

Sept. 15, 1936.

M. C. HANSON

2,054,319

SORTING APPARATUS

Filed Oct. 20, 1930

2 Sheets-Sheet 1

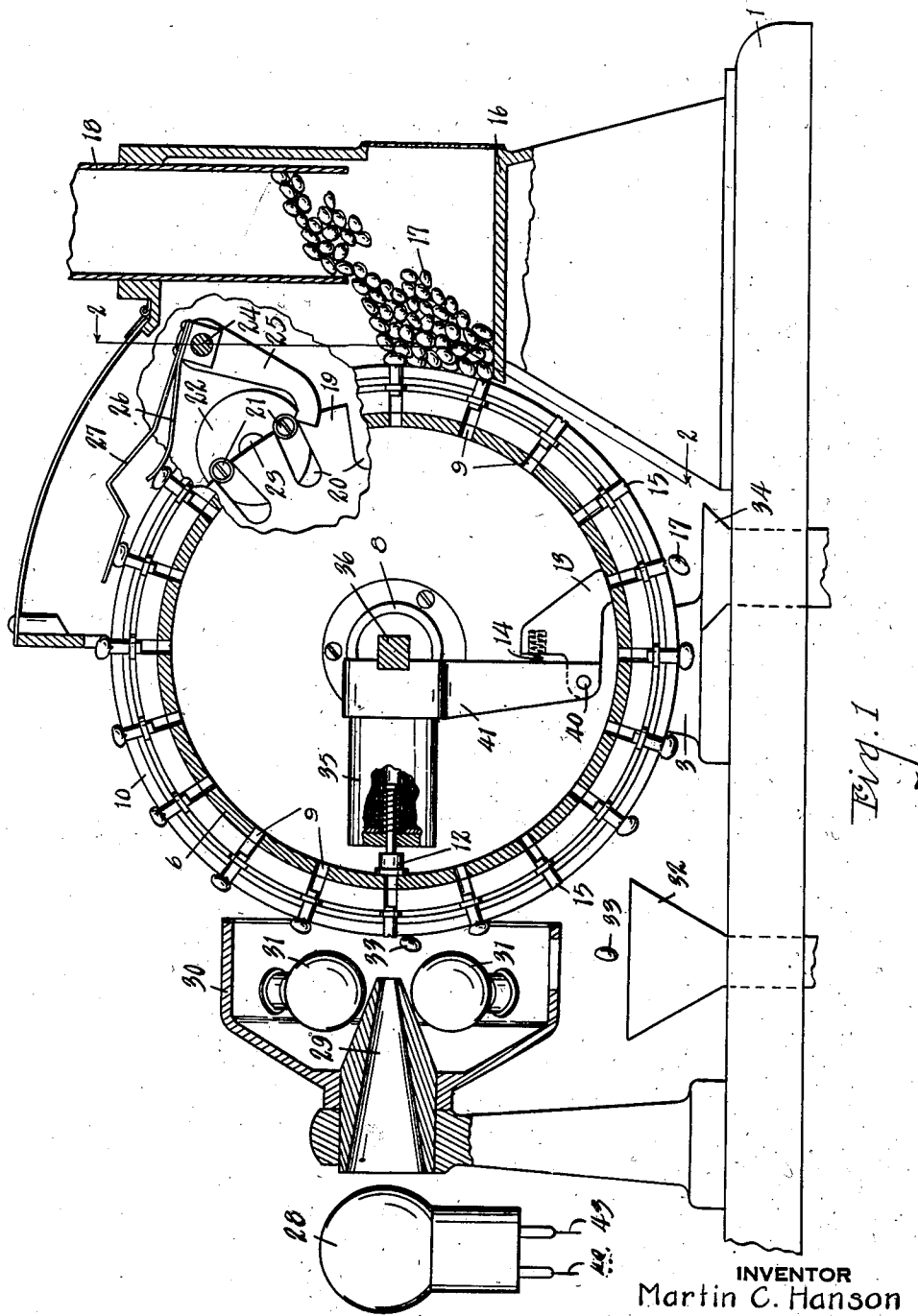


Fig. 1

INVENTOR
Martin C. Hanson
BY
Chappell & Carl
ATTORNEYS

Sept. 15, 1936.

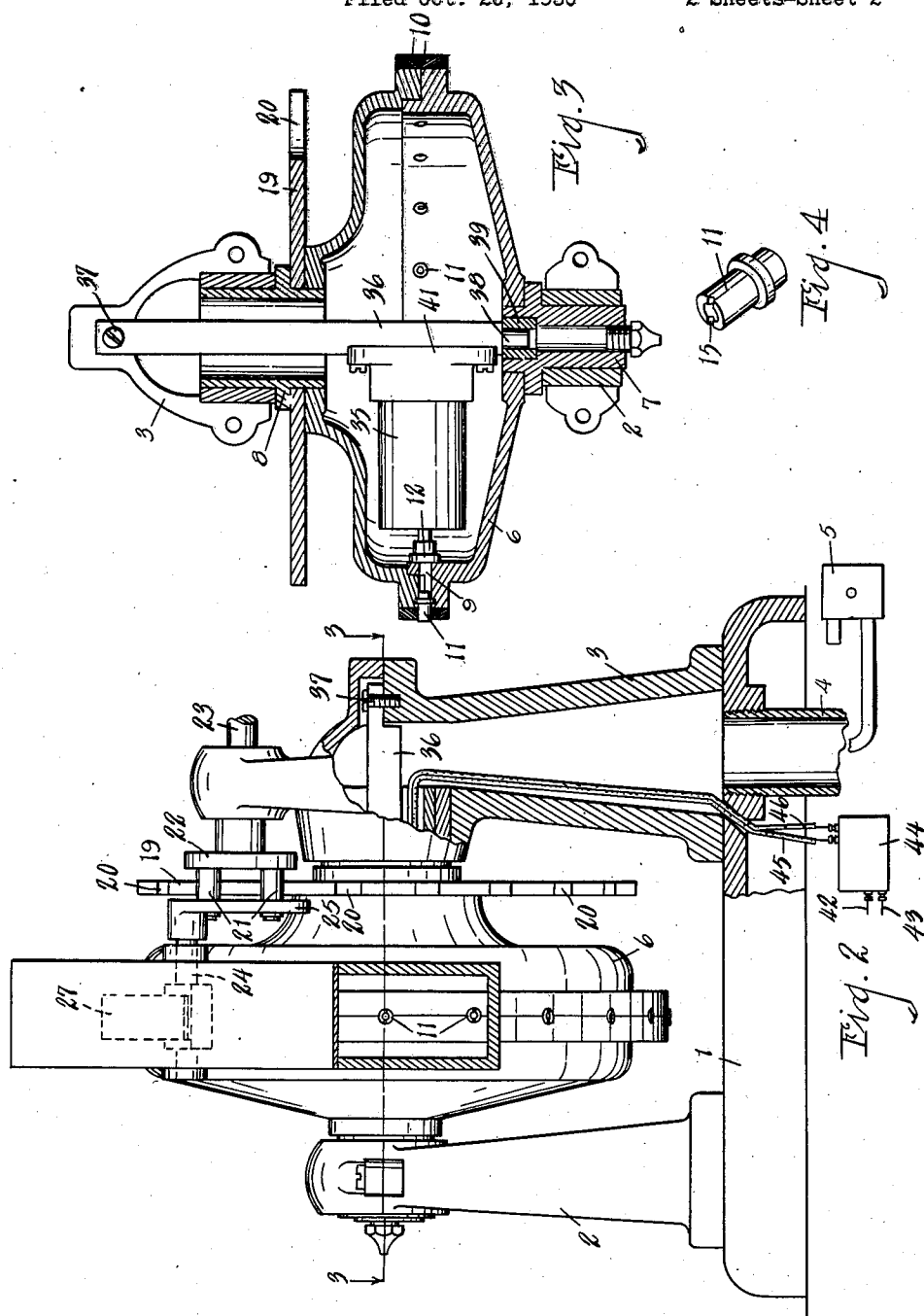
M. C. HANSON

2,054,319

SORTING APPARATUS

Filed Oct. 20, 1930

2 Sheets-Sheet 2



INVENTOR
Martin C. Hanson
BY
Chappell & Earl
ATTORNEYS

UNITED STATES PATENT OFFICE

2,054,319

SORTING APPARATUS

Martin C. Hanson, Grand Rapids, Mich., assignor,
by direct and mesne assignments, to Electric
Sorting Machine Company, a corporation of
Michigan

Application October 20, 1930, Serial No. 439,793

42 Claims. (Cl. 209—111)

The main objects of this invention are:

First, to provide a sorting machine or apparatus which is well adapted for use in sorting beans, the fractured or discolored beans being removed or rejected by the machine.

Second, to provide a machine of this character which is very compact and at the same time of very large capacity.

Third, to provide a machine of this character which is very accurate in operation.

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 fragmentary view mainly in vertical section of my improved sorting machine, parts being shown in conventional form for convenience in illustration.

Fig. 2 is a view partially in section on line 2—2 of Fig. 1 and partially in vertical central section.

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

Fig. 4 is an enlarged perspective view of one of the suction tips.

In the embodiment of my invention illustrated I provide a base 1 having pedestals 2 and 3 thereon, the pedestal 3 being hollow to provide a conduit to which the suction pipe 4 of the suction producing means shown conventionally at 5 is connected.

I provide a hollow drum-like conveyor 6 having a journal 7 mounted within the pedestal 2 and a hollow journal 8 mounted on the pedestal 3 so that the interior of the conveyor communicates with the suction conduit. The drum is provided with a spaced series of peripheral suction orifices 9, and is preferably provided with a facing rim 10 of a uniform neutral color, preferably white. This rim is of hard-surfaced material such as some of the pyroxylin products which permits its ready cleaning and provides a smooth durable surface.

The suction orifices are provided with suction tips 11 which project slightly above the surface of the rim as best shown in Fig. 3. These suction orifices are all open to the suction within the conveyor except as they may be closed by the valve 12, which for convenience I designate as a selecting valve, and the valve 13, which for con-

venience I designate as a discharge valve. The valve 12 is normally open, it being shown in closed position, however, in Fig. 1.

The valve 13 is yieldingly held against the inside of the rim by means of the spring 14 so that the orifices are successively closed by this valve as the drum rotates. To prevent the suction orifices becoming airbound when the valve is closed, the tips 11 are preferably notched at 15, thus insuring a prompt release of the bean when the valve is closed.

At one side of the conveyor I arrange a hopper 16 which is open adjacent the conveyor so that the periphery of the conveyor sweeps through the hopper on its up-stroke into contact with the beans or other articles to be sorted, indicated at 17. The feed chute 18 maintains a uniform supply of beans in the hopper.

The conveyor is driven with a step by step movement, the driving means illustrated comprising a gear 19 having radial slots 20 which are engaged by the pins 21 on the driving gear 22. The shaft 23 of this driving gear being continuously driven imparts a step by step movement to the conveyor. This movement has a relatively slow starting and stopping action, which is also of advantage.

The rockshaft 24 is disposed transversely of the hopper above the feed level thereof and carries an arm 25 with which the gear pins 21 coact as tappets so that the arm is rocked in synchronism with the movements of the conveyor. This rockshaft is provided with spring fingers 26 and 27 which are disposed to strike the beans, uniformly positioning them on the tips. Frequently the beans are picked up in the hopper with their ends engaging the tips; these positioning members, acting while the beans are held upon the tips by suction with a tapping action, place the beans on their sides as indicated.

From these positioning members or fingers the beans are carried forwardly into range of the photo-electric cell 28 which has a focusing tube 29 disposed radially of the conveyor and so that the cell is focused upon a bean held by one of the tips or nipples while the conveyor is at rest. A lamp housing 30 is operatively associated with the cell and disposed so that a portion of the periphery of the drum sweeps into the housing on the down-stroke. Lamps 31 are arranged within this housing at each side of the path of the tips so that the articles carried by the conveyor are very effectively illuminated.

When a damaged or discolored bean is brought into range of the cell the valve 12 is actuated through electrical means to close the orifices as shown in Fig. 1, thereby allowing the defective bean to fall from the tip into a discharge chute 32. Damaged beans are indicated at 33. The good beans are carried forward by the conveyor until the valve 13 is reached, when they are discharged to the chute 34, properly positioned to receive them.

The electrical means in the embodiment illustrated consists of an electromagnet 35 arranged within the conveyor and mounted on the bar-like bracket 36, one end of which is supported at 37 on the pedestal. The other end has a pilot pin 38 engaging a bearing 39 in the journal 7 of the conveyor. The valve 13 is pivoted at 40 on the arm 41 projecting from this bracket 36.

The photo-electric cell or other light-sensitive element 28 is connected by the wires 42 and 43 to an amplifier 44 which is in turn connected by the wires 45 and 46 to the electromagnet 35. The details of these parts are not illustrated.

With the parts thus arranged the beans are automatically picked up as the conveyor rotates, are positioned on their sides on the conveyor by means of the fingers 26 and 27, and are then carried to the detector mechanism described where the discolored, or defective beans in which the defect is of a character to affect the color, are discharged into the discharge chute 32, the good beans being carried on to the discharge chute 34.

The apparatus is of large capacity and very accurate in the performance of the work intended. At the same time the structure may be made very compact.

I have illustrated and described my improvements in an embodiment which I have found highly practical. I have not attempted to illustrate various adaptations and modifications which I contemplate as it is believed that this disclosure will enable those skilled in the art to embody or adapt my improvements 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 machine, the combination with a feed hopper open at one side, a drum-like conveyor disposed so that an annular portion thereof sweeps upwardly in the side opening of said feed hopper, said annular portion having a neutral color and radially disposed suction tips projecting slightly above the surface thereof, suction means connected to the interior of said conveyor, means for driving said conveyor step by step, a lamp housing having an opening receiving a portion of the edge of the conveyor on the down sweep thereof, lamps arranged within said housing on opposite sides of the vertical plane of said suction tips, a photo-electric cell disposed to focus on an article within said lamp housing while the conveyor is at rest, an electromagnet mounted within said conveyor and operatively associated with said photo-electric cell, a selecting valve operatively connected to said electromagnet and arranged within said conveyor so that the suction tips are successively brought into operative relation thereto while they are in operative relation to said cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips as the conveyor revolves.

2. In a sorting machine, the combination with

a feed hopper open at one side, a drum-like conveyor disposed so that a portion of its periphery sweeps upwardly in the side opening of said feed hopper, said conveyor having a rim of neutral color and radially disposed suction tips projecting slightly above the surface of the rim, suction means connected to the interior of said conveyor, means for driving said conveyor step by step, a photoelectric cell disposed to focus on an article while the conveyor is at rest, an electromagnet mounted within said conveyor and operatively associated with said photo-electric cell, a selecting valve operatively connected to said electromagnet and arranged within said conveyor so that the suction tips are successively brought into operative relation thereto while they are in operative relation to said cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips as the conveyor revolves.

3. In a sorting machine, the combination with a feed hopper open at one side, a drum-like conveyor disposed so that a portion of its periphery sweeps upwardly in the side opening of said feed hopper, said conveyor having peripherally disposed suction tips projecting slightly above the surface of the rim, means for driving said conveyor step by step, a lamp housing having an opening receiving the edge of the conveyor on the down-sweep thereof, lamps arranged within said housing on opposite sides of the vertical plane of said suction tips, a photo-electric cell disposed to focus on an article within said lamp housing while the conveyor is at rest, an electromagnet mounted within said conveyor and operatively associated with said photo-electric cell, a selecting valve operatively connected to said electromagnet and arranged within said conveyor so that the suction tips are successively brought into operative relation thereto when they are in operative relation to said cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips as the conveyor revolves.

4. In a sorting machine, the combination with a feed hopper open at one side, a drum-like conveyor disposed so that a portion of its periphery sweeps upwardly in the side opening of said feed hopper, said conveyor having an annular series of suction tips projecting slightly above the surface thereof, means for driving said conveyor, a photo-electric cell disposed to focus on an article while the conveyor is at rest, an electromagnet mounted within said conveyor and operatively associated with said photo-electric cell, a selecting valve operatively connected to said electromagnet and arranged within said conveyor so that the suction tips are successively brought into operative relation thereto when they are in operative relation to said cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips as the conveyor revolves.

5. In a sorting machine, the combination with a feed hopper, of a drum-like conveyor having peripherally disposed series of suction orifices, said conveyor being disposed so that a portion of its periphery sweeps through said feed hopper, means for driving said conveyor step by step, an oscillatingly mounted spring finger actuated in synchronism with said conveyor for positioning the articles thereon, a lamp housing disposed so that a portion of the periphery of the conveyor sweeps therethrough as the conveyor rotates, lamps arranged within said housing on opposite

sides of the plane of the suction orifices of said conveyor, a photo-electric cell disposed to focus on an article within said lamp housing while the conveyor is at rest, an electrically actuated selecting valve arranged within said conveyor so that the suction orifices are successively brought into operative relation thereto while they are in operative relation to said photo-electric cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction orifices as the conveyor revolves.

6. In a sorting machine, the combination of a drum-like conveyor having an annular series of suction orifices, a lamp housing disposed so that a portion thereof of the conveyor sweeps there-through as the conveyor rotates, lamps arranged within said housing on opposite sides of the plane of the suction orifices of said conveyor, a photo-electric cell disposed to focus on an article within said lamp housing while the conveyor is at rest, an electrically actuated selecting valve arranged within said conveyor so that the suction orifices are successively brought into operative relation thereto while they are in operative relation to said photo-electric cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction orifices as the conveyor revolves.

7. In a sorting machine, the combination with a feed hopper, of a rotatably mounted suction head having a rim of neutral color and a peripherally disposed series of uniformly spaced suction tips projecting slightly above the surface of the rim, said conveyor being disposed so that a portion of its periphery sweeps through said feed hopper in contact with the material to be sorted, an electrically actuated selecting valve disposed within said suction head and arranged so that the suction tips are successively brought into operative relation thereto, and means for actuating said selecting valve including a color-sensitive element subject to the articles carried by said head.

8. In a sorting machine, the combination of a rotatably mounted suction head having a rim of neutral color and a peripherally disposed series of uniformly spaced suction tips projecting slightly above the surface of the rim, means for driving said suction head step by step, fingers adapted to successively strike the articles carried by the head for positioning the same thereon, means for actuating said fingers in synchronism with the movement of said head, an electrically actuated selecting valve disposed within said head and arranged so that the suction tips are successively brought into operative relation thereto, and means for actuating said selecting valve including a color-sensitive element subject to the articles carried by said head.

9. In a sorting machine, the combination with a feed hopper, of a rotatably mounted suction head having a peripherally disposed series of uniformly spaced suction orifices, said head being disposed so that a portion of its periphery sweeps through said feed hopper in contact with the material to be sorted, means for driving said suction head step by step, a finger adapted to successively engage the articles carried by the head for positioning the same thereon, an electrically actuated selecting valve disposed within said head and arranged so that the suction orifices are successively brought into operative relation thereto, and means for actuating said valve including a

color-sensitive element subject to the articles carried by said head.

10. In a sorting machine, the combination with a feed hopper, of a rotatably mounted suction head having an annular series of uniformly spaced suction orifices, said head being disposed so that a portion thereof sweeps through said feed hopper in contact with the material to be sorted, an electrically actuated selecting valve disposed within said head and arranged so that the suction orifices are successively brought into operative relation thereto, and means for actuating said valve including a color-sensitive element subject to the articles carried by said head.

11. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of spaced suction tips projecting slightly above the surface thereof, an electrically actuated selecting valve disposed within said head and arranged so that the suction tips are successively brought into operative relation thereto, and means for actuating said selecting valve including a color-sensitive element subject to the articles carried by said head.

12. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of suction orifices adapted to pick up and carry articles to be sorted, a lamp housing through which a portion of the conveyor projects, lamps arranged within said housing, a photo-electric cell disposed to focus on an article carried by said conveyor while within said housing, an electrically actuated selecting valve arranged within said conveyor and operatively associated with said photo-electric cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction orifices.

13. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of suction orifices adapted to pick up and carry articles to be sorted, a lamp housing through which a portion of the conveyor projects, lamps arranged within said housing, a photo-electric cell disposed to focus on an article carried by said conveyor while within said housing, and an electrically actuated selecting valve arranged within said conveyor and operatively associated with said photo-electric cell.

14. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of suction orifices adapted to pick up and carry articles to be sorted, a photo-electric cell disposed to focus on an article carried by said conveyor, an electrically actuated selecting valve arranged within said conveyor and operatively associated with said photo-electric cell, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction orifices.

15. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of suction orifices adapted to pick up and carry articles to be sorted, a photo-electric cell disposed to focus on an article carried by said conveyor, and an electrically actuated selecting valve arranged within said conveyor and operatively associated with said photo-electric cell.

16. In a sorting machine, the combination of a conveyor having a plurality of spaced suction orifices, means for driving said conveyor step by step, means for positioning the articles upon said conveyor comprising a finger actuated to successively strike the articles carried by the conveyor

while the conveyor is at rest, a selecting valve operatively associated with said suction orifices, and a color-sensitive element operatively associated with said conveyor so that the articles carried thereby are successively brought into operative relation thereto, said selecting valve being operatively associated with said color sensitive element.

17. In a sorting machine, the combination of a drum-like conveyor having an annular series of uniformly spaced suction tips projecting slightly above the surface thereof, a feed hopper disposed so that a portion of the rim of the conveyor sweeps upwardly through the mass of objects in the hopper, means for positioning the articles to be sorted on said suction tips as the conveyor revolves, a color-sensitive element operatively associated with said conveyor so that the articles to be sorted are successively brought into operative relation thereto as the conveyor revolves, and means operatively associated with said color-sensitive element for releasing selected articles from said conveyor on the down sweep side thereof, the suction being maintained on the articles carried by the suction tips until the articles are discharged from the conveyor.

18. In a sorting machine, the combination of a drum-like conveyor having an annular series of suction orifices, a color-sensitive element operatively associated with said conveyor so that the articles to be sorted are successively brought into operative relation thereto as the conveyor revolves, and means operatively associated with said color-sensitive element and including a suction valve coacting with said suction orifices for releasing selected articles from said conveyor.

19. In a sorting machine, the combination of a rotatable conveyor having an annular series of suction orifices, a feed hopper disposed so that a portion of the rim sweeps upwardly through the mass of objects in the hopper, means for positioning the articles to be sorted on said conveyor, a color-sensitive element operatively associated with said conveyor so that the articles to be sorted are successively brought into operative relation thereto as the conveyor revolves, and means operatively associated with said color-sensitive element for releasing selected articles from said conveyor on the down sweep side thereof, the suction being maintained on the articles carried by the conveyor until they are discharged from the conveyor.

20. In a sorting machine, the combination of a rotatable conveyor having a peripherally disposed series of suction orifices, a color-sensitive element operatively associated with said conveyor so that the articles to be sorted are successively brought into operative relation thereto as the conveyor revolves, and means operatively associated with said color-sensitive element for releasing selected articles from said conveyor, said means including a valve operatively associated with said orifices, including an electro-magnet arranged within said conveyor.

21. In a sorting machine, the combination of a conveyor having a series of suction orifices, means for driving said conveyor, means for positioning the articles upon said conveyor, a selecting valve operatively associated with said suction orifices for controlling the suction thereof, and a color-sensitive element operatively associated with said conveyor so that the articles carried thereby are successively brought into operative relation thereto, said selecting valve being operatively associated with said color sensitive element.

22. In a sorting machine, the combination of a conveyor having a series of suction orifices, a color-sensitive element operatively associated with said conveyor so that the articles to be sorted are successively brought into operative relation thereto, and means operatively associated with said color sensitive element for releasing selected articles from said conveyor, said means including a valve operatively associated with said orifices, including an electro-magnet arranged within said conveyor.

23. In a sorting machine, the combination of a rotatable drum-like conveyor having an annular series of suction tips projecting slightly above the surface thereof, said suction tips being notched, a feed hopper disposed so that a portion of the conveyor sweeps therethrough, means for positioning the articles carried by said conveyor disposed at the rear of the hopper, a selecting valve arranged within said conveyor so that the suction tips are successively brought into operative relation thereto as the conveyor revolves, means for actuating said valve, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips.

24. In a sorting machine, the combination of a rotatable drum-like conveyor having an annular series of suction tips projecting slightly above the surface thereof, said suction tips being notched, a selecting valve arranged within said conveyor so that the suction tips are successively brought into operative relation thereto as the conveyor revolves, means for actuating said valve, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips.

25. In a sorting machine, the combination of a rotatable drum-like conveyor having an annular series of suction tips projecting slightly above the surface of the rim, said suction tips being notched, a feed hopper disposed so that a portion of the rim sweeps therethrough, means for positioning the articles carried by said conveyor disposed at the rear of the hopper, a selecting valve arranged within said conveyor so that the suction tips are successively brought into operative relation thereto as the conveyor revolves, and means for actuating said valve.

26. In a sorting machine, the combination of a rotatable drum-like conveyor having an annular series of suction tips projecting slightly above the surface thereof, said suction tips being notched, a selecting valve arranged within said conveyor so that the suction tips are successively brought into operative relation thereto as the conveyor revolves, and selecting means for actuating said valve.

27. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of uniformly spaced suction orifices, means for driving said suction head, a selecting valve disposed within said head and arranged so that the suction tips are successively brought into operative relation thereto, and a discharge valve arranged within said conveyor at the rear of said selecting valve to successively close said suction tips.

28. A sorting machine comprising a rotatable conveyor having an annular series of suction orifices, a feed hopper disposed so that a portion of the conveyor sweeps therethrough, means for driving said conveyor step by step, a positioning means actuated in synchronism with said conveyor to radially strike the articles supported by

the conveyor while the conveyor is at rest, and means at the rear of said positioning means for releasing selected articles from said conveyor including a color-sensitive element positioned so that it is focused upon an article carried by the conveyor while the conveyor is at rest.

29. A sorting machine comprising a rotatable conveyor having an annular series of suction orifices, a feed hopper disposed so that a portion of the conveyor sweeps therethrough, means for driving said conveyor step by step, and a positioning means actuated in synchronism with said conveyor to radially strike the articles supported by the conveyor while the conveyor is at rest.

30. In a sorting machine, the combination of a rotatably mounted suction head having an annular series of suction orifices provided with notched tips, means adapted when actuated to cut off the suction of one of said orifices, and selecting means for actuating said last named means.

31. In a sorting machine, the combination of a feed hopper, a conveyor disposed to sweep upwardly through the mass of objects within said hopper and having a series of suction orifices, resilient wiping means for positioning the articles to be sorted on said conveyor disposed at the rear of the hopper so that the articles picked up from the hopper are brought into operative relation thereto, and means at the rear of said positioning means for releasing selected articles from the conveyor including a color sensitive element positioned so that the articles carried by the conveyor are successively brought into operative relation thereto.

32. A sorting machine comprising a rotatable conveyor having an annular series of suction orifices, means for driving said conveyor step by step, and a spring finger actuated in synchronism with said conveyor to radially strike the articles supported by the suction tips while the conveyor is at rest.

33. A sorting machine comprising a rotatable conveyor having an annular series of suction orifices, means for removing selected articles from said conveyor comprising a color sensitive element disposed so that the articles carried by the conveyor are successively presented thereto, a normally open valve controlled by said element to close when a discolored article is presented, and a valve disposed at the rear of said selecting means and normally acting to successively close the suction orifices of said conveyor thereby discharging the articles carried past the said selecting means.

34. A sorting machine comprising a rotatable conveyor having an annular series of suction orifices, a hopper disposed at one side of said conveyor so that the conveyor sweeps upwardly through the mass of objects within the hopper, a lamp housing disposed at the opposite side of said conveyor so that the conveyor sweeps downwardly therethrough, lamps within said housing, electrically controlled means for removing selected articles from said conveyor comprising a light sensitive element arranged so as to focus upon the articles as they are successively carried into said lamp housing, and a valve disposed to successively close said orifices after they have left said lamp housing to effect the removal of the articles not rejected by the light sensitive means, the suction being maintained on the articles carried by the conveyor until they are discharged from the conveyor.

35. A sorting machine comprising a rotatable conveyor having an annular series of suction orifices, a hopper disposed at one side of said conveyor so that the conveyor sweeps upwardly therethrough, a lamp housing disposed at the opposite side of said conveyor so that the conveyor sweeps downwardly therethrough, lamps within said housing, electrically controlled means for removing selected off-color articles from said conveyor comprising a light sensitive element arranged so as to focus upon the articles as they are successively carried into the housing, a normally open suction orifice valve controlled by said light sensitive element to close the suction orifice carrying an off-color article to discharge the same, and normally closed suction orifice valve means for removing the remaining articles from said conveyor carried beyond said housing.

36. In a sorting machine, the combination of a conveyor having a series of suction orifices, a color sensitive element operatively associated with said conveyor so that the articles to be sorted are successively brought into operative relation thereto by the conveyor, normally open valve means operatively associated with said suction orifices and controlled by said sensitive element for discharging selected off-color articles from said conveyor by closing said valve, and a normally closed suction orifice valve for discharging the remaining articles from the conveyor.

37. In a sorting machine, the combination of a hopper adapted to receive the articles to be sorted such as beans en masse and having a side opening, a conveyor disposed so as to sweep upwardly through said side opening and through the mass within the hopper, resilient wiping means for positioning the articles picked up by said conveyor, said means being so disposed that the articles dislodged thereby fall back into the hopper.

38. In a sorting machine, the combination with a feed hopper, of a rotatable drum-like conveyor disposed so that a portion of its periphery sweeps upwardly through said feed hopper and having a peripherally disposed series of suction orifices, a cylindrical lamp housing disposed so that a portion of the periphery of the conveyor sweeps downwardly therethrough as the conveyor rotates, said housing having a discharge at the bottom thereof, lamps disposed radially within said housing on opposite sides of the vertical plane of said conveyor, a photo-electric cell disposed to focus successively on the articles carried by the conveyor, and means controlled by said photo-electric cell for removing selected articles from said conveyor within said lamp housing, the suction being maintained on the articles carried by the conveyor until they are discharged therefrom.

39. In a sorting machine, the combination with a rotatable drum-like conveyor having an annular series of suction orifices, a cylindrical lamp housing disposed so that a portion of the conveyor sweeps downwardly therethrough as the conveyor rotates, said housing having a discharge at the bottom thereof, lamps disposed radially within said housing on opposite sides of the vertical plane of said conveyor, a photo-electric cell disposed to focus on the periphery of said conveyor within said lamp housing and centrally relative to said lamps to focus successively on the articles carried by the conveyor, and means controlled by said photo-electric cell for removing selected articles from said conveyor within said lamp housing, the suction being maintained on the

articles carried by the conveyor until they are discharged therefrom.

40. A sorting machine having in combination a hollow drum-like conveyor provided with a spaced series of peripheral suction orifices and a facing rim of uniform neutral color, such as white, and of hard-surfaced material, such as pyroxylin, which permits its ready cleaning and provides a smooth durable surface, said suction orifices having notches to prevent their becoming air bound when the suction is released and thereby insuring the discharge of the conveyed article from the orifice.

41. A sorting machine having in combination a hollow drum-like conveyor provided with a spaced series of peripheral suction orifices and a facing rim of uniform neutral color and of

hard-surfaced material which permits its ready cleaning and provides a smooth durable surface, said suction orifices having suction tips which project slightly above the said rim, and light sensitive means coacting with said rim to close each suction orifice carrying an article varying in color from that of said rim.

42. A sorting machine having in combination a hollow drum-like conveyor provided with a spaced series of peripheral suction orifices and a facing rim, said suction orifices having suction tips which project slightly above the said rim, and light sensitive means coacting with said rim to close each suction orifice carrying an article varying in color from that of said rim.

MARTIN C. HANSON.