

No. 760,485.

PATENTED MAY 24, 1904.

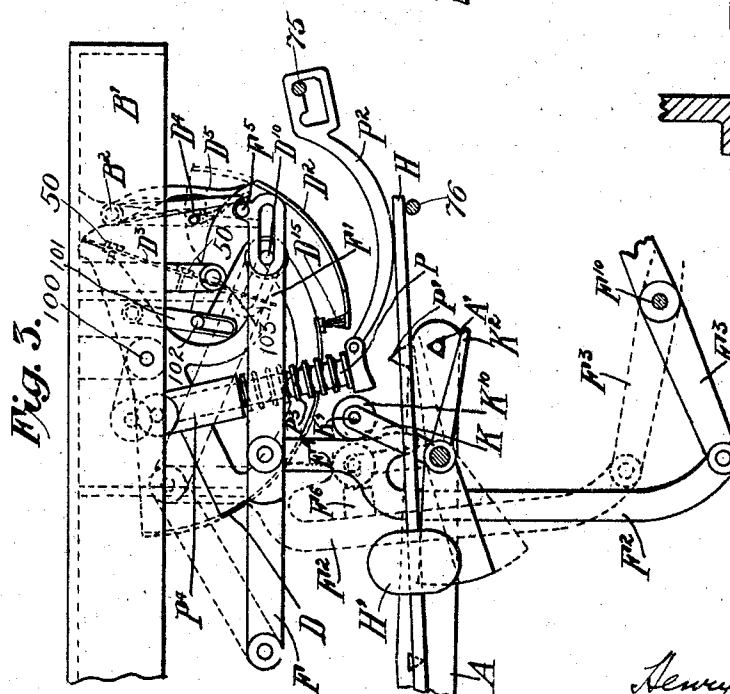
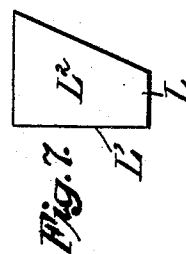
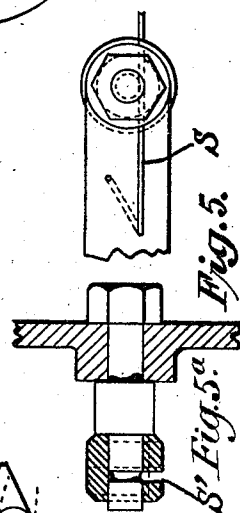
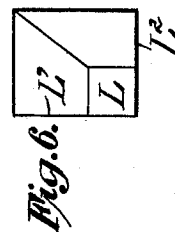
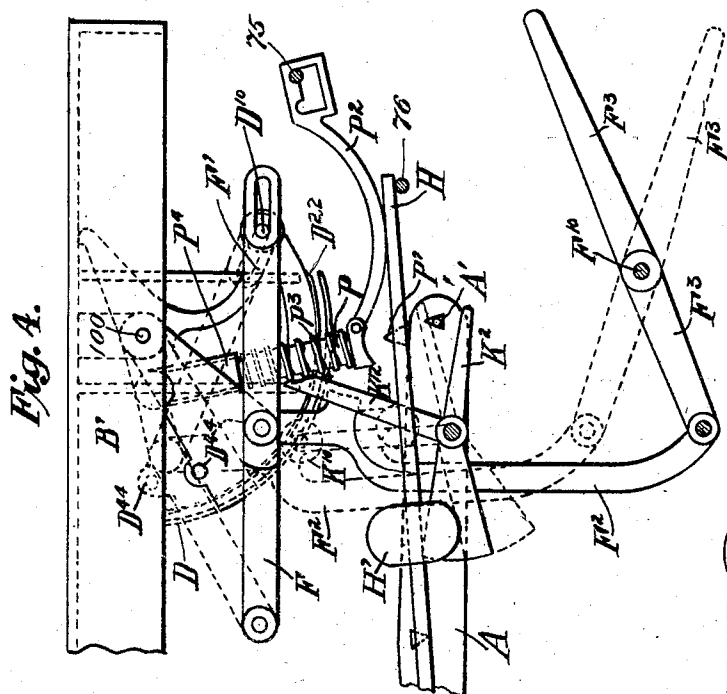
H. RICHARDSON.

AUTOMATIC WEIGHING MACHINE.

APPLICATION FILED DEC. 19, 1902.

NO MODEL.

2 SHEETS--SHEET 2,



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UNITED STATES PATENT OFFICE.

HENRY RICHARDSON, OF HANDSWORTH, ENGLAND.

AUTOMATIC WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 760,485, dated May 24, 1904.

Application filed December 19, 1902. Serial No. 135,937. (No model.)

To all whom it may concern:

Be it known that I, HENRY RICHARDSON, a subject of the King of Great Britain, residing at 166 Ox Hill road, Handsworth, in the county of Stafford, England, have invented certain new and useful Improvements in Automatic Weighing-Machines, of which the following is a specification accompanied by drawings.

My invention relates to weighing-machines or apparatus for automatically weighing various articles of a granular or pulverous character.

The objects of my invention are to improve upon the trip mechanism for the levers and working parts and the shutter mechanism in order to obtain a greater degree of accuracy, to arrange an improved compensating mechanism in such manner that the column of material which is in the act of falling into the scale during the final weighing operations may be compensated for, to afford provision for removing foreign matter from the hopper by constructing a grid within the hopper arranged at an angle to the opening from which the foreign matter is to be removed, to improve upon the construction by which the levers and working parts of the weighing-machine are attached and detached, and to improve upon the feeding-hopper for feeding non-free-running materials, such as tea, flour, bran, coal, and the like.

Further objects of my invention will hereinafter appear; and to these ends my invention consists of an automatic weighing-machine for carrying out the above objects embodying the features of construction, combinations of elements, and arrangement of parts, and having the general mode of operation substantially as hereinafter fully described in this specification and shown in the accompanying drawings, in which—

Figure 1 is a front elevation of an automatic weighing-machine. Fig. 2 is a side elevation of the same. Fig. 3 is a side elevation, on an enlarged scale, of a machine having two shutters for feeding non-free-running materials. Fig. 4 is a side elevation, on an enlarged scale, of a modification of the construction shown in Fig. 3. Fig. 5 is an enlarged detail view of the construction for attaching and detaching

the levers. Fig. 5^a is a section through the same. Fig. 6 is a detail plan view of one form of hopper. Fig. 7 is an elevation of said form of hopper.

In the drawings, Figs. 1 and 2 show a machine having one shutter. Figs. 3 and 4 show a form of machine operating with two cooperating shutters. In each form of the machine the material is allowed to dribble before the flow is cut off. In Fig. 3 the two shutters operate to and from each other, while in Fig. 4 one shutter is arranged above the other. In Figs. 1, 2, 3, and 4 the ordinary form of hopper is illustrated, while in Figs. 6 and 7 a modified form of hopper is shown.

Referring to the drawings, and first with reference to Figs. 1 and 2, the weighing-beam A is suitably pivoted, as shown, on the frame of the machine, with the weighing-hopper B hung at one end and weights suspended at the other end in a scale pan or poise. The weight C equals the material to be weighed, while the weight C' is preferably suspended from the beam to balance the hopper B and its attachments. The flow of material from the hopper or chute B' is in this instance controlled by a swinging shutter D, arranged above the hopper B. The shutter may be constructed in any well-known manner; but, as shown, it is curved and closes over an aperture in the chute B'. The shutter is controlled by the movement of the beam A in such manner that when the hopper B is emptied and in its upper position the shutter is full open and remains so until the larger part of the material to be weighed passes into the hopper B. The hopper then falls through a certain distance, influenced by the weight of the shutter pressing thereon through the intermediary of mechanism to be described. The construction of the machine is such that the shutter reduces the flow of material from a maximum to a substantially constant minimum and allows it to trickle in order to accurately obtain the weight necessary to slightly overbalance the beam, and then upon the tilting of the beam the shutter is entirely closed and the flow completely shut off.

In the double-shutter construction (shown in Figs. 3 and 4) the shutters are also con-

trolled by the movement of the beam in substantially the same manner that the single shutter is controlled. One of the two shutters, which may be termed the "main" shutter, reduces the flow of material from a maximum to a substantially constant minimum, and then upon the tilting of the beam the shutters are entirely closed and the flow completely shut off. Since Figs. 3 and 4 are shown on a larger scale than are Figs. 1 and 2, the invention will be more readily understood by first describing Figs. 3 and 4 and then referring to Figs. 1 and 2, the operating mechanism being substantially the same for both forms of the machine. In Figs. 3 and 4 the shutters are supported at the point P' in full open position by what may be termed the "spring-pendant," comprising the link P, connected to the link P², supported at one end by a pin 75. A spring P³, carrying the cap P⁴, is connected to one of the shutters, as the larger one D, so that the weight thereof is transmitted through the spring to the point P' on the beam A when the shutters are open. The link P² acts as a guide member for the spring-pendant. The pressure of the shutter D at the point P' is reduced accordingly with the volume of dribble falling into the hopper, since the shutter having come to rest at the end of the slot in the link F' its pressure is then transferred to the roller K¹⁰, and obviously at the moment when the total pressure of the shutter is transferred to the roller the beam is free to descend and has, in fact, overbalanced the weight C'. The notches and slot in the link P² are for adjusting said link. The shutters are connected to be controlled by the operatively-connected links F F' F² F³, the function of which is to arrest the movement of the shutters for the formation of the dribble or small flow of the material necessary to obtain accurate weighing. The link or lever F³ is pivoted at F¹⁰, and the link F² is pivotally connected thereto at one end, the other end of said link F² being pivoted to the inner ends of the links F F', which together form a toggle-acting mechanism. The link F is pivoted at its upper end to the frame, while the outer end of link F' is provided with a slot engaging a pin D¹⁰, projecting from the large shutter D. As stated, at the first stage of the weighing operations with the shutters open the linkage is supported at the point P', the links being shown in dotted lines and the toggle-acting mechanism broken. In this position the pin D¹⁰ is at the top of the slot in the end of the link F', so that the shutter may move when released a distance measured by the length of said slot. When the shutter partially closes for the dribble, the pin D¹⁰ moves to the bottom of the said slot, and in this position the shutter is supported from the trigger K until the weighing operation is completed. In Fig. 3 the trigger mechanism supporting the linkage F F' F² F³ is shown provided with a roller K¹⁰ at its end, pivoted to rotate on its axis K', and this roller passes under the link F² at F⁴, while the trigger is positioned against the stop F⁶ on link F² and securely holds the weight of the linkage and the shutters. By a slight pressure exerted on the arm K² the trigger is easily moved aside to release the linkage. In Figs. 1, 2, and 4 a modified form of trigger K¹² is shown, the roller K¹⁰ in this instance being on the link F², the operation of the trigger being similar to that of Fig. 3. In Fig. 3 it will be seen that the small shutter D² is adapted to be opened at the same time that the large shutter is opened. As the large shutter D swings about its pivot 100 in opening, the link 101 is forced downward against pin 102 on the shutter D², thereby swinging said shutter about its pivot 103 to open the same. When the large shutter closes, the small shutter is prevented from closing by the projection D⁴ thereon resting upon the catch D⁵, attached to the chute B' by means of the pin B². The dribble now takes place until the beam, having received the required weight, is moved, and in its movement the trigger K is knocked aside by the pin A'. The linkage F F' F² F³, no longer supported at F⁴, falls, and the projection F⁵ on the link F' knocks aside the catch D⁵ and allows the small shutter D² to close and shut off the supply. As the outer end of the lever F³ moves upwardly it throws the arm 25 upwardly, and thus rocks the weighted bell-crank lever 40 on its pivot 26, thereby opening the bottom 27 of the hopper B by means of the link connection 28. The pressure of the material in the bucket aids in opening said bottom or discharge gate 27. As soon as the material has run out by the hopper the weighted lever falls and forces down the link F³, thereby closing the bottom 27 of the hopper B. The machine thus operates automatically to weigh the charges. As shown, the small shutter D² is constructed and adjusted to project downward beneath the shutter D, while a brush D¹⁵ is attached below the inner edge of the shutter D for the regulation of the flow and for preventing the machine from becoming clogged by large lumps of material, as when coal is being weighed a lump may hold, and the brush keeps back the little pieces which would otherwise trickle through if the brush were not there. In Fig. 4 a small shutter D²² is shown arranged above the shutter D and supported by the projection D¹⁴, resting upon the link F. When the shutter D closes, the small shutter D²² awaits the drawing aside of the trigger K and then likewise closes to shut off the supply. The machine shown in Fig. 4 is more particularly designed for weighing pulverous material, such as flour and the like. The compensating arrangement to compensate for that column of material which is in the act of falling into the scale through the final weighing operation comprises the lever H and the sliding weight H' thereon, said lever during the

weighing operation resting upon the pin A' of the beam A. In Fig. 2 the compensating arrangement is shown acting in conjunction with the beam, but raised from off the beam by the link D⁶, having an arm 76 projecting therefrom. The link D⁶ is attached to the arm of the shutter D and adapted to come into action at the completion of the weighing, when the shutter closes.

Referring now to Figs. 1 and 2, it will be seen that the linkage is constructed the same as in Figs. 3 and 4, except that one shutter is used instead of a plurality of shutters. The operation of the machine is the same in all of the figures. In order to open the shutter or shutters in each form of the apparatus, the outer free end of the lever F³ is pressed down and, as stated, this is done automatically when the weighted arm 25 strikes the end of said lever F³. As shown in the drawings, Fig. 3, a plate D³ is arranged in the chute for regulating the size of the opening during the dribbling period and suitably secured by screws 50, whereby the position of the plate may be adjusted by removing the screws. The ability of the machine to weigh lumps of coal, ore, and the like is dependent upon the size of the opening. As stated, the machine shown in Figs. 1 and 2 with the single shutter is so constructed that the shutter D will close entirely after the dribbling period, allowing the free movement of the linkage F F' to fall into a straightened position, and thereby prevent the shutter from reopening until the desired time. In the hopper K a grid is arranged, and a partition K⁵ is located above the grid. Foreign material is removed through an opening K³.

In Figs. 5 and 5^a are shown, in large detail, views of the method of attaching the various levers and linkages by means of a spring attached to the lever engaging in a groove in the axle on which the said levers revolve, and to disengage them from the axle the spring S is pressed down out of the embayment S', which allows the lever to be withdrawn.

In Fig. 6, illustrating a modification of the hopper, it will be seen that the sides L' L² are perpendicular, for I have found that by adapting this type of hopper in conjunction with my feeding arrangement I am able to obtain better results and more even flow with the non-free-running materials hereinbefore mentioned.

It is desirable to prevent the shutter from being open and the bottom of the hopper open at the same time, and in order to prevent this I provide an interlocking arrangement between the connections for the shutter and those for the gate at the bottom of the hopper, so that when one is open the other is locked closed, and vice versa. As shown in the drawings, the weighted bell-crank lever 40 is provided with an arm 41, adapted to engage a slidable member 42, which slides on

the pins 43, the slots in the member 42 being provided with enlarged portions, so that said member may be removed from the hopper. When the arm F³ moves upwardly to raise the toggle, the member 42 is moved beneath the arm to lock the shutter or shutters closed, and, on the other hand, when the arm F³ is in one of its lowermost positions it is obvious that the member 42 cannot be slid on its supports or pins 43 to open the gate at the bottom of the hopper.

Obviously some features of my invention may be used without others, and my invention may be embodied in widely-varying forms.

Therefore, without limiting myself to the construction shown and described, I claim, and desire to secure by Letters Patent, the following:

1. In an automatic weighing-machine, the combination with the weighing-beam carrying weights at one end and a hopper at the other, of a chute arranged above the hopper, and a plurality of coöperating shutters for controlling the flow of material to be weighed, automatic toggle-acting linkage for controlling the movements of the shutters operatively connected to reduce the volume of flow of material from a maximum to a substantially constant minimum before the weighing operations are completed, a trip for said controlling linkage adapted to support the weight of the shutters and linkage during the last stage of operations with minimum flow, and means for automatically operating said trip to close the shutters, for substantially the purposes set forth.

2. In an automatic weighing-machine, the combination with the weighing-beam carrying weights at one end and a hopper at the other, of a feed-chute arranged above the hopper, and at least one shutter for controlling the flow of material to be weighed, automatic toggle-acting linkage for controlling the movement of the shutter operatively connected to reduce the volume of flow of material from a maximum to a substantially constant minimum before the weighing operations are completed, a trip for controlling said linkage adapted to support the weight of the shutter and linkage during the last stage of operations with minimum flow, and means for automatically operating said trip to close the shutter, for substantially the purposes set forth.

3. In an automatic weighing-machine, the combination of the weighing-beam carrying weights at one end and a hopper at the other, a feed-chute arranged above the hopper, and at least one shutter for controlling the flow of material to be weighed, supporting linkage and a trip for the same, and a roller for supporting the weight of the linkage and the shutter, whereby said trip may be readily operated and the degree of accuracy in weighing increased, for substantially the purposes set forth.

4. In an automatic weighing-machine, the combination of the weighing-beam carrying weights at one end and a hopper at the other, a feed-chute arranged above the hopper, and at least one shutter for controlling the flow of material to be weighed, mechanism connected to automatically control the movement of the shutter, a trip for said mechanism, and a roller for supporting the weight of said mechanism and the shutter from the trip, to permit the material to dribble before the weighing operations are completed, and means for automatically operating said trip, for substantially the purposes set forth.
5. In an automatic weighing-machine, the combination of the weighing-beam carrying weights at one end and a hopper at the other, a feed-chute arranged above the hopper, and at least one shutter for controlling the flow of material to be weighed, operatively-connected links for automatically controlling the shutter, and a trip provided with a roller pivoted thereto for supporting the weight of said links and the shutter, to permit the material to dribble before the weighing operations are completed, and means for automatically operating said trip, for substantially the purposes set forth.
6. In an automatic weighing-machine, the combination with the weighing-beam carrying weights at one end and a hopper at the other, of a chute arranged above the hopper, and a plurality of cooperating shutters for controlling the flow of material to be weighed, one of said shutters being provided with a brush, automatic toggle-acting linkage for controlling the movements of the shutters operatively connected to reduce the volume of flow

of material from a maximum to a substantially constant minimum before the weighing operations are completed, a trip for said controlling linkage adapted to support the weight of the shutters and linkage during the last stage of operations with minimum flow, and means for automatically operating said trip to close the shutters, for substantially the purposes set forth.

7. In an automatic weighing-machine, the combination with the weighing-beam carrying weights at one end and a hopper at the other, of a gate for the discharge-opening of the hopper, a chute arranged above the hopper, at least one shutter for controlling the flow of material to be weighed, automatic toggle-acting linkage for controlling the movement of the shutter operatively connected to reduce the volume of flow of material from a maximum to a substantially constant minimum before the weighing operations are completed, a trip for controlling said linkage adapted to support the weight of the shutter and linkage during the last stage of operations with minimum flow, means for automatically operating said trip to close the shutter, and interlocking connections between the shutter and the gate for the hopper, whereby one is locked close when the other is open, for substantially the purposes set forth.

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

HENRY RICHARDSON.

Witnesses:

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