No. 890,190. PATENTED JUNE 9, 1908.

A. F. H. STEPHENS.

MEANS FOR AUTOMATICALLY WEIGHING POWDERY SUBSTANCES.

APPLICATION FILED MAR. 9, 1907.

2 SHEETS—SHEET 1.

Fig. 2.

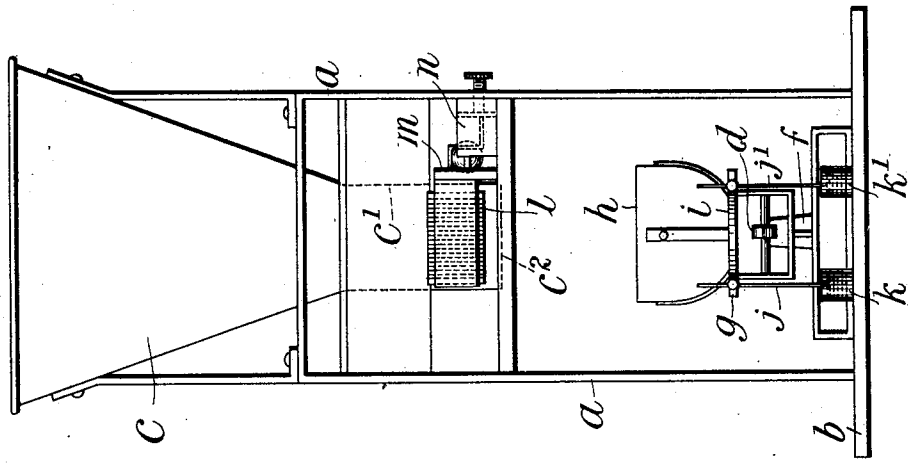
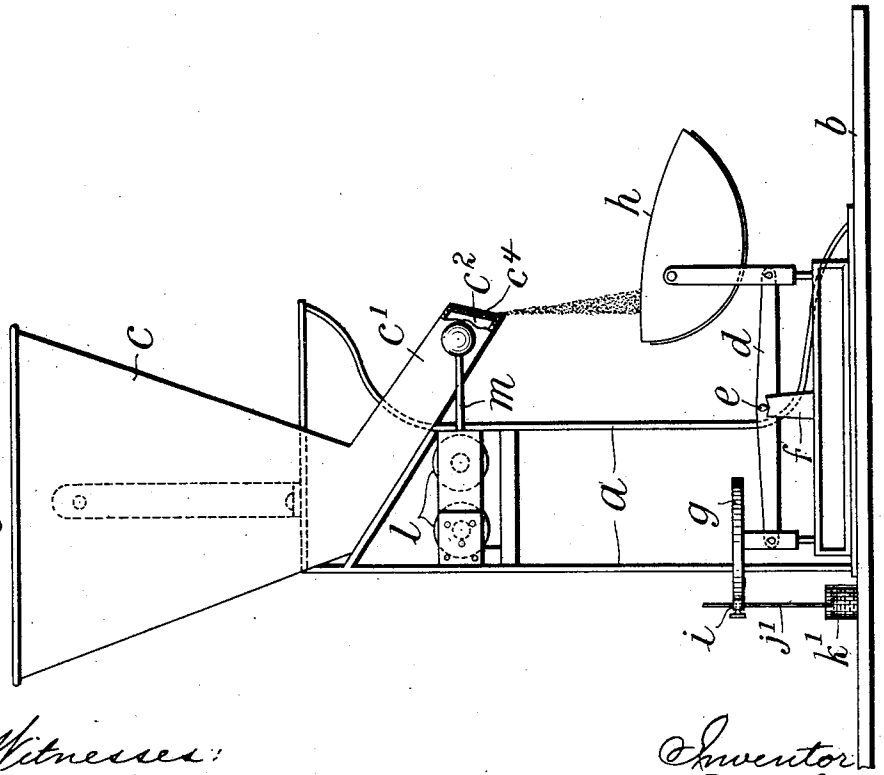


Fig. 1.



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Fig. 3.

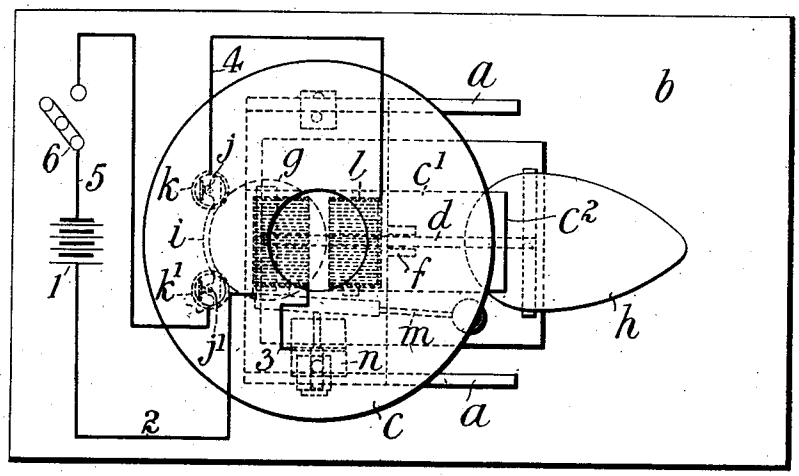


Fig. 4.

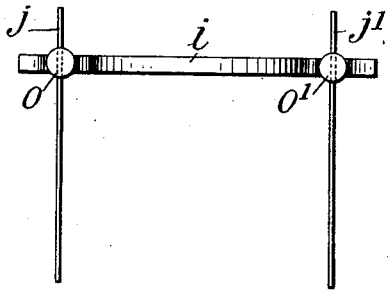


Fig. 5.

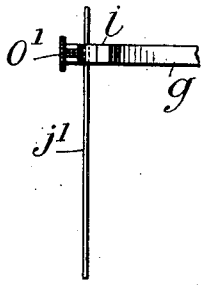
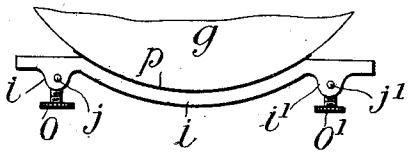


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALBERT FRANCIS HAMBLY STEPHENS, OF CAMBORNE, ENGLAND.

MEANS FOR AUTOMATICALLY WEIGHING POWDERY SUBSTANCES.

No. 890,190. Specification of Letters Patent. Patented June 9, 1908.

Application filed March 9, 1907. Serial No. 361,526.

To all whom it may concern:

Be it known that I, ALBERT FRANCIS HAMBLY STEPHENS, a subject of the King of Great Britain, residing at Commercial street, Camborne, in the county of Cornwall, England, chemist, have invented certain new and useful Improvements in Means for Automatically Weighing Powdery Substances, of which the following is a specification.

The object of this invention is to provide means for automatically delivering into the delivery pan of a beam or other scale, a definite quantity of a powdery substance, according to the weight placed in the other, or weight pan of the scales, and to continuously perform this operation after every time the delivery pan is emptied.

It should be mentioned that considerable difficulty has hitherto been experienced in obtaining a regular automatic feed of powdery substances for automatic weighing, due to their cohesive nature, and a further object of my invention is to overcome this difficulty.

The invention consists in the use of an electro-magnet, the armature of which taps the feed spout of the supply hopper during the period when the weight in the weight pan overcomes that of the delivery or goods pan and the material therein. When the beam reaches equilibrium, or if desired, at any other point, the electric circuit is broken and the tapping of the armature ceases, and simultaneously the feed of material. In conjunction with this device I may employ any suitable means for tipping the delivery or goods pan, either by hand or automatically.

My invention will be more clearly understood by reference to the accompanying drawings, wherein like letters refer to like parts throughout.

Figures 1 2 and 3 are side elevation, end elevation and plan respectively, partly in diagrammatic form, showing a suitable arrangement for carrying my invention into effect, Fig. 3 showing in addition the electric circuit and contacts. Figs. 4 5 and 6 are end view, side view and plan, respectively, showing a method of attaching the contact needles to the scale pan.

Referring first to Figs. 1, 2 and 3 the frame *a* on base plate *b* supports the supply hopper *c* to which the powder to be weighed is fed in any desired manner, this hopper is provided with a feed spout *i* as shown, by means of which the fall of powder is checked in its passage to the outlet c^2. This outlet may be provided with a grid or sieve c^4 of suitable mesh for the purpose of limiting the flow of powder or the like through the outlet, and it is found in practice that such grid or sieve will successfully prevent any further flow of material when the armature of the electro-magnet has ceased vibrating.

Below the supply hopper is arranged a scale or other type of balance by means of which the material is weighed. The delivery or goods pan of this scale is arranged directly under the outlet of the feed spout of the hopper as shown. In the form shown in the drawings the scale consists of the weigh beam *d* fulcrumed on knife-edges *e* on the bearings *f* and supporting at each end scale pans *g* and *h* in known manner. To the weight pan *g* is attached a copper or like metal bar *i* which bar forms the connection between two platinum needles or the like *j j'*. The needles enter cups *k k'* containing mercury or other conductive means whereby the electric circuit is completed.

Mounted on the frame *a* is an electro-magnet *l* provided with a vibrating armature *m* for the purpose of tapping the side of the feed supply spout *c'*. I also arrange an oil bath *n* as shown in which the make and break contacts of the electro-magnet *l* take place to prevent sparking.

Referring now to Figs. 4 to 6, these illustrate a means of attaching the platinum needles to the scale pan *g* and means for adjusting the height of the needles. The bar *i* has bosses *i'* thereon through apertures in which the needles *j j'* can slide, these needles are fixed in the desired position by screws *o o'*, and the bar *i* is secured to the scale pan by screws or other suitable means, the bar being preferably insulated from the scale pan by a strip of mica or the like *p*.

The electric circuit and contacts are shown in Fig. 3. The current passes from the battery 1 through wire 2 to the electro-magnet *l* thence through wire 3 to oil bath *n* through armature *m* and coil magnet to wire 4, the current passing from wire 4 to cup *k*, thence through needle *j* to bar *i*, needle *j'*, cup *k'*, and returns to battery by wire 5. A switch 6 is provided for putting the apparatus in or out of action as required.

The action of the apparatus is as follows:— Weights to the amount of material required are placed on the weight pan *g* which causes the beam and pan *g* to fall and the needles *j*

j' to enter the mercury in cups k k' and thereby complete the circuit through the electro-magnet. This magnet being energized the armature thereof is vibrated and taps the feed supply chute c' causing the powder or other material therein to fall from the outlet into the scale pan h, this continues until the weight of the material in scale pan H overcomes that of the weights on the pan g, and the beam is caused to turn on its fulcrum, and by so doing withdraws the needles from the cups, thereby breaking the circuit and stopping the vibration of the armature, which causes a cessation of the feed. The material in the goods pan is now discharged in any suitable manner, either by hand or otherwise, the particular discharging means forming no part of the present invention. When the goods pan is emptied the weight pan will again fall and complete the circuit through the cups k k' and the cycle of operation is repeated.

By adjusting the position of the needles j j' it is possible to vary the period when the break of the circuit takes place, by which means I compensate for any material in suspension when the vibration ceases.

The make and break contacts used in conjunction with my invention may be of any suitable type, for instance, mercury in the cups forming the conductive means and having glycerin oil or other suitable liquid thereon, in which the contacts could be broken to prevent sparking.

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

In apparatus for automatically weighing powdery substances, the combination with a supply hopper discharging over the goods scale pan of an electro-magnet having a vibrating armature arranged to tap the side of said hopper to effect the separation of the particles of the material until the desired weight of material has fallen into the goods scale pan, and a grid or sieve at the outlet of said hopper for the purpose of limiting or controlling the flow of material therefrom, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses this 26th day of February 1907.

ALBERT FRANCIS HAMBLY STEPHENS.

Witnesses:

HOWARD FOX,

W. H. DANIELL.