Sept. 11, 1934. M. C. HANSON 1,973,206

SORTING APPARATUS

Filed Feb. 27, 1930 2 Sheets-Sheet 1

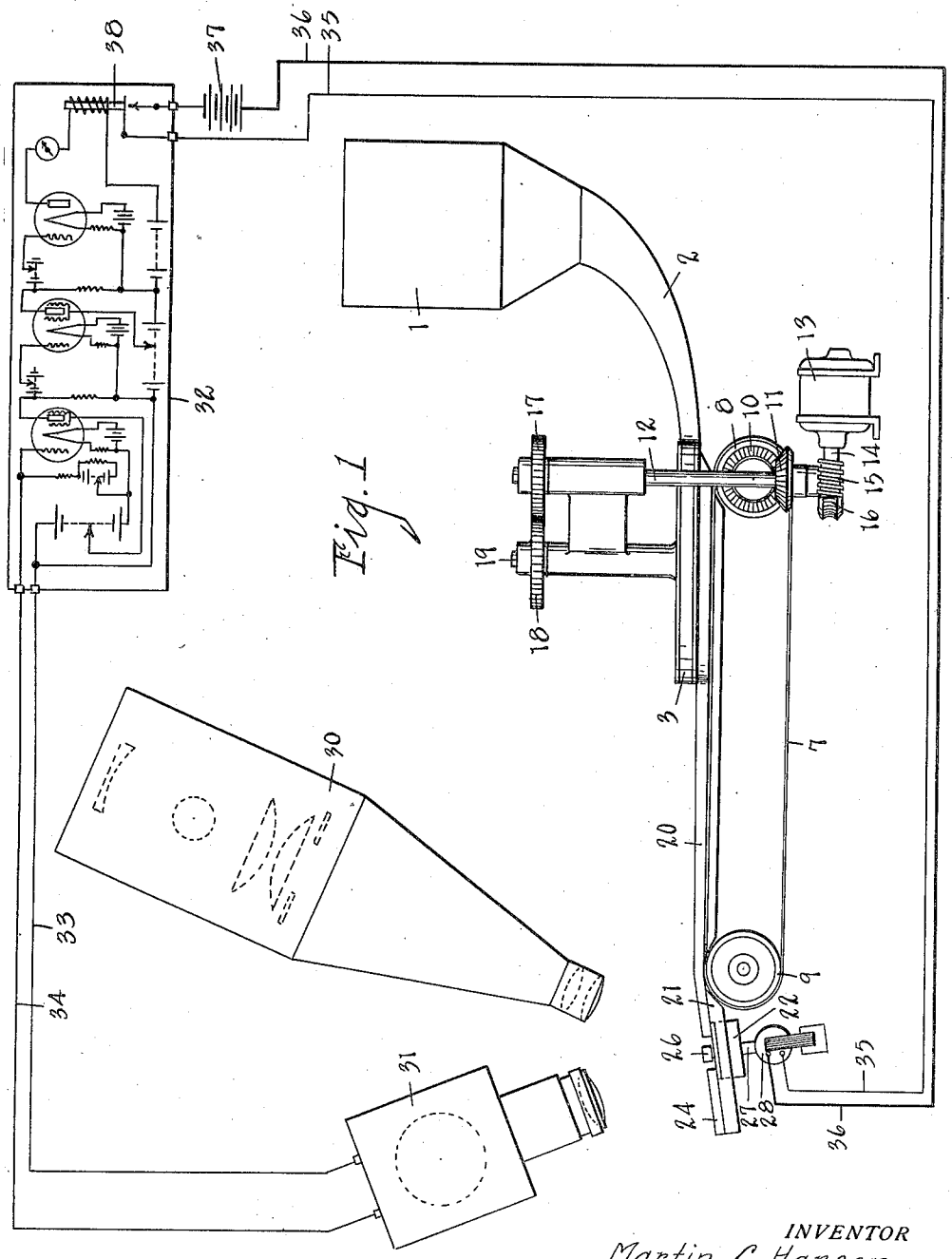

Fig. 1

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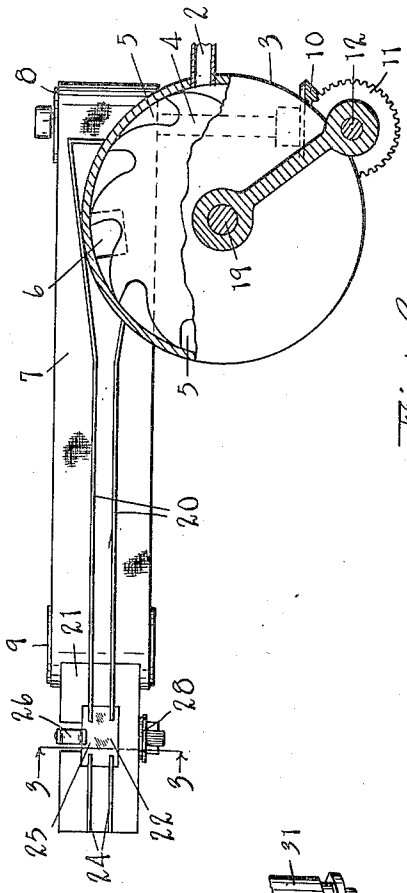

Fig. 2

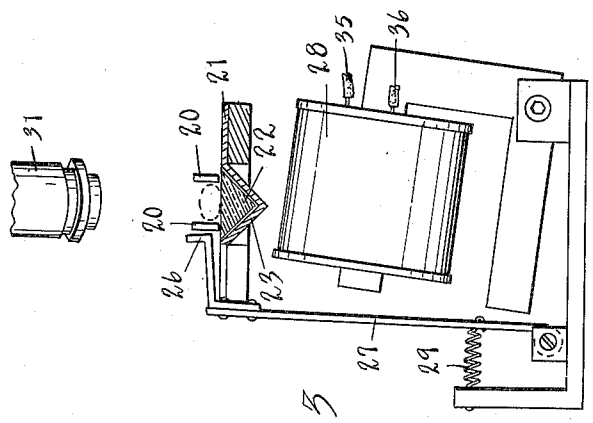

Fig. 3

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UNITED STATES PATENT OFFICE

1,973,206

SORTING APPARATUS

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Application February 27, 1930, Serial No. 431,752

6 Claims. (Cl. 209—111)

The main object of this invention is to provide a sorting apparatus which is well adapted for use in sorting beans, the fractured or discolored beans being rejected or removed by the machine.

A further object is to provide a machine of this character which is of large capacity.

Objects pertaining to details and economies of my invention will definitely appear from the description to follow. The invention is defined in the claims.

A structure which embodies the features of my invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a partial side elevation and a partial diagrammatic view of my improved sorting apparatus or machine, certain parts being shown in conventional form.

Fig. 2 is a fragmentary plan view illustrating details of the feeding means.

Fig. 3 is a fragmentary view partially in section on line 3—3 of Fig. 2.

In the embodiment of my apparatus illustrated, 1 represents a hopper for the beans or other articles to be sorted. This hopper has a delivery spout 2 through which the articles to be sorted flow by gravity to the cylinder 3, the spout opening to the periphery of this cylinder.

Within the cylinder is a feed wheel 4 having a series of peripheral pockets 5 therein of such size as to receive a single bean or other article to be sorted, advancing it to the discharge opening 6 in the bottom of the cylinder. The cylinder is arranged above the conveyor belt 7 supported by the pulleys 8 and 9. The pulley 8 has a beveled gear 10 thereon meshing with the gear 11 on the vertical shaft 12.

This shaft 12 is driven from the motor 13, the shaft 14 of which has a worm 15 meshing with the worm wheel 16 on the lower end of the shaft 12. On its upper end the shaft is provided with a gear 17 meshing with a gear 18 on the upper end of the spindle 19 of the feed wheel 4.

Above the conveyor belt I provide a pair of spaced guide members 20 which permit the articles to be sorted to travel along singly so that they are delivered singly to the inclined sorting chute 21. This sorting chute has a reflector 22 interposed therein which is preferably in the form of a prism, the sides other than the surface being silvered or otherwise treated to provide a prismatic mirror. This prismatic mirror is mounted in the V shaped holder 23.

The guides 20 overlap the chute 21 and supplementary guides 24 are spaced from the ends of the guides 20 leaving an opening or gate 25 in the sorting way.

The ejector 26 is mounted on the pivotally supported armature 27 of the electromagnet 28, the coiled spring 29 acting to normally retract the ejector.

I provide a light projecting means designated generally by the numeral 30 adapted to project the light upon the reflector and the articles thereon. This light projecting means is shown conventionally, and, as the details form no part of this invention, they are not described herein.

I also provide a photo-electric cell designated generally by the numeral 31 operatively associated with the reflector so that when a bean or other object travels across the reflector, if it be discolored or broken so as to result in a discolored or exposed interior portion, less light is reflected into the photo-electric cell.

The light projecting means, reflector and photo-electric cell are arranged as illustrated so that the direct reflection by the reflector of the powerful light from the light projecting means into the photo-electric cell is prevented.

An amplifying or relay unit designated generally by the numeral 32 is connected to the photo-electric cells through the electrical connections 33 and 34, and to the electromagnet through the electrical connections 35 and 36. A battery or source of electric supply 37 is provided in the connection 36. The relay unit switch of the unit 32 is indicated at 38 so that when an imperfect bean is presented on the reflector, its action on the photo-electric cell is to lessen the current flowing in the amplifying and relay circuits, thus releasing the relay and closing the circuits 35 and 36 and thereby actuating the electromagnet and consequently the ejector.

I have shown certain parts of my apparatus in conventional form for convenience in illustration. Inasmuch as the details thereof, such as the details of the amplifying and relay units, light projector unit, and photo-electric cell unit form no part of this invention and may be had as assembled units, I have not described the same herein.

I have not attempted to illustrate various modifications and adaptations of my improvements which I contemplate as it is believed that this disclosure will enable those skilled in the art to embody or adapt the same as may be desired.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a sorting apparatus, the combination of

a conveyor belt, guide members operatively associated with said conveyor belt, means for delivering articles to be sorted to said conveyor belt one by one, an inclined sorting chute disposed at the end of said conveyor belt and having a prismatic mirror interposed therein so that the articles travel across the mirror, means for projecting light upon said mirror to illuminate the under surfaces of the articles, a photo-electric cell operatively associated with said mirror for receiving light reflected from the articles and the mirror simultaneously, an ejector operatively associated with said sorting chute, an electromagnet for actuating said ejector, and a control means for said electromagnet operatively associated with said photo-electric cell.

2. In a sorting apparatus, the combination of a sorting chute having a prismatic mirror interposed therein so that the articles travel across the mirror and their under sides are reflected thereabove, means for projecting light upon said mirror to illuminate the entire surface of the articles, a photo-electric cell operatively associated with said mirror to receive light reflected from the articles and mirror simultaneously, the light projecting means, mirror and photo-electric cell being arranged so that the light from the light projecting means is not directly reflected by the mirror into the photo-electric cell, an ejector operatively associated with said sorting chute, an electro-magnet for actuating said ejector, and a control means for said electromagnet operatively associated with said photo-electric cell.

3. In a bean sorting apparatus, the combination of a sorting way having a prism interposed therein so that the beans pass across the surface thereof one by one, means for projecting light upon said prism, a photo-electric cell operatively associated with said prism, the light projecting means, prism and photo-electric cell being arranged so that the light from the light projecting means is not directly reflected by the prism into the photo-electric cell, and an ejector means operatively associated with said photo-electric cell to be controlled thereby, said prism having its sides silvered for reflecting the under surfaces of the articles and obviating the direct reflection of the powerful light into the photo-electric cell.

4. In a sorting apparatus, the combination of an inclined reflector, means for delivering articles to be sorted one by one to said reflector, means for projecting light upon said reflector to illuminate the bottom surfaces of the articles, a photo-electric cell operatively associated with said reflector, the light projecting means, reflector and photo-electric cell being arranged so that the light from the light projecting means is not directly reflected by the reflector into the photo-electric cell, an ejector, an electro-magnet for actuating said ejector, and a control means for said electromagnet operatively associated with said photo-electric cell.

5. In a bean sorting apparatus, the combination with a photo-electric cell and a light source, of a prism over which the beans are adapted to pass, illuminated by said light source and having its inclined sides silvered to illuminate the under surfaces of the beans by reflected light and to reflect the light from said under surfaces into said photo-electric cell, the light source, prism and photo-electric cell being arranged to prevent the direct reflection by the prism of the powerful light from said light source into said photo-electric cell.

6. In a sorting apparatus, the combination with a photo-electric cell and a light source, of a prism over which the articles to be sorted are adapted to pass, illuminated by said light source and having its inclined sides arranged to illuminate the under surfaces of the articles by reflected light and to reflect the light from said under surfaces into said photo-electric cell, the light source, prism and photo-electric cell being arranged to prevent the direct reflection by the prism of the powerful light from said light source into said photo-electric cell, and sorting means controlled by said photo-electric cell.

MARTIN C. HANSON.