Oct. 25, 1949. F. B. CLARK 2,486,117

COUNTING MACHINE

Filed Jan. 7, 1947 2 Sheets-Sheet 1

Fig. 1

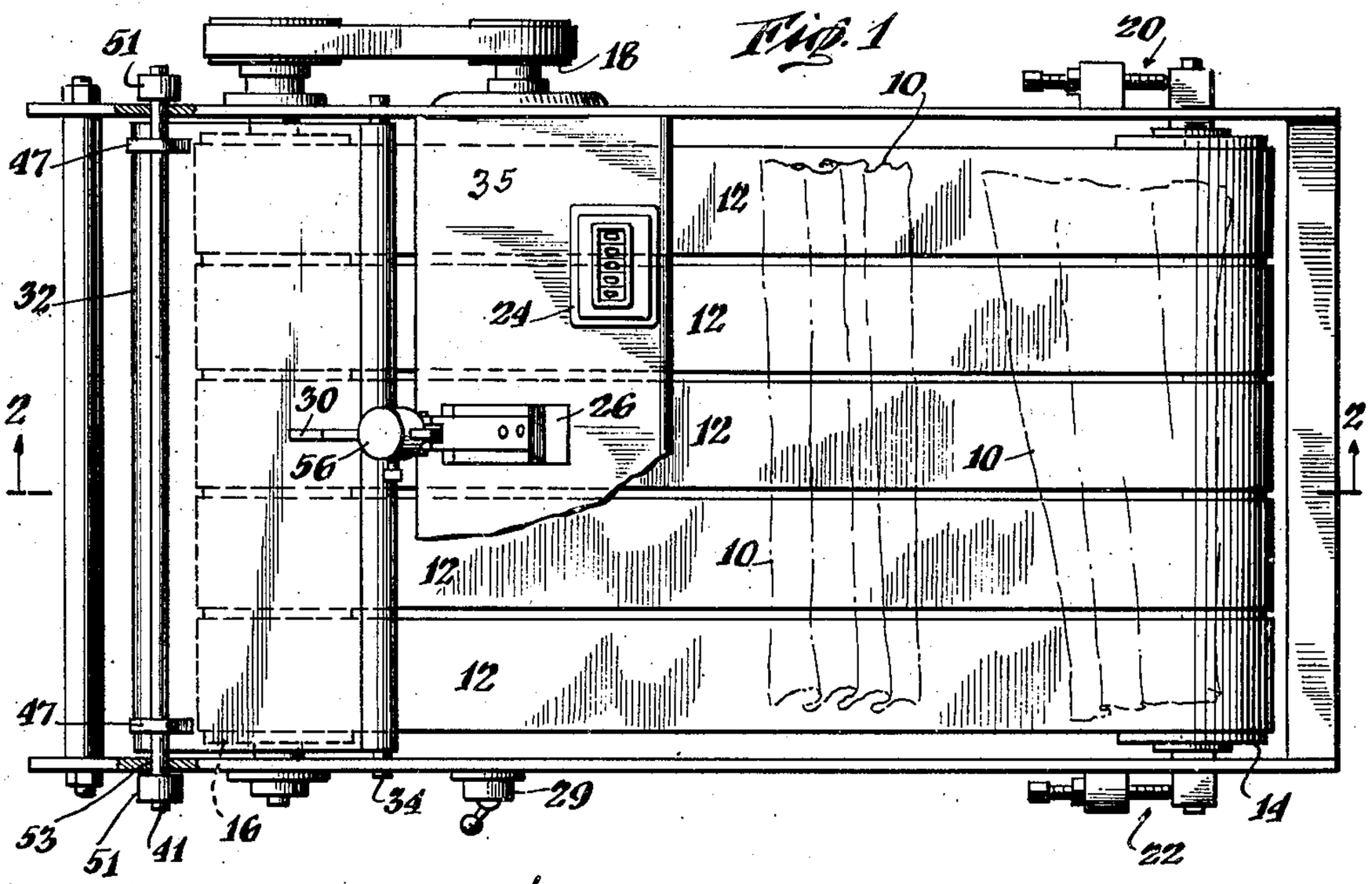

Fig. 2

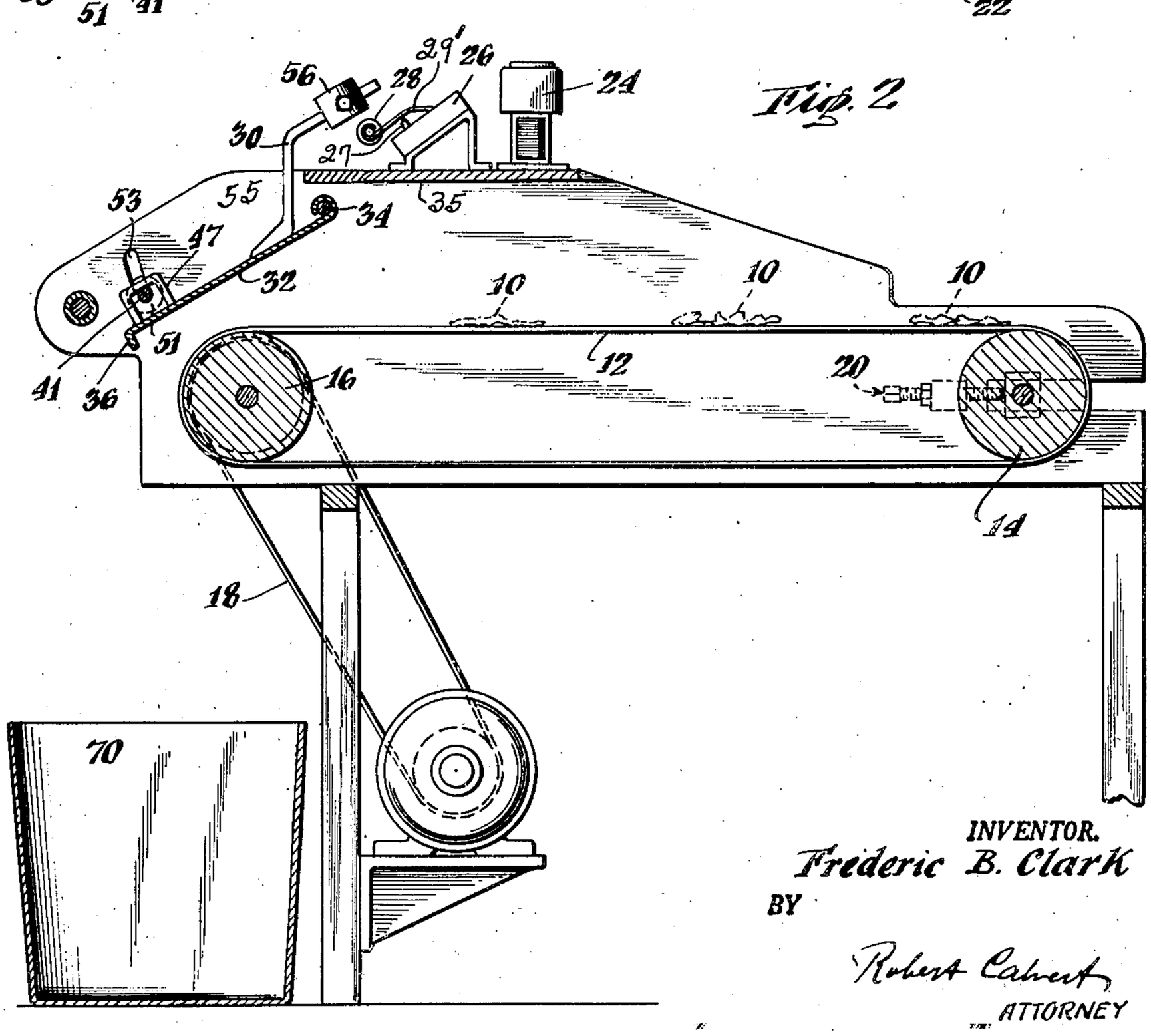

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Fig. 3

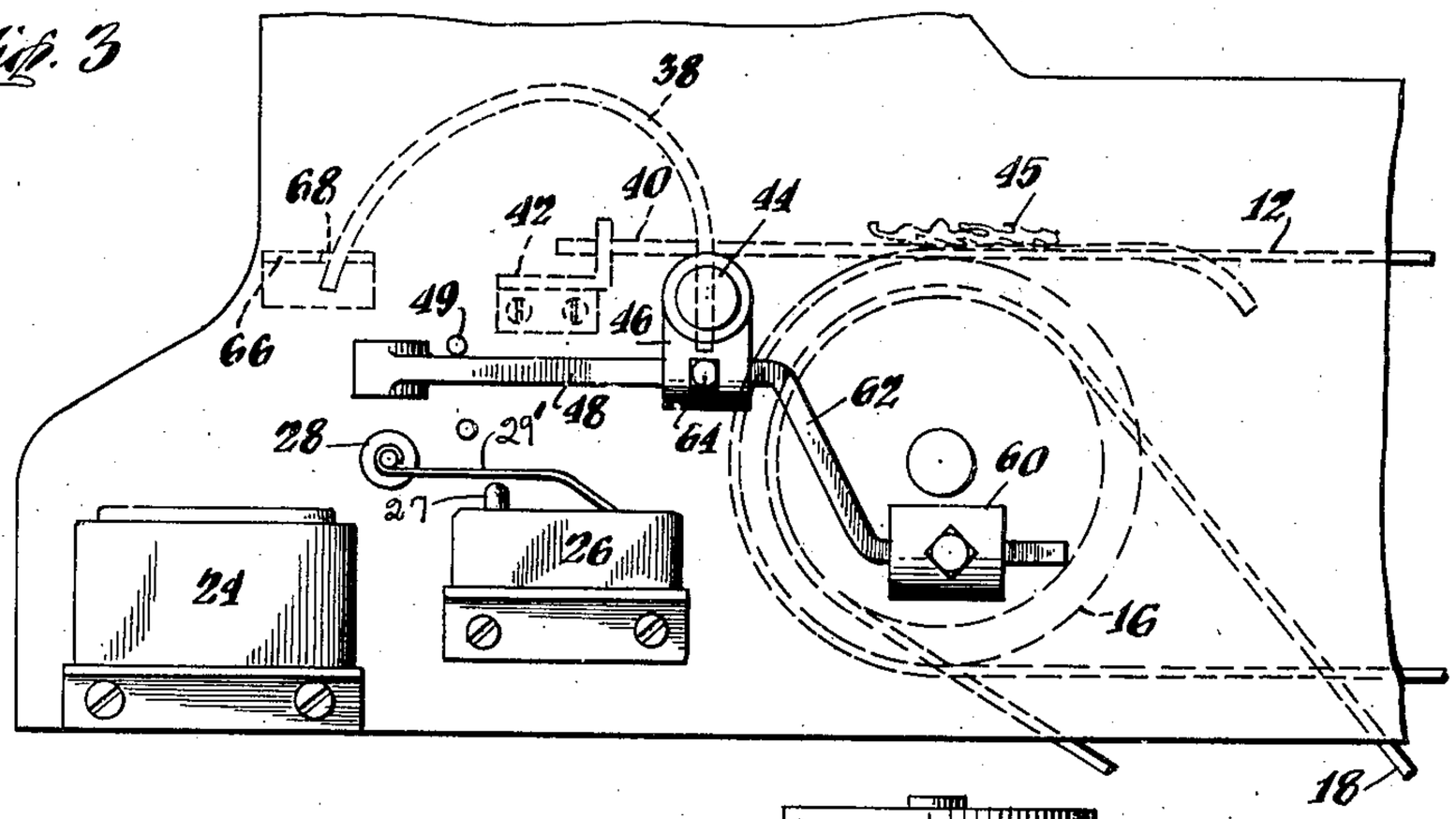


Fig. 4

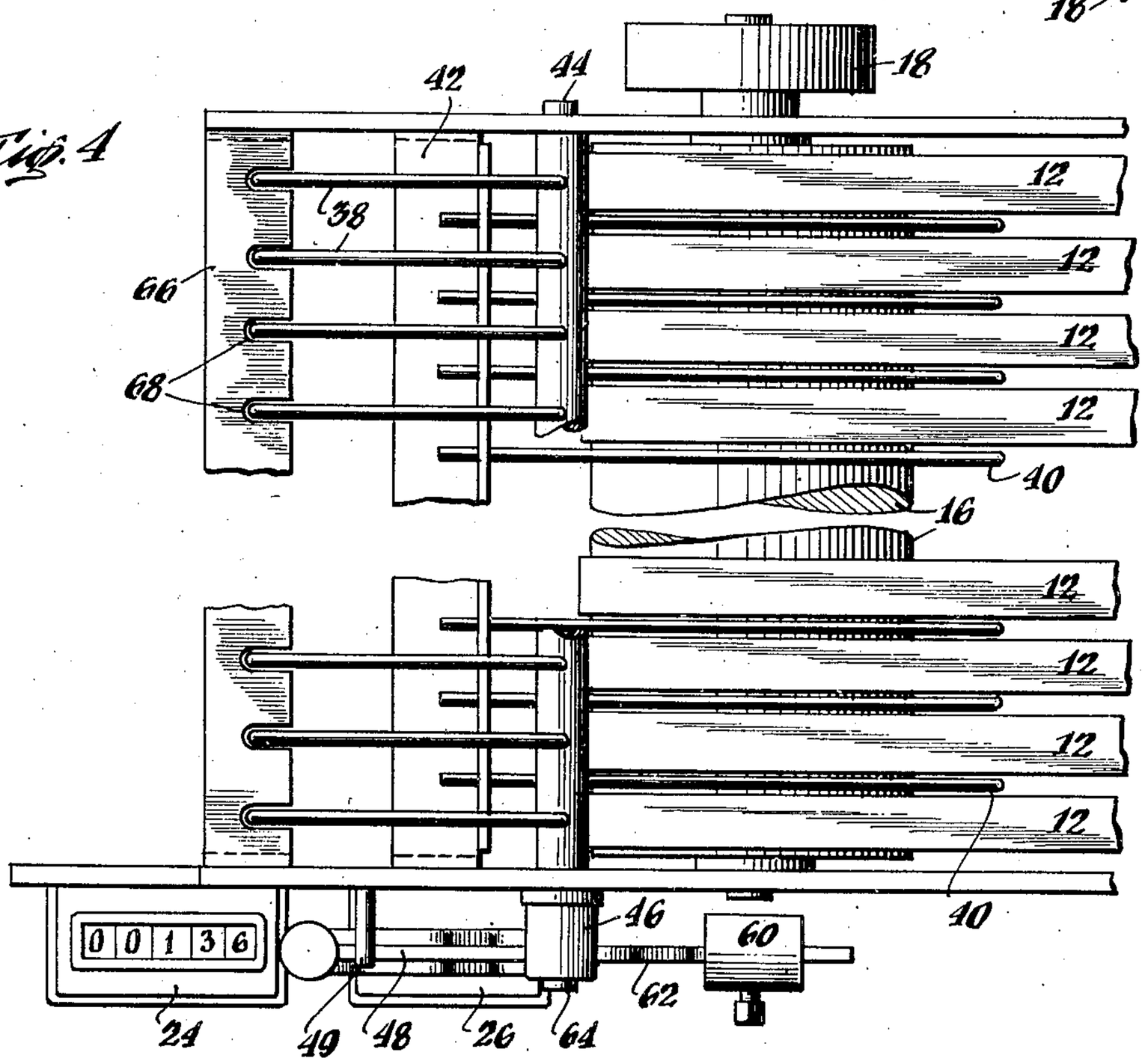
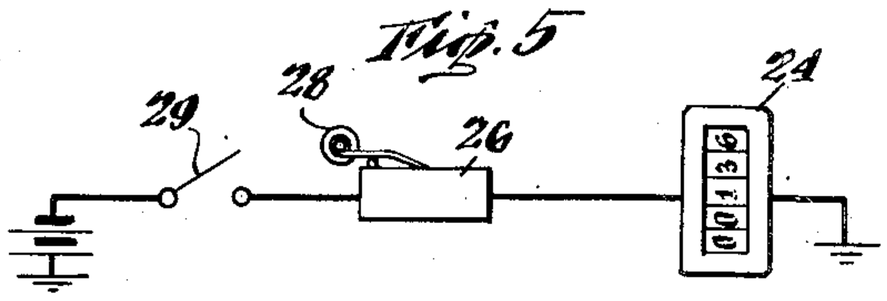


Fig. 5



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UNITED STATES PATENT OFFICE

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COUNTING MACHINE

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Application January 7, 1947, Serial No. 720,541

3 Claims. (Cl. 235—98)

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This invention relates to a counting machine and particularly to a machine for counting objects that at the time of counting may be of irregular shape and overall thickness and difficult, therefore, to count rapidly with conventional machines.

The invention is especially useful in counting soiled laundry goods, including towels, napkins, and the like and will be illustrated by description in connection with such use.

In a usual type of counting machine, the articles to be counted are passed in turn between a support such as a conveyor and a finger that, on being lifted, registers the count. For crumpled towels, napkins and other articles of irregular shape and often of very uneven upper surface and thicknesses of the mass as it passes the counting mechanism, this lifting of a counter figer is unsatisfactory.

In the present machine the counting mechanism is operated, not by the thickness or upper surface of the articles, but by their momentum. In this machine, articles are projected from a high speed belt, in rapid succession, against a baffle and preferably first through a short air space, the deflection of the baffle when struck by the article causing registration on the counting mechanism. The machine includes also a lip extending from the edge of the baffle and causing accumulation of articles against the baffle and lip, so that even lighter laundry items deflect the baffle and register on the counter.

The invention comprises the herein described counting machine, a preferred embodiment and also a modification of which are shown in the attached drawings.

Fig. 1 is a plan view of the preferred embodiment.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a side view, partly in section, of a modified form of machine.

Fig. 4 is a plan view of the machine of Fig. 3.

Fig. 5 is a diagrammatic representation of the electrical circuit including the switch and counter.

Details not shown are conventional.

There are shown means for conveying articles to be counted such as crumpled towels 10, the means including a series of rapidly moving, continuous strip conveyor belts 12 running over roller 14 and over roller 16 with conventional motor and belt drive 18. Conveyor belt tightening means are shown at 20 and 22.

The counting means proper include a counter of conventional type such as the electromagnetic counter 24, an electrical circuit activating the counter and including a circuit making and breaking switch such as the microswitch 26, in series with the counter, having terminal 27 and a closing key 29′ carrying the wheel 28. In the circuit is also a common hand switch 29 (Fig. 5) which is kept closed when the machine is in use.

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The switch closing arm includes a part 30 adjacent to the switch and a portion or baffle 32 joined to the said part, as by welding or riveting (not shown). The combined part and portion are mounted pivotally as shown at 34. As a result the assembly of the baffle and extension (said part) may be moved radially about the pivot 34, the extension 30 to such angular extent that the extension 30 strikes the wheel 28 and causes closing of the make and break switch.

The baffle 32 extends somewhat below and beyond the delivery end of the conveyor belts 12 so as to cross the path of articles thrown from the turn of the conveyor belts. This baffle has a lip or flange 36 that extends a short distance, suitably at about a right angle, from the side of the baffle towards the conveyor. The baffle is rigid to the extent of being shape-retaining. Its upper edge is vertically above the conveyor, i. e., lies in an imaginary plane vertical to the upper reach of the conveyor. The delivery end of the conveyor defines a free (unobstructed) space with the baffle.

The baffle and extension assembly is approximately balanced around its pivotal mounting on rod 34, a counter weight 56 forming a part of the extension 30 being so selected as to mass and position on the extension 30 that the moment of the weight operating to depress the baffle 32 is somewhat but only slightly greater than the moment acting above the pivot point 34. As a result, there is normally no contact between the extension 30 (or the weight 56 forming a part of the extension) and the wheel 28 of the microswitch on the key 29′. The instrument supporting and stop plate 35 extends as a stop near to part 30 (Fig. 2). To deaden vibration of the baffle 32 and cause its quick return to fully inclined position, there is included rod 41 mounted in slots 53 in sides 55 of the machine, and extending at its ends into the short channels 47 mounted on the baffle and in effect as shown in Fig. 2 forming therewith oversize eyelets for the rod. Normally the rod rests in the bottom of the slots and under the base of the channel members so as to limit the downward

movement or inclination of the baffle **32**. The rod is disposed above the baffle at a short distance slightly less than the extent of movement of the baffle for contact with the edge of stop plate **35**.

Upward movement of the baffle registers on the counter.

When the baffle is forced upward, by contact with an object projected by the conveyor belts **12** through space and against the baffle, the baffle rises sufficiently to strike rod **41**, cause counterweight **56** to depress the wheel **28** and attached key **29**, so as to close the microswitch, and also cause arm **30** to strike the edge of stop plate **35**. The rod **41** damps the plate from vibration. There it is bounced upward for a short distance. As it falls, it adds mass and forces the baffle down rapidly. Movement of rod **41** in turn is limited by slot **53**.

This mechanism makes possible a delicate setting of the balance of the baffle arrangement, making certain that the baffle will be deflected by the application of only a small force by the article being counted.

This effect of rod **41** is suitably increased in adjustable manner by counterweights **51** applied to the ends of the rod.

In the modification shown in Figs. 3 and 4, parts of the apparatus not shown, including the right end of the equipment and also the drive mechanism for the conveyors are the same as shown in Figs. 1 and 2.

In this modification, a series of baffles in the form of curved rods **38** are disposed at the delivery end of the conveyor belts **12** for article **45**. Also a series of stationary take-off wires **40** rise from a level just below the conveyor belts to a level above the belts at the delivery end. These wires extend to a frame **42** inside the curvature of the rods.

The rods **38** are attached at their bases to a rotatable trip rod **44** which, in turn, is attached as by the union **46** to the extension **48** serving, when depressed, to strike wheel **28** on the key of the make and break switch **26**, the closing of which operates the counter **24**.

In the modification the counter weight **60** is mounted on the balancing section **62** for the extension **48**. The assembly of the extension **48**, weight **60**, section 62, and parts **38**, **44**, and **46** are mounted pivotally as shown at **64**, with the moment of weight to the right of the pivot point **64** slightly larger than that to the left, so that the part **48** of the arm is kept normally in raised position against stop **49**. This keeps the switch **26** open until force is applied to depress arm **48** against the contact wheel **50** and thus depress the key **29** and close the switch.

The curved rods **38** at their ends move in the guide bar **66**, in slots **68** therein.

After clearing the rods **68** or the baffle **32**, the articles thus counted drop into receiver **70**.

The operation of the counting machine will be largely evident from the description of the machine that has been given.

Articles to be counted, such as wadded up towels, napkins, or diapers, are thrown on the conveyors **12** as rapidly and as close together as desired so long as there is no overlapping of and a short space between the separate objects in the direction of movement of the conveyors, that is to the left in the machine as illustrated. The objects so thrown upon the conveyor system are then moved rapidly to the left at a speed depending upon the rate of movement of the conveyor belts. The speed must be sufficiently high to project the articles with force against the baffle, as for example, about 500 to 1500 feet a minute and preferably 800 to 1,000 feet. Whatever the speed selected, it must be uniform. My conveyor gives such uniformity.

When the articles to be counted reach the left end of the conveyor system where the belts turn, the articles are thrown through space against the baffle **32** of Figs. 1 and 2. The force thus applied against the baffle, as the front edge only of the article strikes the baffle, is ordinarily not sufficient to raise the baffle and cause pressing of the upper part of the arm, such as the counterweight **56**, against the wheel **28** of the microswitch. As the article keeps coming on it accumulates behind the baffle and lip **36** and in the angle therebetween, until the energy delivered by the accumulation behind the baffle and the lip is sufficient to lift the baffle and cause closing of the microswitch through the key **29**.

As the baffle and lip yield before the article thrown against them, the article is itself falling. It drops finally to the collecting receiver **70**.

All this happens in what seems to be an immeasurably short period of time. There is simply contact of the laundry article against the baffle, a temporary accumulation of the flexible material in front of the baffle and in the corner formed by the lip **36**, dropping of the individual article out of the way, and the return of the baffle hastened by rod **41** to normal position before the next article strikes the baffle.

Because of the speed of the action it is possible to count articles in rapid succession. Thus, towels may be counted at a rate as high as 60 to 180 a minute, this with a machine in which the upper reach of the conveyor belts is about 18 inches wide by 36 long. The limiting factor in speed of counting is the dexterity of the operator who throws or drops the towels one at a time upon the conveyor belt.

The towels may be wet or dry. In fact the wetter the towel and the more wadded up it is, the better it works; it gives a greater striking force against the baffle **32** and lip **36**.

In the modification shown in Figs. 3 and 4, the same general method of operation is used.

The articles being counted are thrown separately onto the conveyors **12**. When they strike the series of hooks or curved rods **38**, the articles apply a force against the rods which depresses them in the direction of movement of the conveyors. This causes rotation of the trip rod **44** until arm **48** contacts the wheel **28** of the microswitch **26** and causes registration in the electromagnetic counter. The towels then pass over the hooks into a receiver (not shown in Fig. 3, but like **70** of Fig. 2).

Materials of construction are those that are conventionally used in the construction of like parts in other machines. Thus conveyor belts may be of canvas, electrical contacts of copper or aluminum, and other parts of steel, aluminum, or galvanized iron. V-belts, if used, are a rubber composition.

The counters are simple and effective in operation and the count is not affected by the number of alternate high and low spots in the crumpled articles delivered to the conveyor belts **12**. The articles are counted at least as well and ordinarily more rapidly when in such crumpled condition than when laid flat on the belts. Preferably I simply pick out in the articles as received

and throw them one by one as rapidly as possible on the conveyor belts.

It will be understood also that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

What I claim is:

1. A machine adapted for counting articles that are light in weight and irregular in shape comprising an electromagnetic counter, a rigid sheet baffle, means extending from the baffle for energizing the counter when the baffle is displaced angularly, means mounting the baffle pivotally, a horizontal conveyor terminating at the delivery end adjacent to but short of the baffle and at a level above the lower edge of the sheet baffle, the delivery end of the conveyor defining a free space between it and the said baffle, and means for moving the conveyor rapidly in the direction of the said baffle, so that light weight articles on the conveyor are thrown through space from the end of the conveyor against the baffle and the baffle is displaced angularly so as to energize the electromagnetic counter.

2. A machine as described in claim 1, the said sheet baffle being inclined, the upper edge of the

baffle being vertically above a part of the said conveyor and the lower edge of the sheet baffle being beyond and below the delivery end of the conveyor.

3. A machine as described in claim 2, the lower edge of the said baffle being in the form of a flange defining with the rest of the sheet an angle on the side of the said sheet towards the said conveyor, the flange forming an element for retaining temporarily the light weight articles thrown against the baffle so as to increase the effect of the articles on the displacement of the baffle.

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