4 Sheets—Sheet 1.

J. SCHEITLIN.

Weighing Machine.

No. 21,028.

Patented July 27, 1858.

Fig. 1

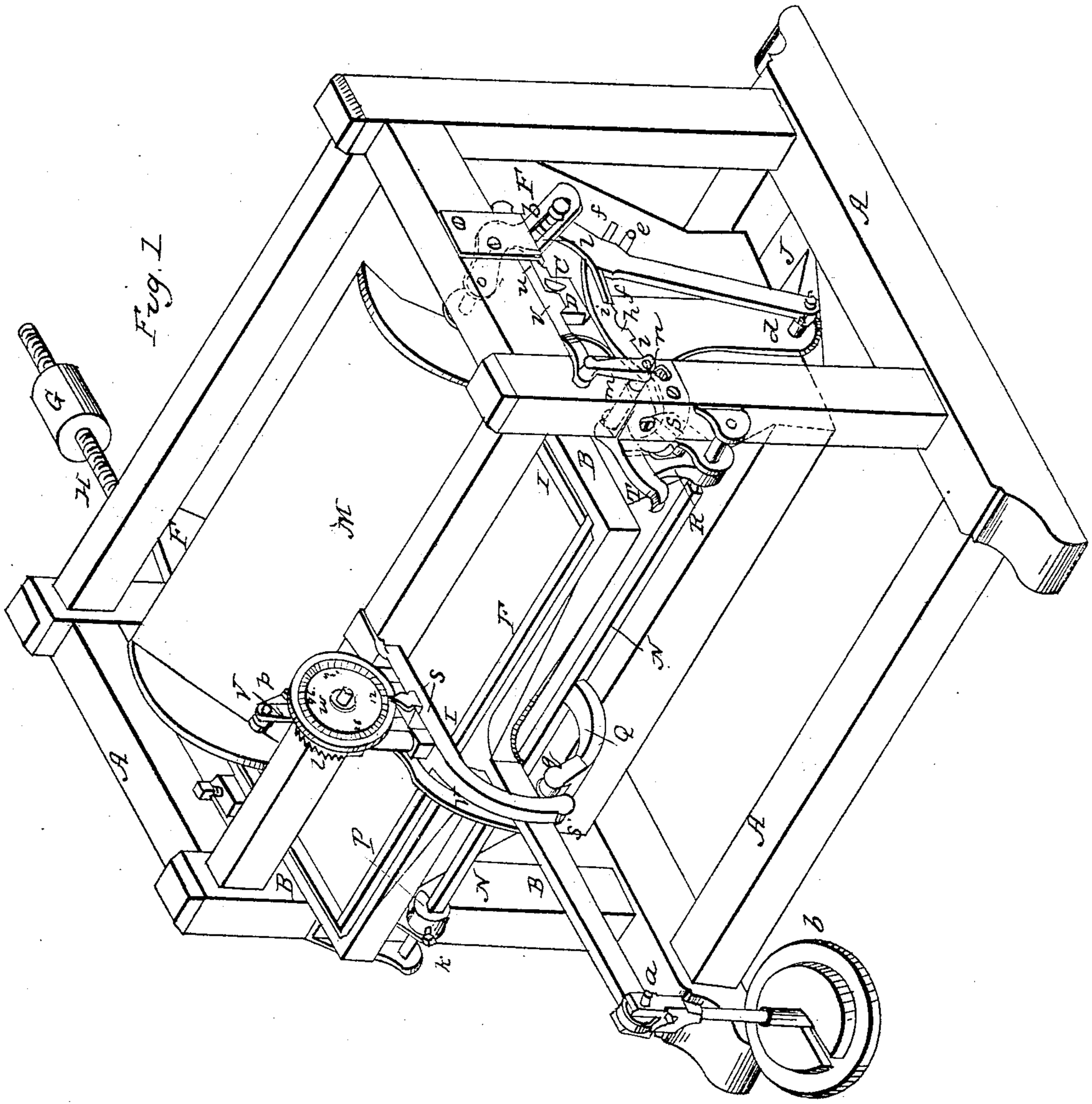

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Fig. 2

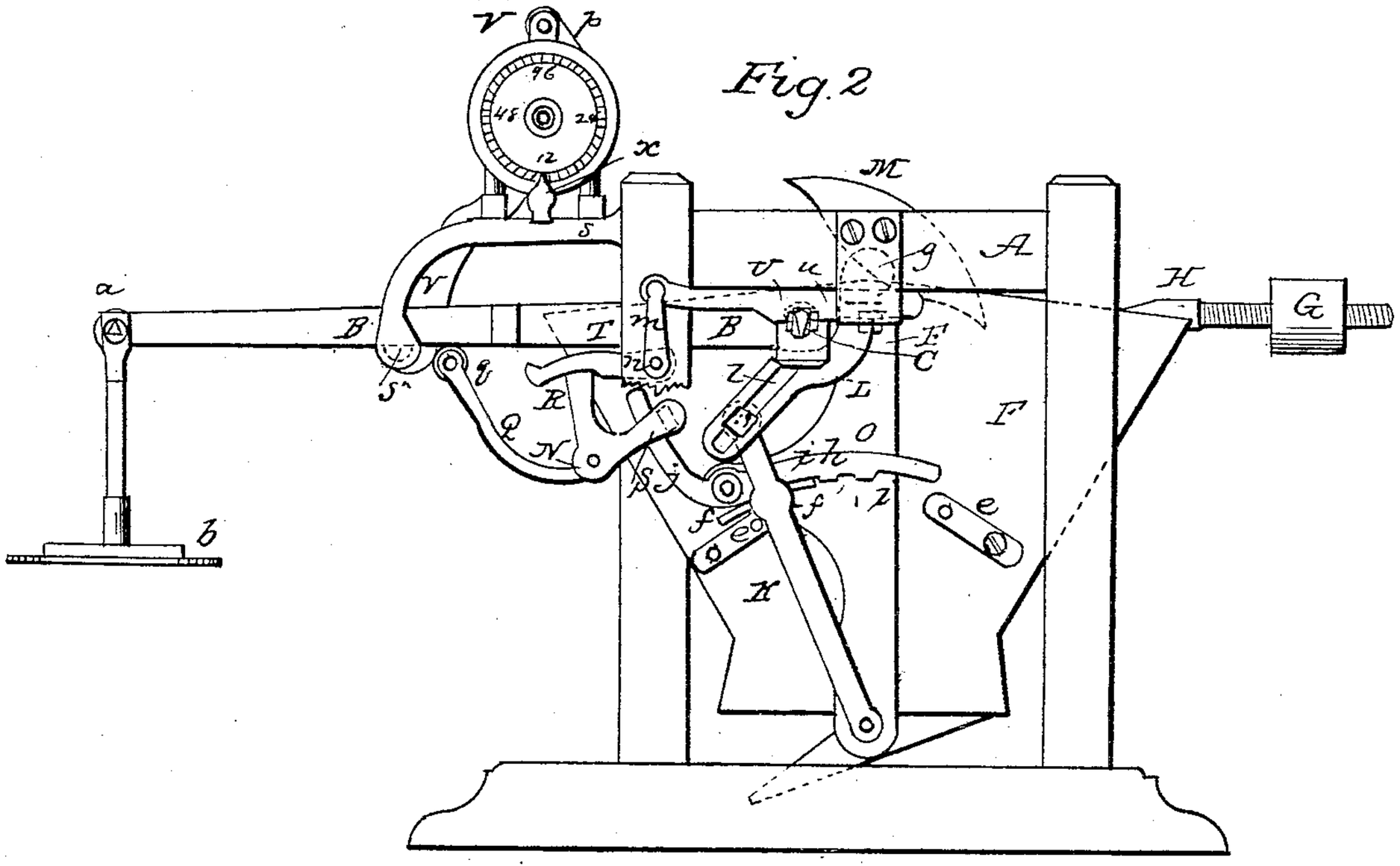

Fig. 3

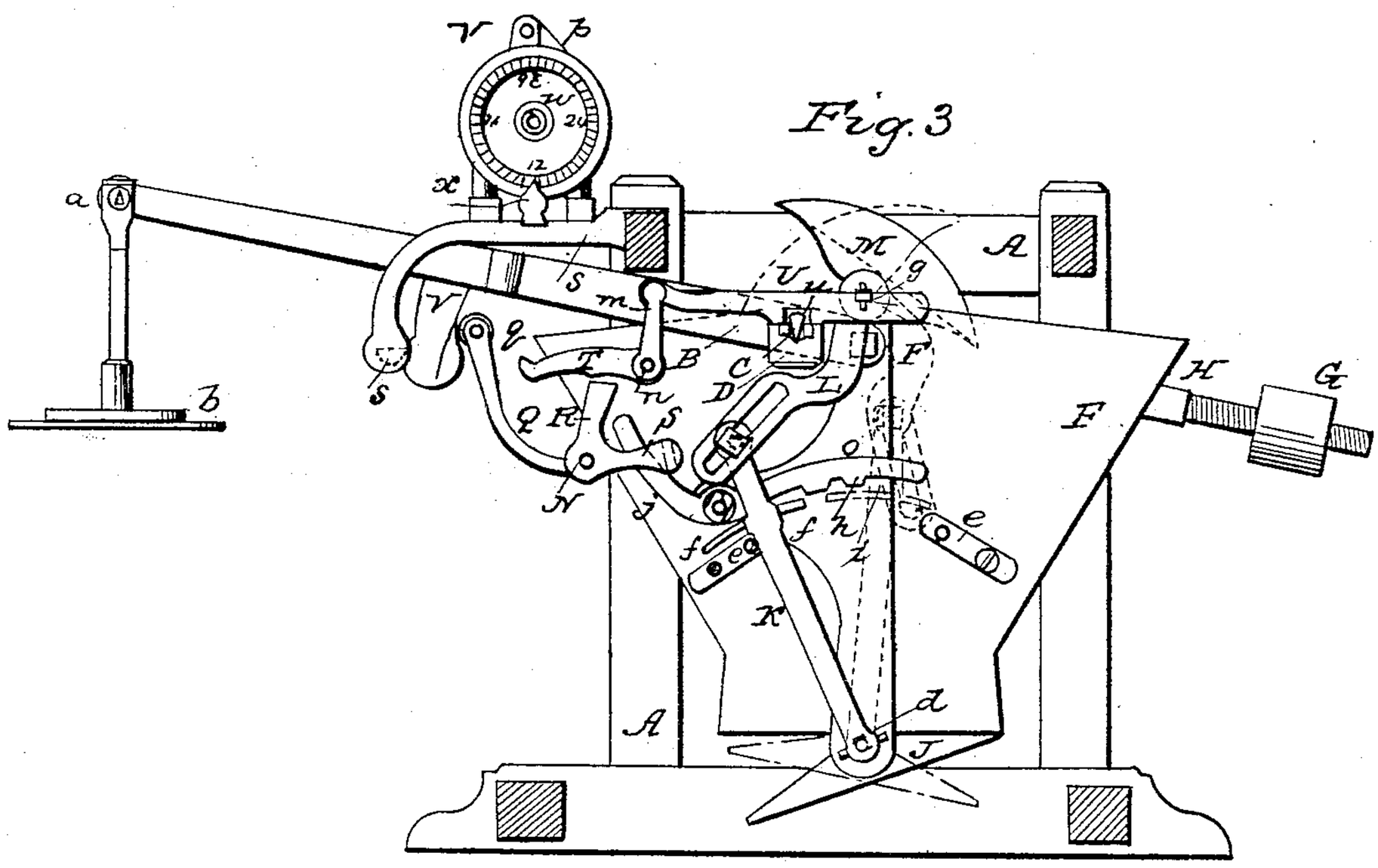

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Fig. 4

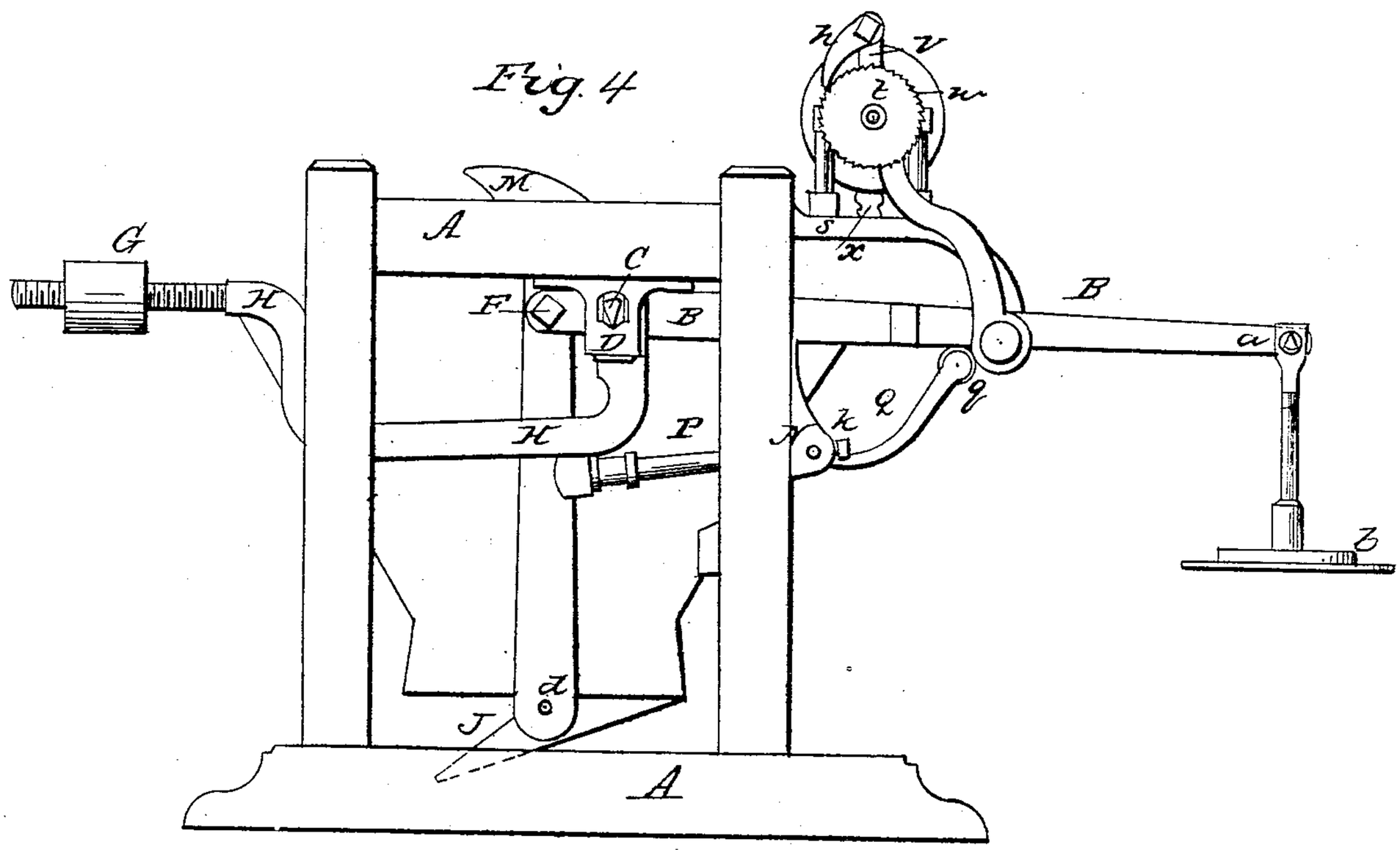

Fig. 5

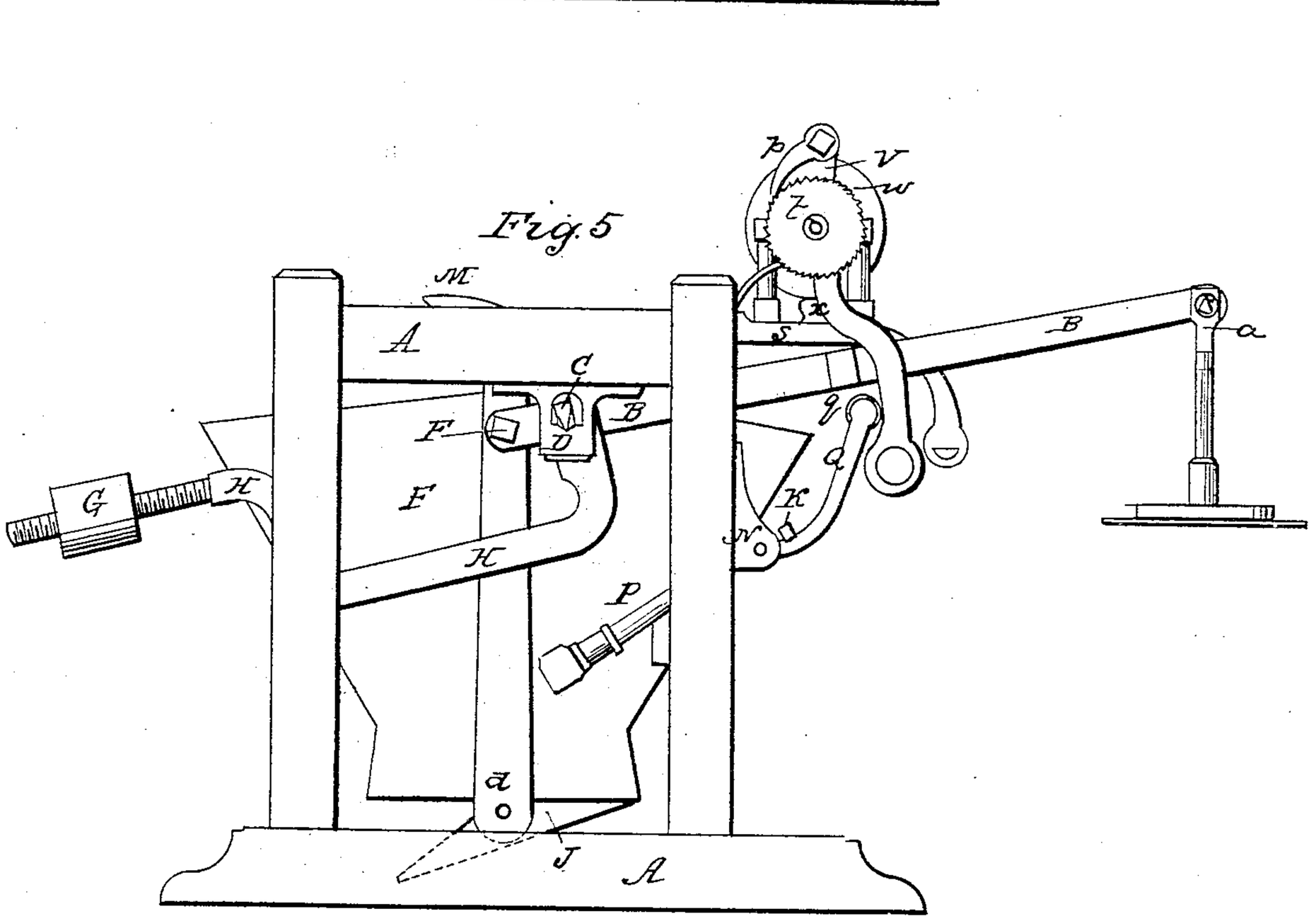

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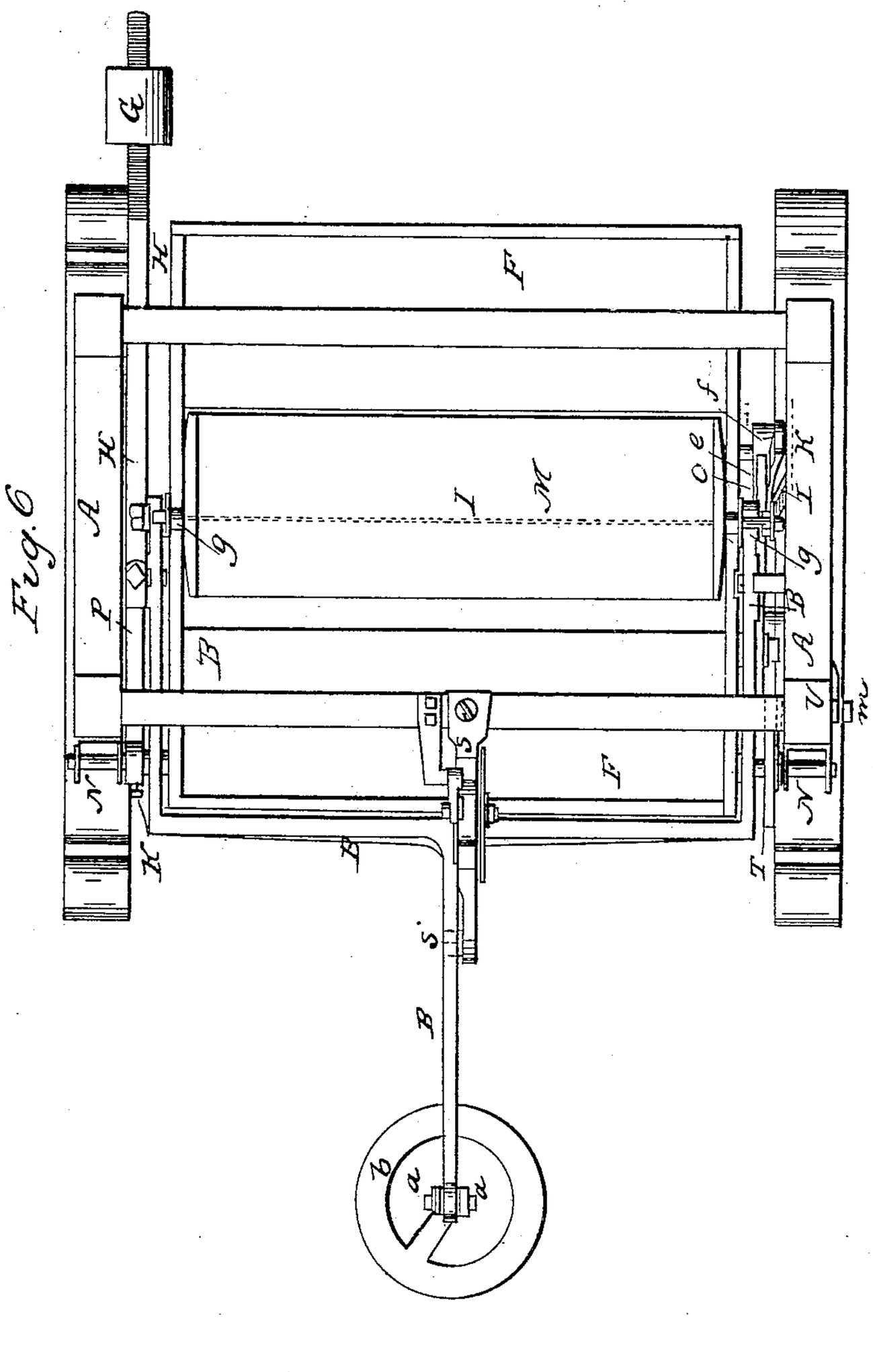
Fig. 6



UNITED STATES PATENT OFFICE.

J. SCHEITLIN, OF COLUMBIA, SOUTH CAROLINA.

MACHINE FOR WEIGHING AND REGISTERING GRAIN.

Specification of Letters Patent No. 21,028, dated July 27, 1858.

To all whom it may concern:

Be it known that I, J. SCHEITLIN, of the city of Columbia, in the county of Richland and State of South Carolina, have invented certain new and useful Improvements in Machines for Weighing Grain and Registering the Quantity Weighed, of which improvements the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1, represents a view in perspective, of a machine embracing my improvements and ready to receive the grain on the side next the weights. Fig. 2, represents an elevation of one end of the machine, with some of the parts changed from the position shown in Fig. 1, to receive the grain on the side farthest from the weights—a part of the frame being removed to show the mechanism. Fig. 3, represents a part of the same elevator with the bucket as depressed at the moment it is ready to discharge the grain—the red lines showing the change of position of the parts as the grain begins to discharge and just before the machine returns to the position shown in Fig. 1. Fig. 4, represents an elevation of the other end of the machine in the position shown in Fig. 1. Fig. 5, represents an elevation of the same end, with the bucket depressed; that is in the position of the machine shown in Fig. 3, and Fig. 6, represents a plan or top view of the machine; certain parts concealed from view, being dotted in.

The machine is provided with a rectangular frame (A) within which the weighting bucket (F) hangs from one end of the scale-beam (B), which with all the rest of the mechanism, is supported by the frame. The scale beam, at one end, is made in the form of a rectangular fork (as shown in Fig. 6.) the arms of which are of a length and distance apart, sufficient to allow the bucket suspended from their ends, to hang freely within them. On these two arms the fulcrum is made by projecting knife edges (C, C,) which turn on bearings (D, D,) attached to cross-bars of the frame. On the long arm of the beam is another knife-edge (*a*) from which the weight-pan (*b*) is suspended by a stirrup and rod. From the ends of the arms of the fork the bucket is hung by pivots or knife-edges (F, F). A counterpoise (G), capable of adjustment on a screw, is attached, by a curved arm (H), to the scale-beam; so that the weight of the bucket, and of other parts suspended from or attached to the beam, may be put in equilibrio before the weighing begins.

The bucket is divided into two compartments by a vertical partition (I) (dotted in the drawings) reaching to the vibrating bottom (J) which is provided, at its ends, with pivots (*d*, *d*,) turning in bearings attached to the ends of the bucket. This vibrating bottom has its upper surface formed of two planes inclined to each other so that by turning on its pivots, it alternately closes and opens each of the compartments the one not closed being opened wide enough for the rapid discharge of the grain. Upon one of these pivots (*d*) is fastened a vibrating lever (K) projecting upward, which, as it turns from one side to the other, is arrested at either extremity of its arc of vibration by coming in contact with stops (*e*, *e*,) upon the bucket. Upon and across this vibrating lever is fastened a locking piece (*f*) engaging with the latch-lever presently to be described.

The upper end of the vibrating lever (K) is furnished with a pin at right angles to it, working in a slot (*l*) of an upper vibrating lever (L), which is fastened to one of the pivots (*g*, *g*,) of a tipping-tray (M). This tipping-tray, whose surface is plane, receives the grain from a spout immediately over it; and has a guard at each end to prevent the grain from running off. The tipping-tray turns on pivots (*g*, *g*,) the bearings of which are attached to the top of the ends of the bucket, so that the grain, at proper intervals is delivered into each of the compartments alternately.

When the weight of the grain opens the bottom on one side and closes it on the other, the lower vibrating lever (K) is carried from the stop on one side to that of the other, and at the same time, the pin at its extremity, working in the slot (*l*) turns the upper vibrating lever (L) and with it the tipping-tray (M) so that the grain is delivered into the compartment the bottom of which has been closed by this movement.

While the grain is flowing into either one of the compartments its weight is prevented from opening the bottom until the proper time, by the following contrivance. A latch lever (O) turns upon a pin attached to one end of the bucket, so that when the latch falls by its own weight, one of two notches

(*i i*) on its under surface, will fall upon the locking piece (*f*) of the lower vibrating lever when it rests against either of the stops (*e*, *e*,) as is seen in Figs. 1 and 2. The projection (*h*) between the notches, holds the lower vibrating lever and the bottom (J) from turning until the proper moment, when, by a mechanism presently to be described and operating upon a curved end (*j*) projecting from the latch-lever (O), it is raised (as shown in Fig. 3) and the weight of the grain opens the bottom and throws the lower vibrating lever to the opposite side (as shown in red in Fig. 3) when, upon the falling of the latch, the lever and bottom are again held locked—as seen in Fig. 1. The under surface of the latch is curved in such a way, that when lifted, the projection just clears the locking piece, as the lever vibrates, and engages it again (with the smallest possible amount of motion) when the latch falls.

The mechanism by which the bottom is unlocked for the grain to be discharged at the proper time will now be described. On the side of the machine nearest the scale pan and turning in suitable bearings on the frame is a rock-shaft (N), upon one end of this rock-shaft is secured a tumbler (P) which may, by means of a collar and set-screws (K), be adjusted in any required direction upon the shaft, with reference to the other parts secured upon it. From the center of the shaft, and immediately under the long arm of the scale beam, there projects upward and outward a curved arm (Q) bearing on its end a roller (*q*) to diminish the friction where it touches the scale-beam. On the other end of the rock shaft is secured a holding arm (R) which is kept in a nearly vertical position by a detent (T), over it, when the bottom is to be kept locked. At the same end of the rock-shaft is fastened a striking arm (S) with a pin on its end which reaches inside of the curved end (*j*) of the latch lever (O) above described. These parts are not in contact while the bottom is locked and to avoid accidental contact the curve of the arm is such that the oscillations of the bucket will not allow them to touch. The detent (T) is lifted at the proper moment, by motion communicated from one of the fulcrum knife-edges (C), over the end of which is a horizontal slide (U) with a recess (*u*) in which the knife edge plays freely until the buckets descend; when the upper part of the knife edge bears against the slide and moves it a very small distance toward the center of suspension of the bucket; this motion draws a vertical arm (*m*) jointed to the other end of the slide (U) and turning on a pin (*n*) to which is also fastened the detent T, which is thereby lifted, and the holding arm (R) allowed to escape; the tumbler turning the rock-shaft (N) so that the striking arm (S) falls upon the curved end of the latch, which thereby lifted (as shown in Fig. 3) and the bottom unlocked in the manner which has already been described.

When the tumbler falls the curved arm (Q) rises and bears against the scale-beam; but when the grain is discharged and the weights preponderate, the beam, in falling, depresses the curved arm and raises the tumbler; when the detent is again brought down upon the holding arm which has returned to its vertical position.

In order to secure great delicacy of the balance and to keep the beam from touching the roller-arm, at the time the weighing is to be completed, the parts may be so arranged that the holding-arm does not engage with the detent until the weight end of the beam descends below a horizontal position, the curved arm is therefore held below the beam, when it resumes a horizontal position at the moment the bucket is full. The beam is prevented from descending farther than is necessary by a stop (*s'*) which may conveniently be placed on an arm projecting from the support (*s*) of the counting apparatus which is placed nearly over the long arm of the beam.

The count is made by a lever (V) turning upon an axle above, which is operated by the curved arm, the roller of which is broad enough to cover both the beam and the counting lever, the end of the latter resting upon the roller when the weighing begins. When the bucket descends, the arm slips by the end of the counting lever, which being weighed, descends, and thereby carries a pawl (*p*) over one tooth of a toothed wheel (*t*) when the long arm of the lever descends and the curved arm is again brought down, the latter forces out the counting lever which by means of the pawl moves the toothed wheel each time the curved arm rises. The wheel is secured to an axle in suitable bearings upon the support (S); and to the same axle is fastened the graduated count-wheel or dial (*w*) over the face of which projects the fixed index (*x*). The divisions of the dial are such that for each discharge of the bucket one point passes the index. A second pawl may be provided to secure the tooth wheel so that only one division is marked for each discharge of the bucket. Other arrangements for indicating the number of discharges of the buckets, may be used and gearing may be provided to register high numbers.

Before use the balance must be adjusted by means for the counterpoise, and, if necessary, by weights upon the scale pan. The weight representing, (according to the relative lengths of the two arms) the weight to be measured out each time is then to be put upon the pan. The machine being placed

over the vessel intended to receive the grain, is supplied by a spout just above the tipping tray. The opening of the spout may be nearly as long as the tipping-tray but much narrower, the middle of the mouth being over the axis of the tray. From such a spout there will be a nearly uniform flow of the grain whether the bin or receptacle, above, be full or not.

The grain which falls upon the tray is led into one of the compartments of the bucket until the proper quantity has entered, when the bucket descends until the action of the knife edge tilts the detent, the descent of the tumbler then throws the striking arm upon the curved end of the latch, which is thereby lifted, and the weight of the grain opens the bottom on one side and closes it on the other, and, with the bottom, turns the lower vibrating lever with a very rapid motion; this movement, as before explained, turns the upper lever and, with it, the tipping-tray so as to throw the grain into the other compartment as it is closed. The weight of the grain yet remaining in the compartment from it is being discharged, keeps the bottom of the other compartment closed until the bucket commences to rise; but as the bucket rises the long arm of the beam depresses the curved arm and lifts the striking arm, so that the latch falls and locks the bottom; while the detent falls and secures the holding arm, and the bucket is again up and the various parts of the machine occupying their former relative positions, except that the bottom now up was, before, down, and the tray is tipped to the opposite side, the second compartment is being filled and the register advanced one point. Meanwhile, there has been no interruption of the flow of the grain and consequently, no time is lost. The movements from the descent of the bucket to its rising again, have been described in the order of their occurrence, but when the machine is properly adjusted the time occupied by them is very small.

The operation of the machine has been described in weighing grain, but it is evident that any dry and granular substance (not fine enough to form a powder that will clog or "hang") may be weighed equally as well in the same way. Shot and other substances of still larger size, might also be correctly weighed by suitably increasing the size of the feeding and discharging openings, and preserving the proper relation between them; so that the latter shall always be much larger than the former.

Owing to the free suspension of the bucket there are but two causes which can tend, in this machine, to produce a deviation from the most perfect accuracy, of which the scales ordinarily used, in weighing such substances, are capable. One of these causes is the slight downward impulse given to the bucket by the last grains falling upon it as the weighing on one side is completed, this alone would make the quantity weighed off too small. The other cause is owing to the grains continuing to fall after the bucket has commenced to descend; which alone would make the weight too great. The distance of the fall, in the former, and the time of the descent in the latter of these, is so small that the error introduced would be of no great moment, but as they tend to produce opposite effects one neutralizes the other, and the result is so nearly accurate, that, by experiment it has been found that the quantity, indicated as the sum of a large number of rapid weighings does not differ essentially from the truth. If the highest possible exactness were required for substances of great value, it would only be necessary to adjust the balance so that the quantity measured off should be strictly equal to the weight required.

It has been shown by experiment that sand and other granular substances, escaping from proper orifices, do not obey the law of hydrostatic pressure as is the case with fluids; but that their flow is uniform, no matter what weight the substance may reach in the vessel. It has thus been found that equal measures and equal weights will escape in equal times. If the substance to be weighed was strictly homogeneous, it would only be necessary to note the time of the flow (having previously determined the time of the flow of any unit of weight) to measure accurately any quantity; but differences in the density or even in the dryness of different parts of the mass, would introduce errors which, in the long run, might accumulate to an injurious extent. To avoid such errors the present invention has been made; which introducing a high degree of accuracy in the weighing, opposes no varying resistances (such as opening, or shutting or sliding values, or other like surfaces), to the flow of the grain into the scale, which diminish that accuracy. All of these produce friction far exceeding the limits of exactness of the nicest mode of weighing.

My machine, while capable of weighing very rapidly, has no surface moving against the grain as in previous machines, to diminish the accuracy of the result; for the tray does not tip until the weighing is finished; and, as the tipping of the tray and of the bottom are simultaneous, the bottom of the empty compartment is shut before the grain has time to fall upon it.

Various devices have been introduced into grain weighing and other necessary machines, for the purpose of insuring greater accuracy in the results, but these have generally aimed to attain this object by a diminution of the flow at the time the weighing was about to be finished, but all of these devices increase the time occupied, and by increasing

the friction, lose as much, in point of accuracy as they propose to gain.

Variously contrived alternating buckets have been proposed, which involve a multiplication of parts without corresponding advantages. Single oscillating buckets with a partition (oscillating on a fixed center) have also been used to measure both fluids and solids; but from the position of the load near to the center, these cannot attain a high degree of accuracy, and, in weighing grain or other solids the friction renders them practically useless. It has also been proposed to use a single oscillating bucket, with a partition, but suspended from a balance, but this kind of bucket is also objectionable because it is required to oscillate against a certain amount of resistance before the grain can be discharged. All such contrivances can be easily distinguished from my invention.

I have described, above, the plan of construction which I deem the most efficient and compact, but various modifications may be made, by those skilled in the art of constructing weighing machines, without departing from the spirit of the invention. The slots, pins, detents, latch and tumbler may all be replaced by well known equivalents without changing the mode of operation of the machine. Other kinds of registering or counting apparatus may be employed to suit the particular ends desired. I have described a single vibrating bottom, but it is evident that two bottoms connected with the tray by mechanism such as I have described, might be employed; but although these would attain the same end they would not be so simple in arrangement, as the plan adopted in the machine as described.

What I claim as my invention and desire to secure by Letters Patent, is—

1. A bucket with two compartments for a grain weighing and registering machine which is suspended freely from the arm of the balance until the weighing is completed and does not require to be turned or oscillated to dislodge the grain.

2. The combination of a bucket with a tipping bottom to open and close the compartments alternately, with a tipping tray operating substantially as above described.

3. The combination of the roller-arm or its equivalent with the scale-beam and registering apparatus in such manner that the same part of the mechanism which makes the count also resets and locks the tipping bottom, so that no miscount can be made.

In testimony whereof, I have hereunto subscribed my name.

J. SCHEITLIN.

Witnesses:
RALPH E. B. HEWETSON,
HENRY B. LATROBE.