Sheet 1: 3 Sheets

H. Pooley, H. Pooley Jr., T. Roberts and L. Lue.

Grain-Weigher

No. 74.719. Patented Feb. 18. 1868.

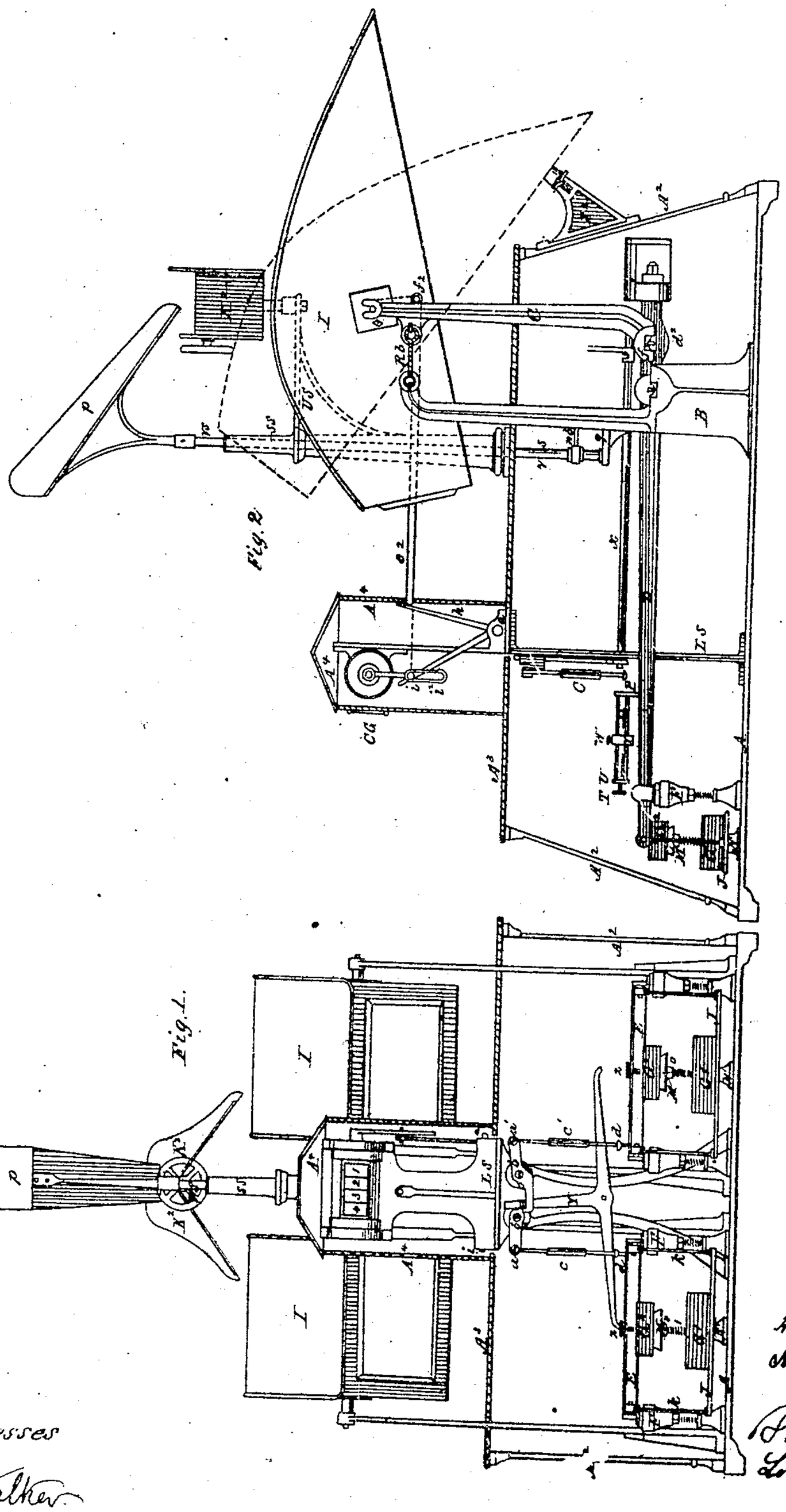

Fig. 2.

Fig. 1.

Witnesses

Wm. Walker

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Inventors

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Sheet 2 – 3 Sheets

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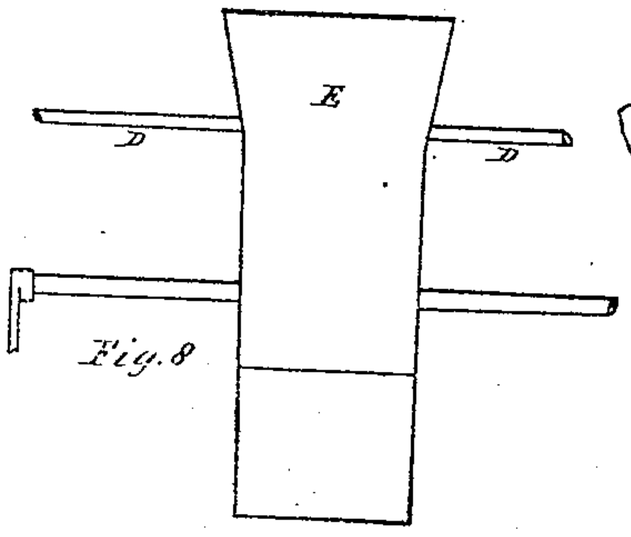

Fig. 8

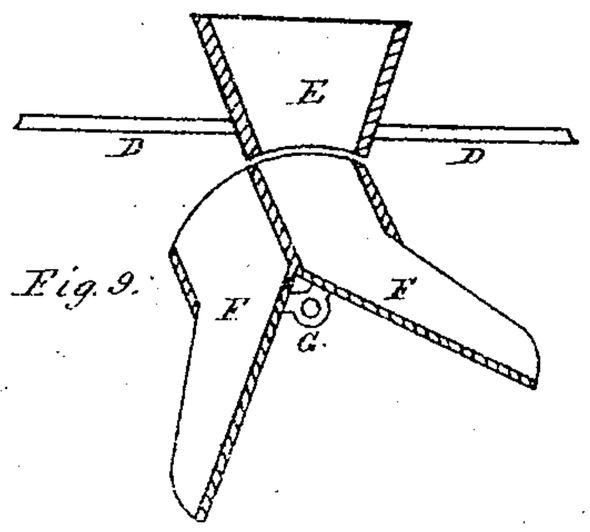

Fig. 9.

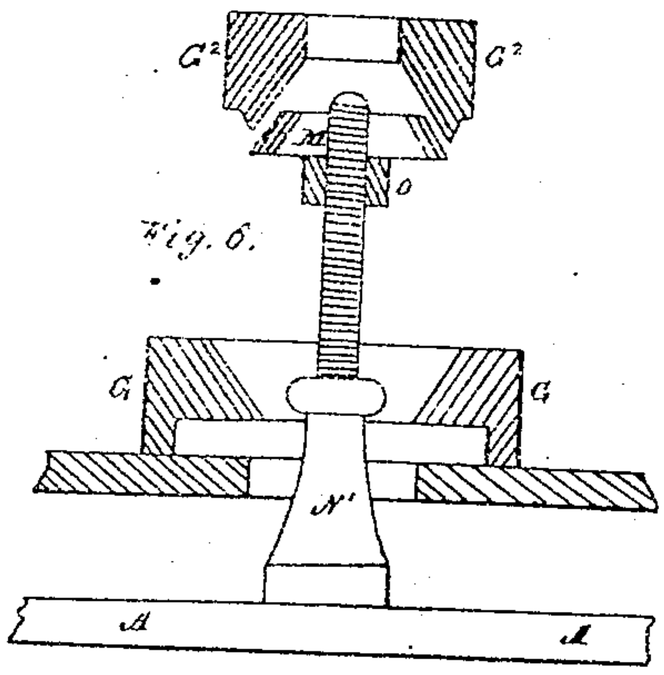

Fig. 6.

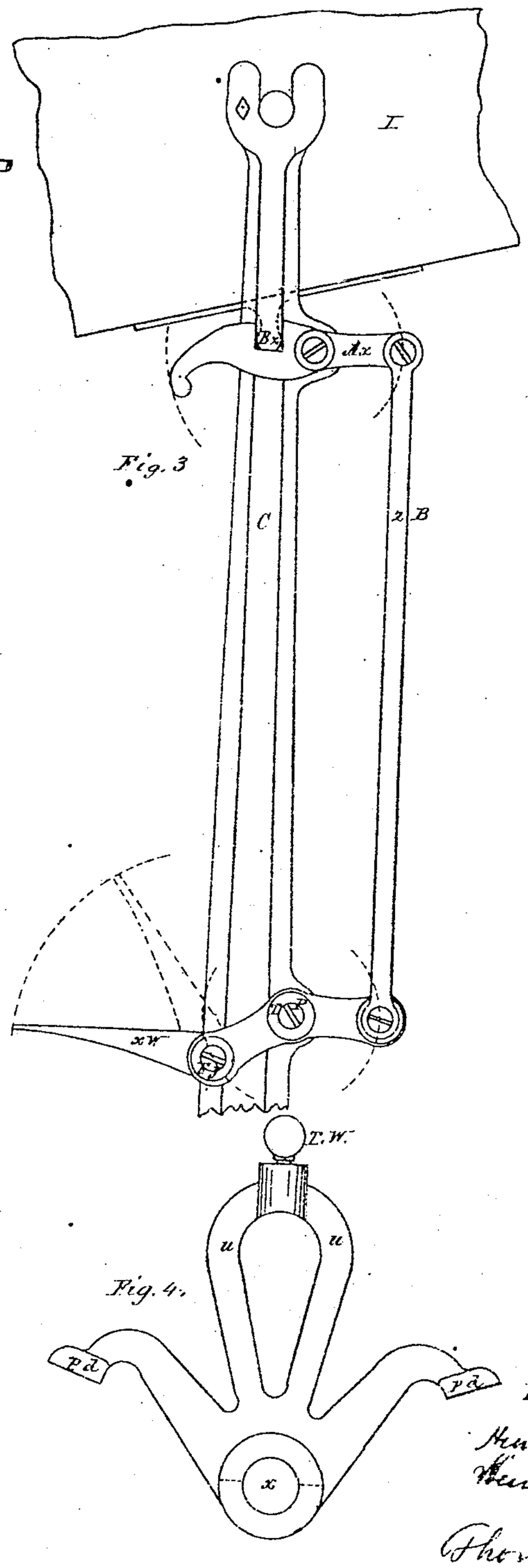

Fig. 3

Fig. 4.

Witnesses

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Sheet 3 – 3 Sheets

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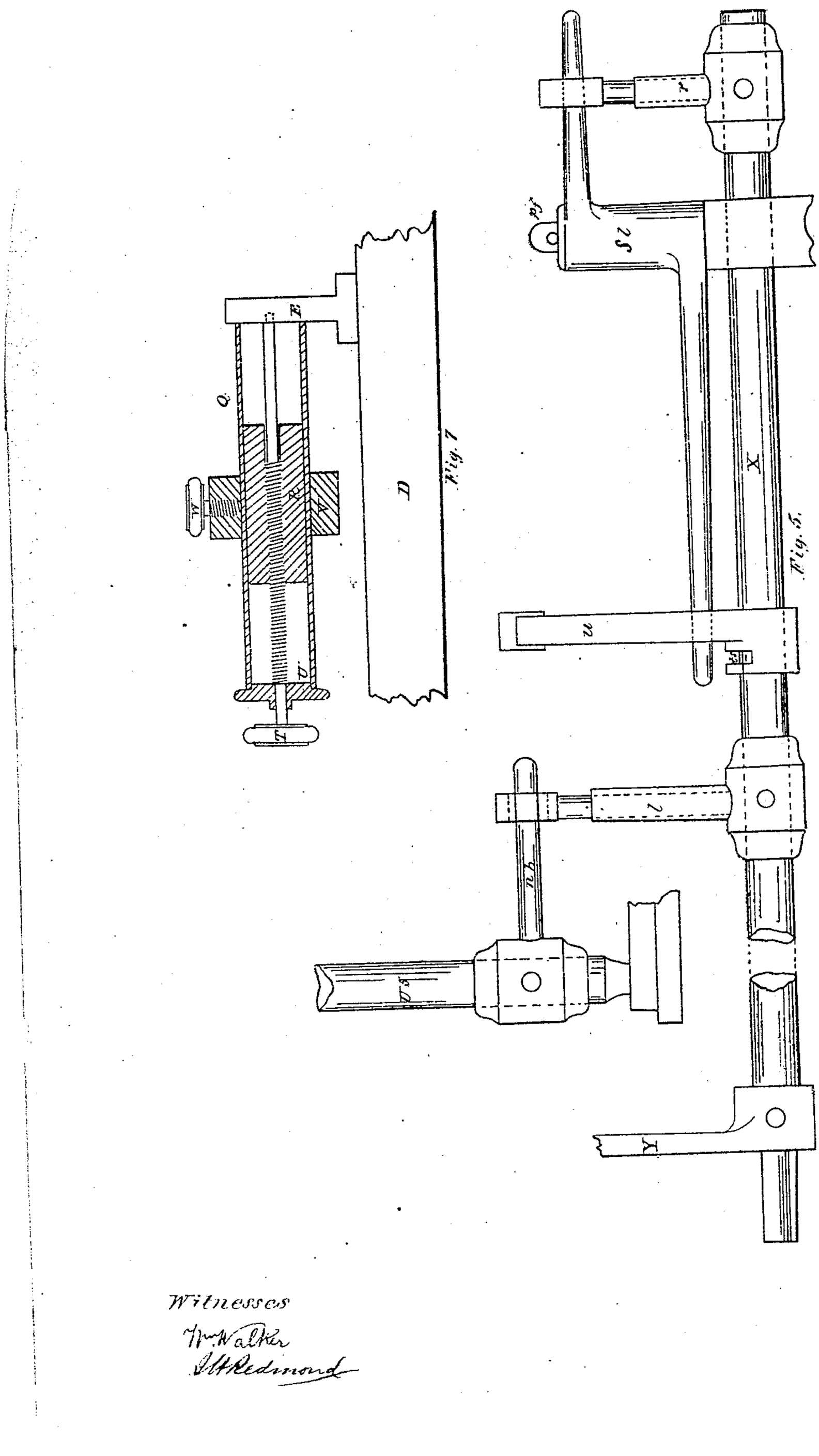

Witnesses
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HENRY POOLEY, HENRY POOLEY, JR., THOMAS ROBERTS, AND LOUIS LUC,
OF LIVERPOOL, ENGLAND.

Letters Patent No. 74,719, *dated February* 18, 1868.

IMPROVEMENT IN GRAIN-WEIGHING MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL TO WHOM IT MAY CONCERN:

Be it known that we, HENRY POOLEY the elder, and HENRY POOLEY the younger, of the firm of HENRY POOLEY & SON, of Liverpool, in the county of Lancaster, engineers, THOMAS ROBERTS, of the same place, iron-founder, and LOUIS LUC, of the same place, balance-maker, do hereby declare the following written specification to be a full and exact description of our invention for "An Improved System of Continuous Self-Acting and Self-Registering Machinery for Weighing Grain, Flour, or other Materials;" reference being had to the accompanying drawings, and to the letters and figures marked thereon, such and all corresponding letters and figures in each drawing representing similar parts of the machinery.

The accompanying drawings are three in number, viz:

Sheet 1, which contains two figures, Figure 1 being a back elevation, partly in transverse section, with the casing on that side removed to expose the working parts, and Figure 2 a side elevation, partly in longitudinal section, with the casing removed as in fig. 1.

Sheet 2 contains, on a considerably enlarged scale, first, Figure 3, which represents one of the standards that carry the scoop-scales, the catch which holds the scale in position, and the trigger and its connection by which the scale is tipped; second, Figure 4, the peculiar-shaped tumbler-hammer which actuates the trigger; third, Figure 6, a section of the scale-plate, the proportional weights, and the short pillar supporting them; fourth, Figures 8 and 9, the alternative feeding and distributing-hopper and double rocking-spout.

Sheet 3 contains, first, Figure 5, which shows the rocking-shaft with its several fittings, also, part of the vertical shaft and its footstep, together with its connection with the rocking-shaft, and second, Figure 7, which shows the hollow cylindrical bar with its internal adjusting-weight and its external compensating-weight, together with the mode of moving and setting them, and of their attachment to the double beams and transverse bars.

We now proceed to describe and specify in detail our invention, thus: The apparatus may best be raised upon a base or foundation-plate of metal, timber, or other suitable material, A A, figs. 1 and 2, sheet 1, on and to which all the machinery can be fixed, and around said base can be constructed casing, A^2, figs. 1 and 2, sheet 1, and covering-plates, A^3, figs. 1 and 2, sheet 1, wherewith the several working parts may be guarded from dirt and injury.

The working parts of the machinery are composed of four distinct sections combined in action to produce the desired result. These several sections are, first, the weighing part; second, the feeding and distributing part; third, the tipping or discharging part; fourth, the registering part. These several sections we specify in terms following, viz:

First, the weighing part. To accomplish this we make two double beams D, fig. 2, sheet 1, being levers of the first order, the short arms of each being one-tenth or other proportion of the length of the longer arms, each of these double beams forming one casting, the sides being connected by transverse bars E E, fig. 1, sheet 1, and having knife-edged fulcra of hardened steel, *f*, fig. 2, sheet 1, working on steel faces dove-tailed into cast-iron standard B, fig. 2, sheet 1. At the shorter ends of our double beams we make knife-edge verges or points of impact, d^2, fig. 2, sheet 1, upon which the weighing-scales and their attachments rest or are imposed. These weighing-scales are two in number, I I I, figs. 1 and 2, sheet 1, and ranged side by side. They may be best made of sheet iron and of the scoop-shape, fitted on each of their sides with a pivot, ⊙, fig. 2, sheet 1, carefully adjusted in its position relatively to the centre of gravity, with a view to the movement of the scale when loaded, and its return to its proper place after discharge.

By means of the pivots, ⊙, here named, each scale rests in the hollowed tops of two vertical and conjoined supporters C, fig. 2, sheet 1, the lower extremities of which are kneed inwards and fitted with steel faces resting upon the knife-edged verges d^2, fig. 2, sheet 1, before named, at the shorter ends of the double beams.

The vertical supporters, now referred to, are kept in their true position by means of radius-bars, R *b*, fig. 2, sheet 1, equal in length to the short arms of the double beams, connected to the vertical supporters C near their upper end, and to fixed standards, being prolongations of those standards B, fig. 2, sheet 1, on which the fulcra of the double beams repose. These radius-bars are formed with steeled loops at their ends, and are held in tension by knife-edged pivots.

At the ends of the longer arms of the double beams D, we make steel knife-edged centres, from which are freely suspended, by rods, K K K K, fig. 1, sheet 1, having steeled loops, scale-plates, J J J, figs. 1 and 2, sheet 1, for the reception of the proportional weights G^1 G^2, figs. 1 and 2, sheet 1, by which the load of grain or other material is determined, such weights, (provided the double weighing-beams be made of the proportion herein specified,) being ten pounds to one hundred pounds, or other proportion when the beams are made otherwise.

The scale-plate J, now specified, is perforated in its centre to admit the free passage through it of a bar or pillar of iron, N N, figs. 1 and 2, sheet 1, which pillar is bolted by a flanch at its foot to the base, above named, and it is fitted at its top with a cushion, M, figs. 1 and 2, plate 1, on which rests loosely the finishing-weight, hereinafter described.

The proportional weights G^2 and G^1, figs. 1 and 2, sheet 1, above mentioned, are two in number for each scale.

One of each of these two, G^1, is a constant weight corresponding with about eighty per cent. of the total weight of the load of grain or other material to be weighed at one draught. This constant weight is placed on the scale-plate J, and similarly to that plate is perforated to permit the passage through it of the bar or pillar, above described, N N, figs. 1 and 2, sheet 1.

The second or finishing-weight, G^2, figs. 1 and 2, sheet 1, rests loosely upon a cushion, M, figs. 1 and 2, sheet 1, formed on the top of the aforesaid pillar, and it is made with a V-shaped bead on its under side to fit in a prepared hollow on the top side of the first or constant weight G^1, by which lesser weight it is caught and lifted as it rises in the act of weighing. The finishing-weight G^2 is varied in its amount according to the requirements of the different species of grain or other material which is to be weighed. Upon some part of the double beam, and usually attached to one of its transverse bars E, fig. 1, sheet 1, we place a hollow cylindrical or other-shaped bar, Q, fig. 2, sheet 1, paralled to the longitudinal axis of the beam, and having within it a weight, R, fig. 7, sheet 3, operated by a screw, S, fig. 7, sheet 3, with a milled-edge disk, T, fig. 2, sheet 1, and fig. 7, sheet 3, the use of which is to adjust the equilibrium of the scales and other parts which may become liable to vary.

A second movable weight, V, fig. 2, sheet 1, and fig. 7, sheet 3, is made to slide outside the same hollow bar Q, which bar has upon its exterior a graduated scale for the purpose of compensating for the small portion of grain or other commodity which is in the act of entering the scoop or scale whilst in the act of tipping. The second movable weight, now described, can be fixed in its proper place by means of the set-screw W, fig. 2, sheet 1.

As resting-beds for the longer arms of the double beams, with their scale-plates and weights, we make short pillars, F F F F, figs. 1 and 2, sheet 1, bolted at foot to the base-plate, and in order to prevent shocks to the machinery by the sudden fall of the beams and weights, when the scoops are discharged, we fit into the tops of these short pillars thick caoutchouc cushions, on which the ends of the beams are safely received.

In order to limit the extent of action of the scoop-scales when discharging their load, we affix to the casing A^2, fig. 2, sheet 1, immediately under each scoop, a bracket of cast iron, F^2, having a cushion at its upper end upon which the scoop falls; the position of the scoops when down upon the bracket being shown on fig. 2, sheet 1, by the dotted lines.

Having now described the first or weighing-section of our said invention, we proceed to the second or feeding and distributing part, which we construct as follows: In the centre of the apparatus, between the two scoop scales, we fix securely a hollow upright standard, S S, figs. 1 and 2, sheet 1, within which is a vertical free-working shaft, V S, figs. 1 and 2, sheet 1, resting on a steeled footstep, *q*, fig. 2, sheet 1. Upon the head of this shaft we fit an inclined chute or spout, *p*, figs. 1 and 2, sheet 1, into which the grain or other material to be weighed is directed from the depot or shore, and is by the chute delivered into a small hopper, K^2, figs. 1 and 2, sheet 1, fixed immediately below it upon an arm, U S, fig. 2, sheet 1, which is cast upon and forms part of the hollow upright standard above named.

The small hopper K^2, here mentioned, is made with a double-inclined bottom, forming two sides of a triangle, the apex being uppermost, which gives the hopper the character of a double chute or distributer, by which latter name it is in fact distinguished, one passage of which is over each of the twin scales or scoops I I, fig. 1, sheet 1.

Now, when the working vertical shaft V S, fig. 2, sheet 1, with the chute *p*, is swivelled partially towards one side, more grain will fall into one scoop than the other, and when the said shaft is wholly turned to one side, all the grain will fall into one scale and be entirely cut off from the other. When the shaft is turned first partly and then wholly back again, the process is reversed, and thus each scale is fitted alternately. The hopper or distributer K^2 is fitted on a saddle upon which it can be moved by a screw and hand-wheel, *o*, nearer or further from the centre of the scoop, as circumstances require.

Just above the footstep *q*, fig. 2, sheet 1, of the vertical shaft, is fitted with a horizontal bar or arm, *n b*, fig. 2, sheet 1, the end of which takes into a slot formed in a vertical arm or bar, *l*, fig. 5, sheet 3, which latter arm is keyed or otherwise secured to a horizontal rocking-shaft, X, fig. 5, sheet 3, and fig. 2, sheet 1, working on stationary bearings, and lying between and parallel to the double or weighing-beams.

At and upon the rear or inner end of the said rocking-shaft is fitted a lever, Y, fig. 5, sheet 3, and Y, fig. 1, sheet 1, in the form of an inverted T or L, the transverse limbs of which T-lever extend over and across the inner halves of each of the double beams, and are bent downwards as tappets approaching towards table-heads Z Z, fig. 1, sheet 1, of adjustable screws fitted in the transverse bars E E of those double beams.

For the purpose of sustaining the bearings of the rocking-shaft, two standards, L S, figs. 1 and 2, sheet 1, are firmly bolted to the base-plate, A, one of which standards is continued upwards and gives support to the registering-apparatus hereafter to be described.

Upon this last-named standard are fitted two balanced catches, *b b*, fig. 1, sheet 1, one for each scale, lying horizontally when at rest, and embracing a square stud formed upon the vertical limb of the inverted T-lever

Y, fig. 1, and from the tail of each of these catches there hangs loosely, from a joint, a rod, C C, fig. 1, the lower end of which rod approaches, within a regulated and adjustable distance, the top side of each of the transverse bars E E, fig. 1, of the double beams.

The action of the several parts of the feeding and distributing arrangement now specified is the following: When about eighty per cent. of the load of grain has been received into one of the scoop-scales, it causes the longer arm of one of the double beams D D, and the first or constant weight G, figs. 1 and 2, sheet 1, to rise as high as the second or finishing-weight G^2, figs. 1 and 2, which reposes on the head of the pillar N, central to the scale-plate J, and, in rising, the table-head Z Z, fig. 1, of the screw upon the double beam comes in contact with and lifts one of the tappets of the inverted T-lever Y, fig. 1, by which it turns the rocking-shaft X, fig. 2, sheet 1, and with it the vertical shaft V S, fig. 2, and swivelling-spout or feeder *p*, fig. 2, are turned partially towards the second scoop-scale.

When the full prescribed load has been delivered into the first scoop-scale, the double beam again further rises up to and lifts the finishing-weights G^2, figs. 1 and 2, sheet 1, and in its rise touches the end of the hanging rod C, fig. 1, which lifts the tail of the catch *b*, fig. 1, and liberates the inverted T-lever Y, which then completes its action upon the vertical shaft X, fig. 2, sheet 1, and swivelling-spout *p*, fig. 2, thereby shutting off the entire feed of grain from the first scoop-scale, and turning the full delivery into the second scoop, the process going on from scale to scale continuously. If preferred, in place of using the swivelling hopper-spout hereinbefore described, a double spout, F F, fig. 9, sheet 2, may be fitted on the under side of the supply-hopper E, fig. 9, sheet 2, and which is divided into two parts at the throat or upper end by a vertical diaphragm, as shown in the drawing. By this double hopper-spout being thrown on one side, the supply may be given into either scale, or, by being partially thrown on to one side, a larger supply may be given to one scale than to the other; but if the dividing-diaphragm in the throat of the rocking-spout be brought to a vertical position, the supply to each scale will be equal. This double spout may be actuated from the horizontal rocking-shaft, hereinbefore described, in any convenient manner.

The third or tipping and discharging section of our said invention is constructed in the following manner:

The scoop-scales I I, figs. 1 and 2, sheet 1, rest, by means of their pivots ⊙ hereinbefore described, upon the superior ends of their vertical supporters C, fig. 2, each being retained in the position most suitable for receiving the loads of grain, by means of a stud, $B^{\times}$, fig. 3, sheet 2, riveted to the bottom of each of the scoops, which stud lies within a recess in a catch, $A^{\times}$, fig. 3, sheet 2, working on a pin, C, fig. 3, sheet 2, secured to one of the above-named vertical supporters, *c*, fig. 3, sheet 2. Each catch, $A^{\times}$, has one of its ends prolonged, and to that end is attached a rod, Z B, fig. 3, sheet 2, connecting it with a trigger, X W, fig. 3, sheet 2, which works freely on a pin, T P, fig. 3, sheet 2, secured to a lower part of the same vertical supporter *c* at a level somewhat below that of the horizontal rocking-shaft X, fig. 2, sheet 1. Upon the rocking-shaft X is keyed, or otherwise secured, a short upright bar, *r*, fig. 5, sheet 3, slotted at its upper end, and into this slot we put the shorter end of a horizontal-kneed lever, *s l*, fig. 5, sheet 3, lying parallel to and above the rocking-shaft X, and working on a pivot-fulcrum, *p f*, fig. 5, sheet 3, fixed upon the top of a short pillar, which carries one bearing of the said rocking-shaft X, on which pivot-fulcrum it is movable freely. The longer end of this kneed lever *s l* takes loosely into a tumbling-hammer, U, fig. 5, sheet 3, V-shaped interiorly, *u u*, fig. 4, sheet 2, which hammer is fitted upon the part of the rocking-shaft which lies immediately between the two triggers X W, fig. 3, sheet 2, before specified, and it has action laterally both ways, but limited in its extent by a transverse slot, *t s*, fig. 5, sheet 3, in the hammer U, and a pin fitted in the rocking-shaft.

The hammer is weighted at its top T W, fig. 4, sheet 2, to such an amount as to cause it, when moved from its place of rest by the action of the horizontal lever *s l*, fig. 5, sheet 3, to tumble or fall upon the upper side of the trigger X W, which it depresses by its pallets *p d*, fig. 4, sheet 2, and thereby withdraws the catch from the stud $B^{\times}$, fig. 3, sheet 2, on the bottom of the scoop-scale I, which then immediately tips and discharges its load. The trigger X W is fitted with a rule-joint R J, fig. 3, sheet 2, which allows it to yield to the hammer in its return action.

We must observe here that the same leading movements which operate the feeding and distributing section of our invention actuate the tipping and discharging part; also saving in so far as we specify under the latter designation separately.

It now remains for us to describe the self-registering section of our invention, or fourth part of the specification, as follows: Upon the head of the standard, before described, L S, figs. 1 and 2, sheet 1, which carries one end of the rocking-shaft X, and other parts before described, we fix a cylindrical counter, 4 3 2 1, fig. 1, sheet 1, having as many free concentric rings as there are places of figures in the ultimate result of a given period of weighing-action. To each end of the axis of the counter, we key a slotted lever, i^2, fig. 2, sheet 1, and to each of these levers we attach one arm of a two-armed or bell-crank lever, *h*, having on one arm a stud taking into the slot i^1, same figure, and, by its other arm, resting against one end of a horizontal connecting-rod, *e r*, fig. 2, sheet 1, the other end of which rod is jointed to a part of the scoop-scale in such manner that each time the scoop falls in the act of tipping its load, it pushes the connecting-rod against one arm of the bell-crank lever *h*, and by its agency operates one of the aforesaid slotted levers, and thereby moves the counter one figure correspondent with the number of the load which has just been weighed and discharged.

This self-registering apparatus now described is enclosed within an iron or other casing, A^4, figs. 1 and 2, sheet 1, which defends the several parts from injury and from dirt, and this case we prefer to have under lock, in order to prevent the indication being tampered with; but we provide that part of the said casing shall be composed of glass in front of the movable concentric rings or disks, as at C G, fig. 2, sheet 1, so as to render visible the progress and results of the apparatus to the person in charge.

In describing the mode of action of our apparatus, it is necessary to premise that the several movements by which the weight is ascertained, the feed distributed to the scales, or the load discharged therefrom, and the duty of the machine registered, are operated entirely by the momentum due to the load of grain or other material which is being weighed. The process is carried on in the following manner; that is to say, the grain is introduced to the machine from the depot in any manner by which a continuous supply can be conveniently delivered into the feeder. Then, when the first scale has received the main part of its load, that scale falls through a portion of its full descent, and, in falling, lifts a proportional weight equal to the partial load then in the scale, and at the same moment moves the distributer partly towards the second scale, which then begins to fill, whilst the first scale is receiving more slowly the finishing part of its load. When the load is complete in one scale, that scale falls through the remaining part of its descent, and in falling releases the catch that, till then, had held it in position, whereupon the scale immediately tips, and simultaneously shifts the full feed of grain over the second scale, at same time moving the register one figure, showing the number of the load then weighed.

The operation proceeds from scale to scale alternately as long as the feed of grain is continued, and is entirely self-acting throughout, the flow of grain or material never being cut off or interrupted during the discharge of the scales, which we believe to be an advantage not heretofore successfully accomplished by any other apparatus.

Having now fully described and set forth the nature of our invention, and how we believe the same may be best carried into practical effect, we wish it to be understood that we do not confine ourselves to the precise details, relative proportions, or dimensions hereinbefore particularized, as it may be readily seen that the same may be considerably varied without departing from the invention; but

What we claim as new, and our invention, is—

1. The construction and use of twin scales, placed side by side, when operated by devices substantially in the manner and for the purpose hereinbefore described and set forth.

2. The combination of the swivelling inclined spout into which the grain or other material to be weighed falls from the store or hopper, and the stationary double spout which guides the grain or material to be weighed into the scales, substantially as shown and described.

3. The alternative mode of accomplishing the same purposes by means of the rocking double-throated feed-spout, fitted underneath a hopper, substantially in the manner and for the purposes hereinbefore set forth.

4. The inverted T-lever and its balanced catches on the end of the rocking-shaft, which directs and controls the momentum of the apparatus originated by the loaded scales, in the manner and for the purposes hereinbefore described and set forth.

5. The construction and use of the rocking-shaft and its appendages, as the means of distributing the continuous flow of grain or other material to the scales, and for the other purposes hereinbefore described and set forth.

6. The construction and use of the double-action tumbling-hammer for disengaging each scale alternately after it has received the full load, and also the peculiar locking-apparatus connected therewith, and the mode of tilting the scales, as hereinbefore described and set forth.

Lastly, the arrangement and combination of the several parts, forming together the double self-acting and self-registering apparatus for weighing a continuous flow of grain or other material, all as hereinbefore described and set forth.

In witness whereof we, the said HENRY POOLEY the elder, HENRY POOLEY the younger, THOMAS ROBERTS, and LOUIS LUC, have hereunto set our hands and affixed our seals, this 18th day of October, in the year of our Lord one thousand eight hundred and sixty-six.

HENRY POOLEY. [L. S.]
HENRY POOLEY, JR. [L. S.]
THOMAS ROBERTS. [L. S.]
LOUIS LUC. [L. S.]

Witnesses:

WILLIAM WALKER, *of* 44 *Castle Street, Liverpool,*

JOHN HAMILTON REDMOND, *Secretary to the above William Walker.*