppositely-acting bell-crank levers, subject to the scale-beam, as described, and the links from said bell-crank lever to said cut-off valves, all for coöperation, substantially as and for the purposes set forth.

4. The combination with the scale-beam having the links h^2 of the bucket pivoted to said links below the bucket's center of gravity, the weighted trip-lever and pawl, controlling the scale-beam, the bucket latch-lever h^{13} and the standard g^4 having the slot g^6 through which said latch-lever works, substantially as and for the purposes set forth.

5. The combination with the storage-bin and cut-off valves, of the scale-beam and bucket, the oppositely-acting and overlapped bell-crank levers with links to said valves and subject to said beam, for closing said cut-off valves, and a pull-rope applied to the overlapping member of said bell-crank levers, for throwing said valves in their open positions, substantially as described.

6. The combination with a scale-beam carrying a dumping-bucket, of a scale-weight arranged to act on said beam only while the beam and bucket are in a filling position and to be thrown completely off from said scale-beam, under the initial movement of said beam from the predetermined load, and a bucket-latch arranged to hold said bucket from dumping until after said scale-weight has been thrown off from said scale-beam, and then to permit the bucket to dump, substantially as described.

7. The combination with a supply-hopper and cut-off valve controlling the supply therefrom, of a scale-beam carrying a dumping-bucket for receiving from said hopper, a scale-weight arranged to act on said scale-beam only while the beam and bucket are in filling position, and to be thrown completely off from said scale-beam under the initial movement of said beam from the predetermined load, connections to said cut-off valves arranged to be operated by said scale-beam on its downward movement under the load, to effect the cut-off, and a bucket-latch arranged to hold said bucket from dumping until after said weight has been thrown from the scale-beam and the cut-off valves have been thrown into their closed position by said beam, and then to permit the bucket to dump, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE T. HONSTAIN.
CHARLES E. BIRD.

Witnesses:
JAS. F. WILLIAMSON,
BESSIE B. NELSON.