Aug. 28, 1928. 1,682,276

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BAG SEPARATING APPARATUS

Filed June 12, 1926 4 Sheets-Sheet 1

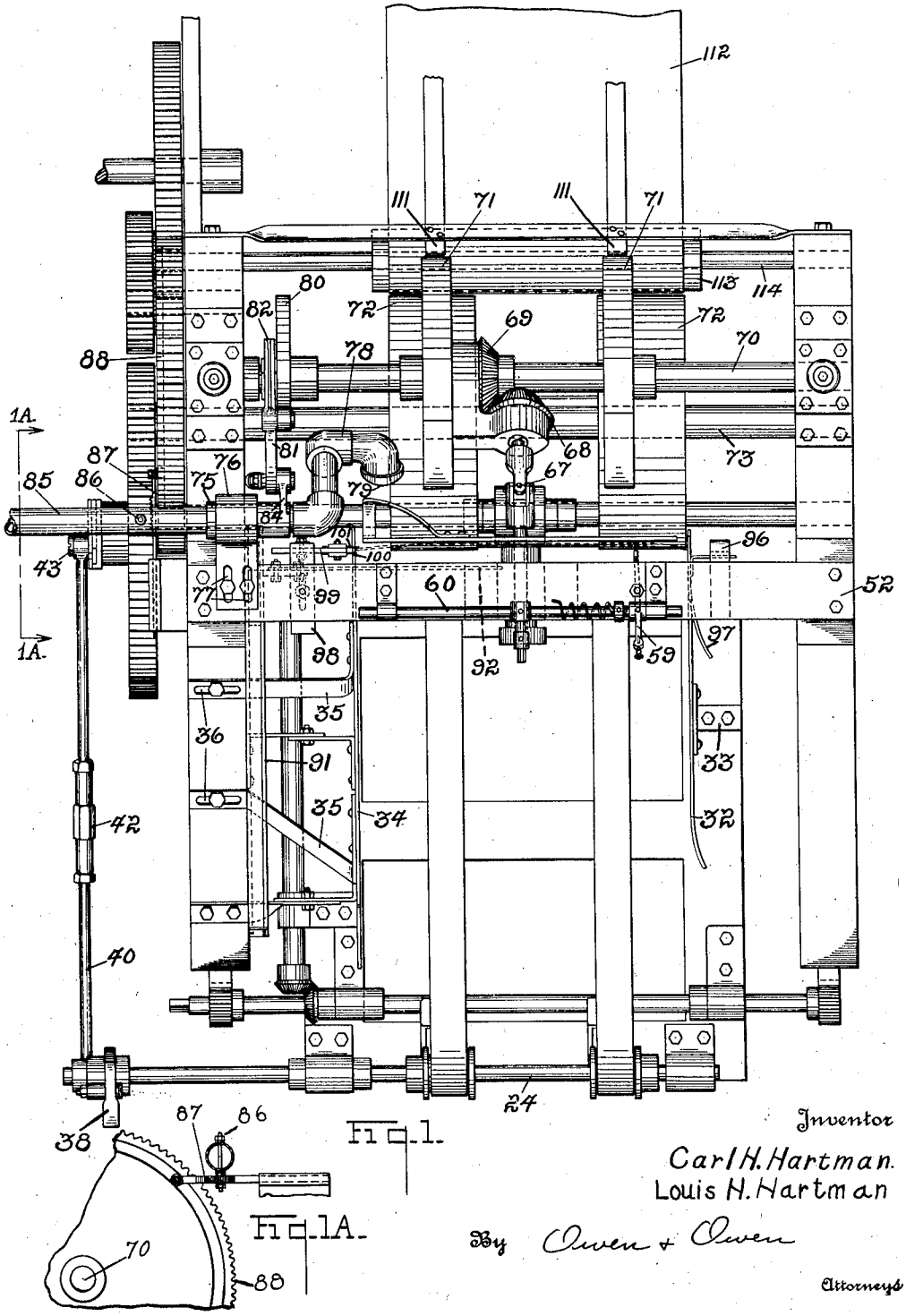


Fig. 1.

Fig. 1A.

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Filed June 12, 1926 4 Sheets-Sheet 2

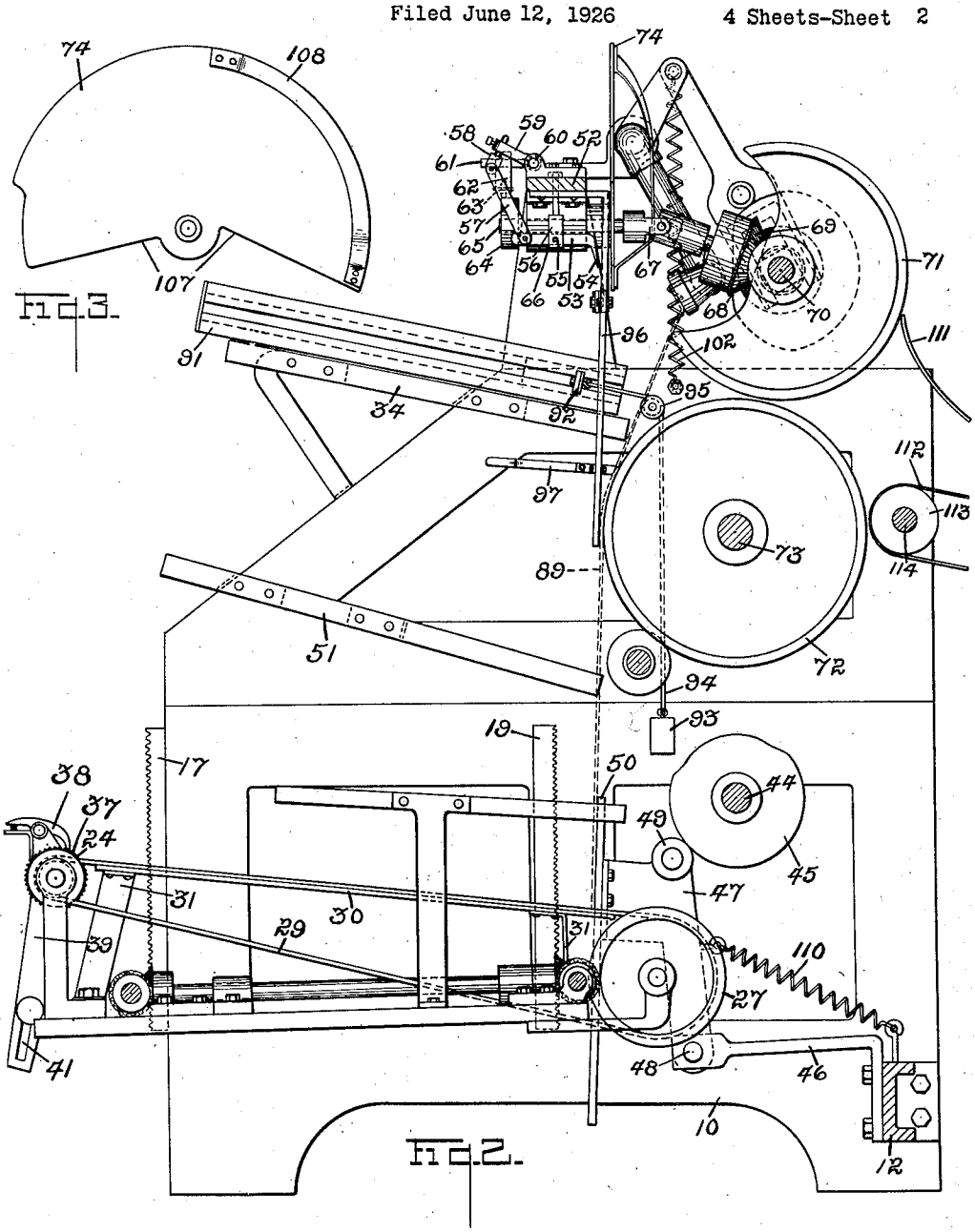


FIG. 3.

FIG. 2.

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Filed June 12, 1926 4 Sheets-Sheet 3

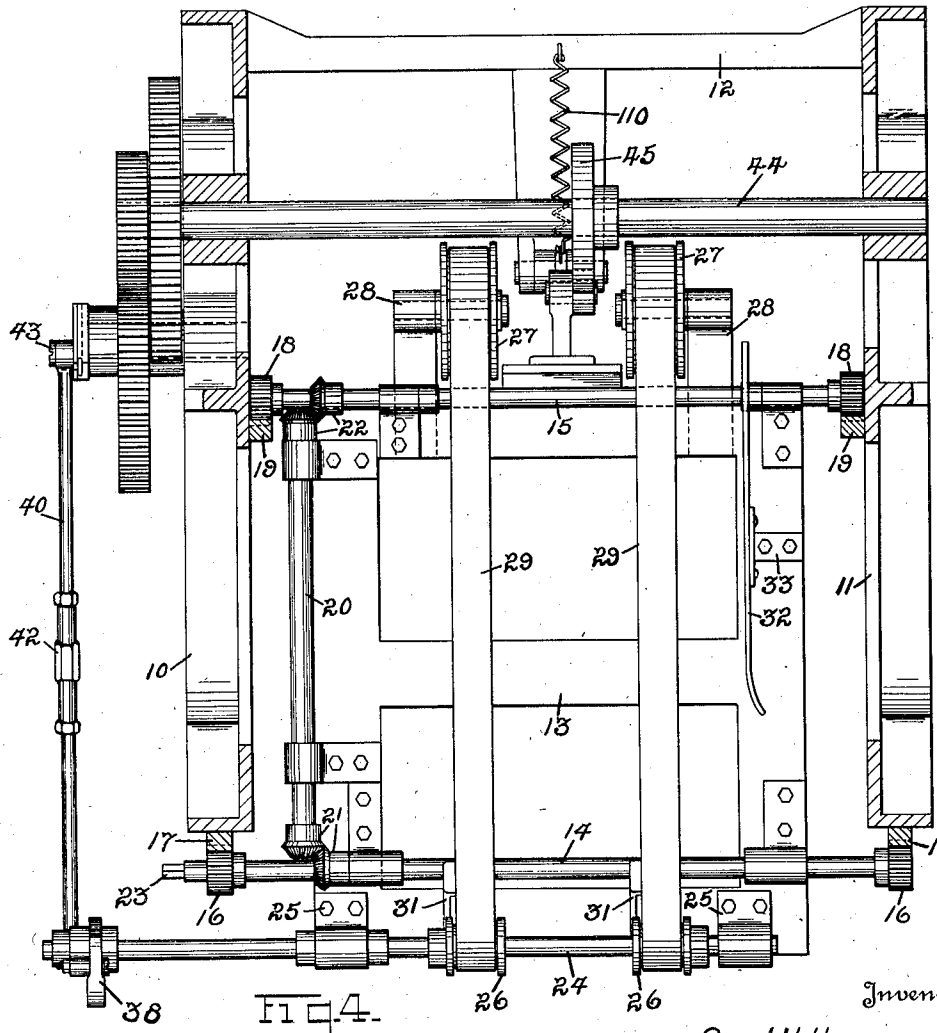


FIG. 4.

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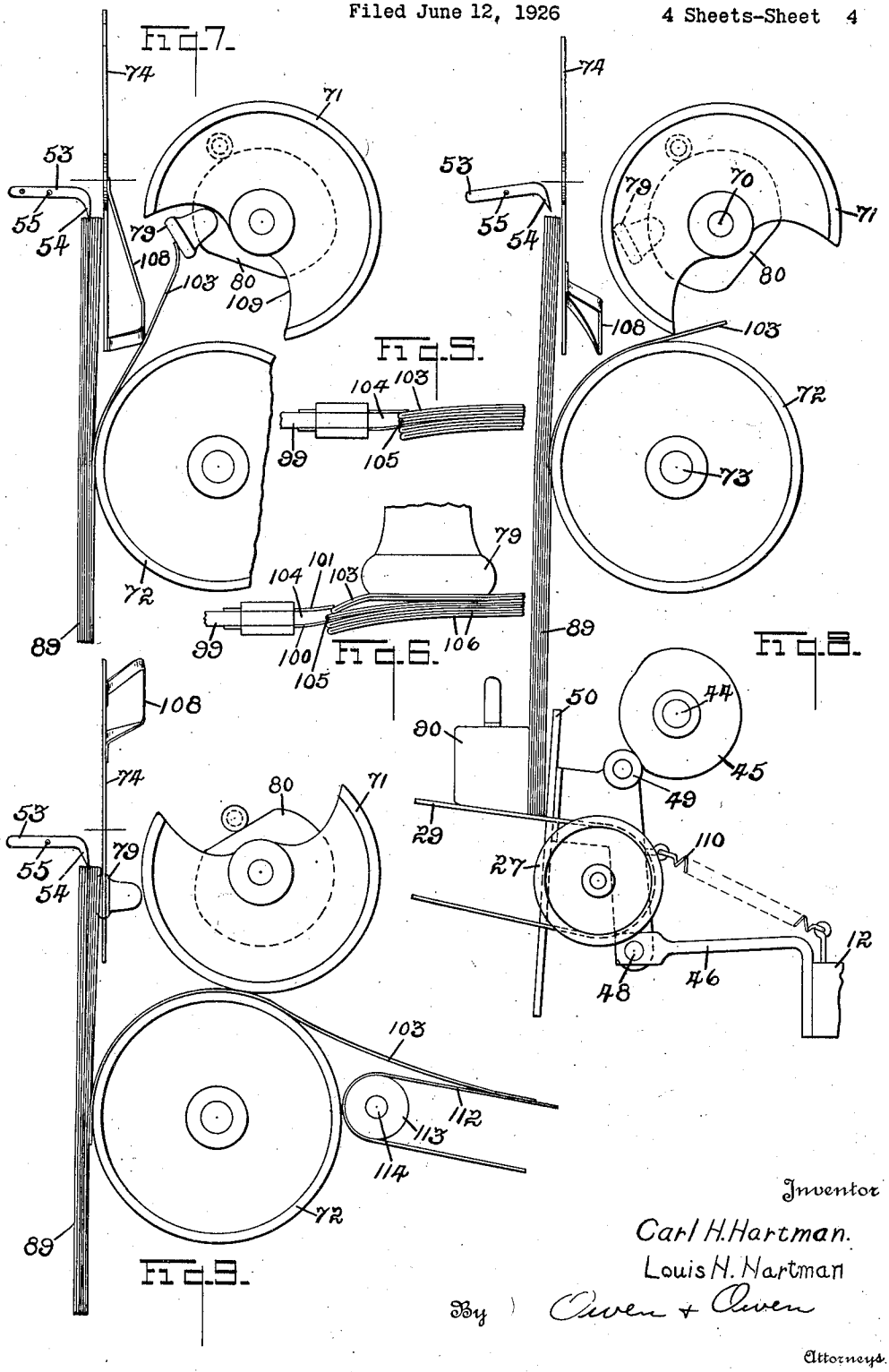
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Filed June 12, 1926 4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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BAG-SEPARATING APPARATUS.

Application filed June 12, 1926. Serial No. 115,483.

This invention relates to apparatus for separating bags or similar articles from a bundle thereof and feeding them one at a time to apparatus for the treatment. The nature and details of this invention will appear as the description proceeds.

In the accompanying drawings forming a part of this specification, Figure 1 is a plan view of apparatus embodying our invention; Fig. 2 is a partial longitudinal vertical section of the same; Fig. 3 is a detail of a separator disc; Fig. 4 is a partial horizontal section showing the carrier for a bundle of bags; Figs. 5 to 9 are somewhat diagrammatic views showing the operation of portions of the device in separating a bag from a bundle thereof; Fig. 1ª is a detail of the vacuum tube.

In the form of invention shown, the working parts are supported by side frames 10 and 11. The side frames are connected by shafts and suitable cross pieces, one of these cross pieces 12 being shown in connection at the lower right corner of Fig. 2.

A bundle carrier frame 13 is provided with a front supporting shaft 14 and a rear supporting shaft 15. Spur gears 16 are attached to the ends of shaft 14 in position to mesh with upright racks 17 on the side frames. Similar gears 18 on the ends of shaft 15 are in position to mesh with racks 19 on the side frames. A connecting shaft 20 is connected by bevel gears 21 to shaft 14 and by bevel gears 22 to shaft 15. In this way shafts 14 and 15 are compelled to rotate in unison. In the construction shown, shaft 14 is provided with a squared end 23 to which a crank may be attached. It will be readily seen that the frame may be raised or lowered by turning shaft 14, without changing the angle of the carrier.

A carrier shaft 24 is mounted in suitable brackets 25 attached to the front end of frame 13 and carries pulleys 26. Pulleys 27 are mounted on brackets 28 attached to the rear end of frame 13. Belts 29, passing over pulleys 26 and 27, act as conveyors for bundles of bags. Supports 30 are provided beneath the belts. In the construction shown, supports 30 are carried by brackets 31 mounted on frame 13.

Suitable guides are provided for the bundles of bags. In the construction shown there is a guide 32 for the right side of the bundle, as viewed in Figs. 1 and 4, this guide being supported by a bracket 33 attached to frame 13. A guide 34 is provided for the upper left side of the bundles, as viewed in Fig. 1, guide 34 being mounted on brackets 35 which are attached to side frame 10 adjustably, as by means of bolts through slots 36.

A ratchet wheel 37 is provided on the end of shaft 24. A pawl 38 is mounted on a lever 39 in position to cooperate with ratchet wheel 37. A link 40 is connected to lever 39 adjustably, as by means of a suitable attachment securing it in adjusted position in slot 41. A turn buckle 42 is provided in link 40 so that its length may be adjusted. The other end of link 40 is connected to a wrist pin 43 attached to a suitable crank driven in any desired manner.

Behind and above the rear end of the bundle carrier there is a cross shaft 44 carrying a cam 45. A bracket 46 mounted upon cross piece 12 has a stop lever 47 pivoted thereto at 48. Lever 47 carries a roller 49 in position to contact cam 44. A stop plate 50 is attached to lever 47 in position to contact the rear side of a bundle of bags, as will be more fully explained later.

Other guides may be provided for the bundle of bags on either side of its path as desired. One additional guide 51 is indicated in Fig. 2 as being mounted upon side frame 10 beneath guide 34.

Frames 10 and 12 are shown connected at their upper sides by a cross piece 52. A stop lever 53 having a finger 54 is pivoted at 55 on a bracket 56, depending from cross piece 52. Lever 53 is connected by a link 57 to a block 58, which is adjustably attached to a rock arm 59 on a rock shaft 60. Rock shaft 60 has another arm 61 carrying a block 62 to which is attached a roller 63 in position to contact a cam 64 on a shaft 65 mounted in bracket bearing 66. Shaft 65 is provided with a universal joint 67 and carries, on its end opposite cam 64, a bevel gear 68 meshing with bevel gear 69 on a shaft 70. Shaft 70 also carries notched discs 71. Beneath shaft 71 there are supporting discs 72 mounted on a shaft 73. A separator disc 74 is mounted upon shaft 65 adjacent the rear of cross piece 52.

A vacuum pipe 75 is oscillatably mounted in a bearing 76 on the upper side of frame 10. Bearing 76 is adjustably mounted on the frame, as by means of bolts passing through slots 77. The vacuum pipe has an offset end 78 carrying a suction nozzle 79. There is a

cam 80 on shaft 70 adapted to actuate a slide 81. Slide 81 has one end 82 forked and embracing shaft 80, and the other end pivoted at 83 to an arm 84 attached to the vacuum pipe.

A pipe 85 leads to any desired means for evacuating air, and has its end entering pipe 75 in oscillatable relation thereto. Pipe 85 is provided with a valve 86, which may be operated by a rack 87 actuated by a cam, not shown, in the face of a gear 88 on the end of shaft 70. Preferably, valve 86 is constructed to open communication between pipe 85 and nozzle 79 just as the nozzle completes its forward movement, and to close such communication and break the vacuum in pipe 75 just as the nozzle completes its rearward movement.

When a bundle 89 of bags is mounted on the carrier, the lower end is preferably pressed forward by a block 90, shown in Fig. 8, and which rests loosely upon belts 29 and holds the bottoms of the bags together. Upon frame 10, above guide 34, there is mounted a guideway 91 for a slidable pusher 92 for the top of the bundle of bags. A weight 93 is attached to the end of a cord 94 which passes over a pulley 95 to pusher 92, and normally urges the pusher against the bags. From the right end of cross piece 52, as seen in Fig. 1, there depends a bracket 96 to which there is attached a spring guide plate 97 adapted to press the upper end of a bundle of bags against guide 34. From the other end of cross piece 52 there depends a somewhat similar, but shorter, bracket 98 to which there is attached a finger holder 99. Holder 99 carries a short finger 100 and a long finger 101.

The operation of the apparatus is substantially as follows. A bundle of bags is placed on end upon belts 29 and moves forward until its bottom end rests against stop plate 50. The top end of the bundle is pressed forward by pusher 92, but is normally stopped by fingers 100 and 101 at the side and finger 54 at the top. If the bags should sag forward near the middle of the bundle, they will encounter discs 72, but in ordinary operation they are spaced slightly from discs 72 until a bag is separated from the bundle.

When a bag is to be separated from the bundle, nozzle 79 is permitted by cam 80 to swing downward by gravity. Spring 102 connected to arm 84 continues to swing the nozzle forward until it contacts the rear bag 103 of the bundle of bags. The edge of bag 103 normally rests in the space 104 between fingers 100 and 101, as shown in Fig. 5. There is sufficient space between fingers 100 and 101 so that a second bag 105 may rest within this space also, but frequently there will be only the one bag 103 having its edge in this space. The further forward movement of bag 103 is stopped by the comparatively long and slender finger 101, while the shorter, but stiffer, finger 100 prevents the succeeding bags 106 from pressing unduly against the rear bags.

At the time when suction nozzle 79 starts to swing backward, under the influence of cam 80, the cut-away side 107 of separator disc 74 is downward so that the top of bag 103 is first drawn out from between fingers 101 and 100, as shown in Fig. 6, and is then bent forward to the position shown in Fig. 7. Immediately after the top of bag 103 is moved back of disc 74, the rotation of the disc carries it downward so as to place it in front of the top of bag 105. A spring plate 108 is attached to the rear side of disc 74 and aids in pressing the top end of bag 103 over between discs 71 and 72. Discs 71 are rotated in timed relation to cam 80 and disc 74, so that the top end of bag 103 is swung forward into notches 109 in discs 71.

A spring 110 holds roller 49 against cam 50. Cam 50 is so formed and operated that it allows roller 49 and stop plate 50 to move slightly rearward just at the time that the top end of bag 103 is gripped between discs 71 and 72, as shown in Fig. 8. This relieves pressure on the bottom end of the bag and allows it to be pulled upward and away from the bundle, as shown in Fig. 9.

Normally the top end of the bag 103 will pass to the rear horizontally from between discs 71 and 72; but deflectors 111 are provided to prevent the bag from following the surfaces of discs 71, if it should adhere slightly thereto. A belt conveyor 112, having its forward end carried by a roller 113, supported by shaft 114, is in position to receive the bag and advance it to any desired apparatus. Other means may be used, if desired, for carrying away the bag, the purpose of this apparatus being to separate bags one at a time from a bundle thereof and feed them forward in desired timed relation to any suitable apparatus for further treatment.

Finger 54 is not absolutely necessary for the correct operation of the apparatus with fairly stiff bags, but is sometimes desirable. It will be understood that this finger is normally thrust downward by cam 64 raising roller 63. Cam 64 is on the same shaft with disc 74, and operates in timed relation with nozzle 79 and discs 71. Just at the time that the nozzle starts to swing backward so as to separate the top end of bag 103 from the bundle, cam 64 allows roller 65 to drop and raise finger 54, so as to release the top end of the bundle. As will be readily seen from Fig. 3, discs 74 is cut away less than 180°, so that it is still in front of the top end of bag 103 at the corner adjacent finger 54 until after the corner of bag 103 adjacent finger 102 is pulled backward by nozzle 79 beyond the disc. This insures the separation of bag 103 from the bundle of bags in front of it, and lessens the pressure of the bags upon fingers 100 and

101. As the separator disc continues to rotate, it not only aids in pressing the top end of bag 103 over between discs 71 and 72, but it also provides a stop for the top of the second bag 105.

The relation of fingers 100 and 101 and their combined operation is a very material factor in the successful operation of the device. It is quite essential that there shall not be a too stiff top for the corner of the front bag, or they injure the bag when it is drawn away by the suction nozzle. Furthermore, if the full weight of the bundle of bags is pressing against the rear bag when it is drawn away, the second bag is apt to follow along past the stop with the first bag. When the weight of the following bags is taken off, or greatly relieved, by a second finger, the first bag may be held in place by a comparatively light finger until it is positively moved by the suction means. In the operation of the device shown, finger 100 is so constructed that it will almost, but not quite, stop the advance of the bags. In this way there is very little pressure against the first bag, and it may be securely held by a light finger 101, which will yield readily to the movement of the bag when it is pulled by the suction nozzle, and at the same time will snap back very promptly into position and prevent the further movement of the second bag until that in turn is pulled by the suction nozzle.

It will be understood that suitable gears are provided for operating shafts 70, 73 and 44 in timed relation. The crank actuating link 40 may be rotated in timed with relation with shafts 70, 73 and 44, or it may be driven independently. In either case, the operation of the ratchet advancing means is so adjusted that the rearward movement of belts 29 will be slightly more rapid than the feeding away of the bags on the rear side of the bundle. By this means the bags are held firmly at all times against plate 50, except when the plate is purposely released temporarily for the removal of a bag.

Various changes may be made in the mechanical construction and in the arrangement and proportions of parts within the terms of the appended claims.

What we claim is:

1. In apparatus of the character described, a conveyor belt having approximately horizontal run, guides adapted to support a bundle of bags standing on end on said belt, a flat support over which the belt runs, means to separate one of the upper corners of each successive bag, one at a time, from the other bags of the bundle, a member movable transversely from said corner across the path of the bags between the separated bag and the bundle, and means to feed forward at regular intervals the separated bags.

2. In apparatus of the character described, a conveyor adapted to carry a bundle of bags standing upright thereon, an oscillatable finger adapted to contact the tops of the bags, means to separate one corner of the top of one bag from the bundle, means to seize the separated top and move the bag away from the bundle, and means oscillating the finger to release the bag after its corner is moved by the first said means and before it is seized by the second said means.

3. In apparatus of the character described, means to present a bundle of bags to a separating device, two yieldable fingers substantially perpendicular to the direction of movement of the bags adapted to stop the movement of the bags by contacting the bundle, the first encountered of said fingers acting to nearly stop the movement of the bags so that but little pressure is brought to bear upon the last encountered finger, and means for pulling a single bag at a time past the last said finger.

4. In apparatus of the character described, means for conveying a bundle of bags in substantially upright position, two fingers adjacent the path of the top of the bags and the ends of the fingers extending into the path of said bags, the first encountered of said fingers being shorter and stiffer than the second encountered of said fingers, and means for drawing the bags, one at a time, past the second said finger.

5. In apparatus of the character described, means for conveying a bundle of bags in substantially upright position, two fingers adjacent the path of the top of the bags and the ends of the fingers extending into the path of said bags, there being a space between the ends of said fingers adapted to receive not more than three of said bags, and means for drawing the bags, one at a time, past the second said finger.

6. In apparatus of the character described, means to advance a bundle of bags towards a separating device, and a separating device for separating the bags and moving them away from the bundle, one at a time, said device comprising an oscillatable vacuum nozzle adapted to pull one corner of a bag away from the bundle, and a notched disc rotatably mounted in the plane of the bundle, the notch of said disc being less than 180°, and means for rotating the disc in such timed relation with the movement of the nozzle that one corner of the disc next the notch contacts the face of the bag contacted by the vacuum nozzle until the other corner of said disc enters between said bag and the next adjacent bag in the bundle, and a notched disc and mating disc mounted on axes transverse the direction of travel of the bundle and adapted to receive and feed forward a bag separated by the nozzle and first said disc.

7. In apparatus of the character described, means to advance a bundle of bags towards a separating device, and a separating device comprising a stop finger projecting into the

path of the bundle at the side of and near one corner of the bags, a second stop finger at the end of the bag adjacent the other corner of the same end where the first said stop finger is located, vacuum means to pull the corner of a bag from the bundle past the first said stop finger, a notched disc having an axis beyond that end of the bags where the fingers are located and parallel with the direction of travel of the bundle and adapted to enter between the corner of a bag separated by the vacuum means and the bundle and move that bag past the second said stop finger to separate it from the bundle.

8. In apparatus of the character described, means to advance a bundle of bags towards a separating device, and a separating device comprising a stop finger projecting into the path of the bundle at the side of and near one corner of the bags, a second stop finger at the end of the bag adjacent the other corner of the same end where the first said stop finger is located, vacuum means to pull the corner of a bag from the bundle past the first said stop finger, means for moving the second said stop finger in timed relation with said vacuum means to release the bag after its separation has been begun by the said vacuum means.

9. In apparatus of the character described, means to present a bundle of bags to a separating device, and a separating device comprising two stop fingers projecting slightly into the path of one side of the bundle in position to be encountered by the bags successively, the first of said stop fingers to be encountered being shorter than the other, a finger projecting perpendicularly into the path of the end of the bundle, means to pull one corner of a bag from the bundle past the first said stop fingers, and means oscillating the last said finger in timed relation with said pulling means.

10. In apparatus of the character described, means for carrying a bundle of bags upright on one end thereof and presenting them to a separating device, and a separating device comprising a stop finger at one side of the path of the bundle near the top thereof and a stop finger projecting into the path of the top end of the bundle near the opposite side thereof, and separating means adapted to separate a bag from the bundle first past one of said stop fingers and then past the other.

11. In apparatus of the character described, means for carrying a bundle of bags upright on one end thereof and presenting them to a separating device, and a separating device comprising a stop finger at one side of the path of the bundle near the top thereof and a stop finger projecting into the path of the top end of the bundle near the opposite side thereof, vacuum means for pulling one upper corner of a bag from the bundle past the first said finger, and means for thereafter separating the same bag from the bundle past the second said finger.

In testimony whereof, we have hereunto signed our names to this specification.

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