Nov. 4, 1958 J. M. MARGULIS ET AL 2,858,960

HOPPER FOR HOOKS

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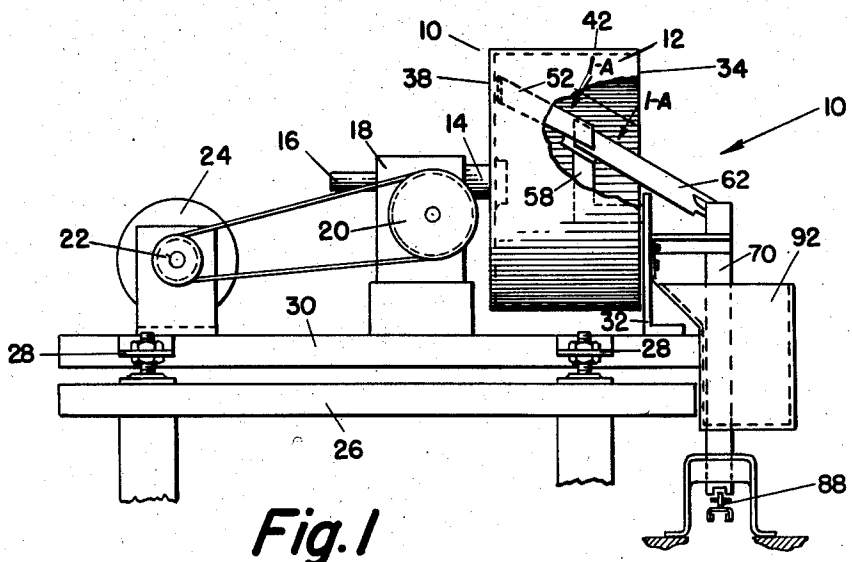


Fig. 1

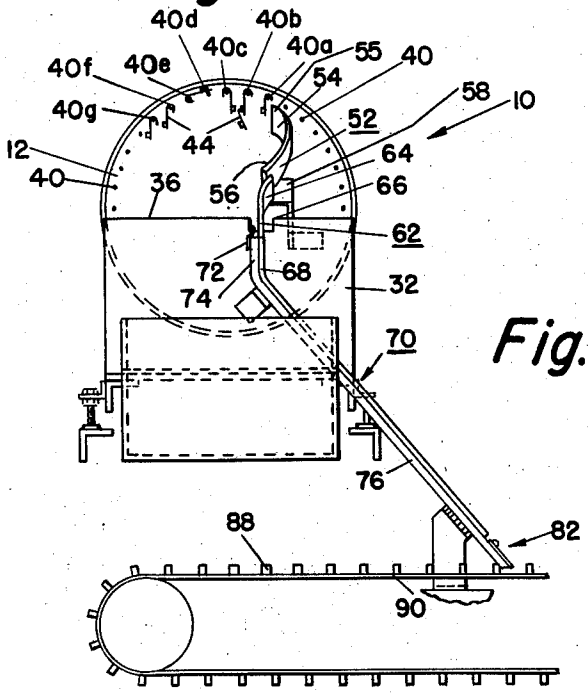


Fig. 2

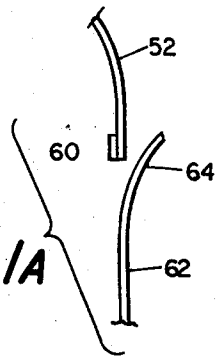


Fig. 1A

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HOPPER FOR HOOKS

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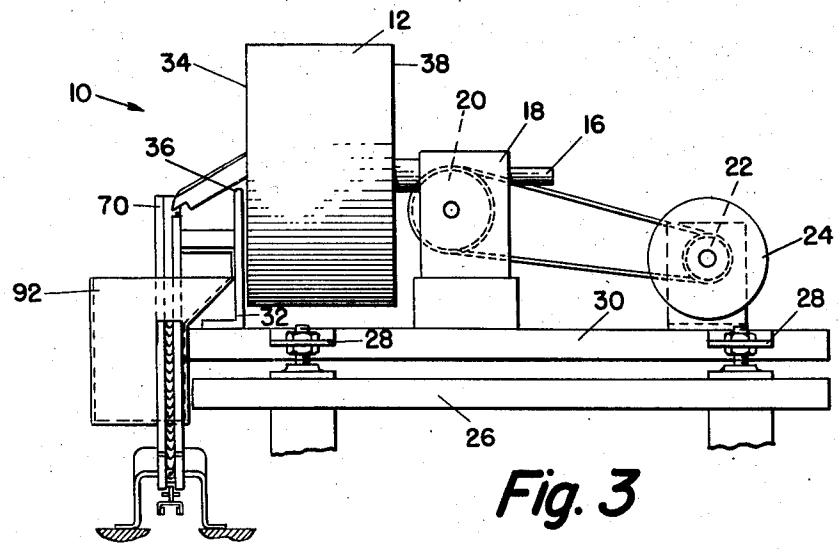


Fig. 3

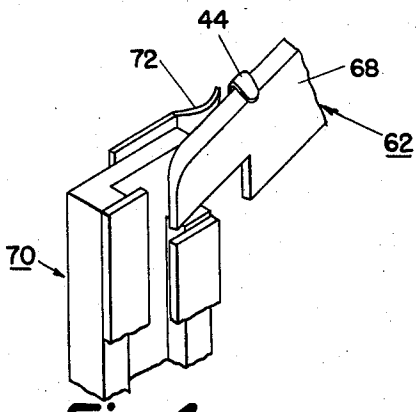


Fig. 4

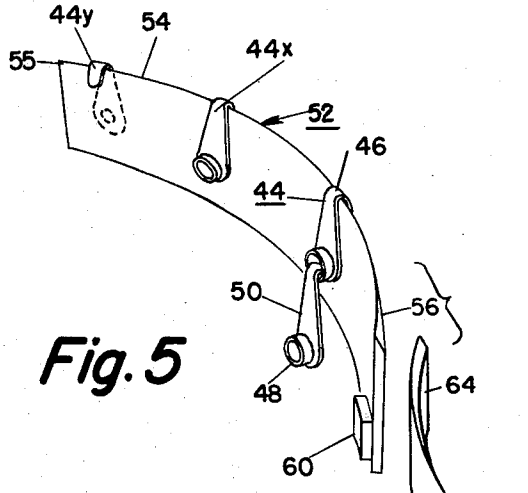


Fig. 5

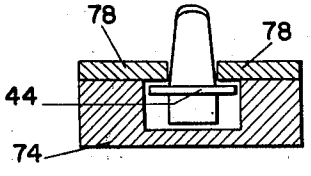


Fig. 6

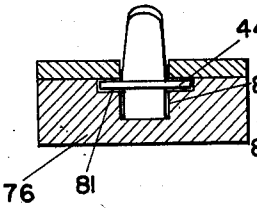


Fig. 7

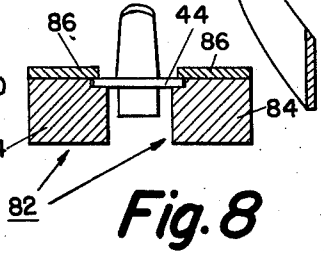


Fig. 8

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HOPPER FOR HOOKS

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3 Claims. (Cl. 221—160)

The present invention relates to a hopper for discharging hooks and the like, and more particularly to a high speed hopper mechanism for automatically discharging hooks in a controlled fashion.

In the manufacture of adhesive cloth picture hangers, and a variety of other articles comprising hooks, it is necessary to insert such hooks onto the articles in a predetermined position, in order that the hook may be correctly fastened to the finished article. Frequently, however, such hooks are of relatively small size, and cannot be rapidly and accurately mounted by hand into position.

Modern high-speed assembly lines require not only the accurate mounting of the component elements of the article being manufactured, but also the rapid mounting of such elements. For example, the manufacture of adhesive cloth picture hangers is conducted on assembly lines wherein each line produces at least 150 to 200 picture hangers per minute. The accurate positioning of hooks and related small objects at these high speeds for protracted periods of time has presented a serious problem, which has not heretofore been adequately solved.

The present invention has as an object the provision of a hopper capable of rapidly delivering hooks and related objects to a predetermined point in a predetermined position.

This invention has as a further object the provision of a high speed delivery mechanism in which hooks and related objects are delivered in properly aligned disposition, and in which hooks not in such aligned disposition are discarded.

For the purpose of illustrating the invention there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

Referring to the drawings wherein like reference characters refer to like parts:

Figure 1 is a side elevational view, partly broken away and partly in section of the hopper mechanism of the present invention.

Figure 1A is a view taken on line 1A—1A of Figure 1.

Figure 2 is an end elevation of the hopper mechanism of the present invention.

Figure 3 is a side elevational view of the hopper mechanism of the present invention viewed from the side opposite to Figure 1.

Figure 4 is a fragmentary perspective view of the bottom portion of the receiving blade and upper portion of the chute.

Figure 5 is a perspective view of the pickup blade with hooks carried thereon.

Figure 6 is a cross-section through the upper portion of the chute, showing a hook in place.

Figure 7 is a cross-section through the lower portion of the chute, showing a hook in place.

Figure 8 is a cross-section through the hook positioner, showing a hook in place.

Referring to the drawings and initially to Figure 1, 10 designates the hopper mechanism of the present invention, which includes a rotating drum 12 having a drum hub 14 driven by drive shaft 16. The rotation of drive shaft 16 is regulated by gear reducer assembly 18. Gear reducer assembly 18 is driven by pulley 20, which in turn is driven by motor pulley 22 of electric motor 24.

Hopper mechanism 10 including each of the aforesaid elements is mounted upon table 26, and is carried by means of leveling clamps 28 on bed member 30. Leveling clamps 28 may be adjusted to assure that bed member 30 is horizontally disposed, notwithstanding slight variations in the table 26, or in the supporting floor upon which the table 26 is carried.

A retaining plate 32 is fixedly secured to bed member 30 and is juxtaposed closely proximate the lower half of drum 12. The clearance between the forward edge 34 of drum 12 and the juxtaposed face of retaining plate 32 is less than the space required for a hook to fall from drum 12, so that a large supply of hooks may be retained within drum 12, notwithstanding its rapid rotation. However, the level of hooks within drum 12 should not be above the uppermost edge 36 of retaining plate 32.

The rear wall 38 of drum 12 is provided with a plurality of pins 40 proximate its outer periphery but spaced radially inwardly from annular flange 42 of drum 12 in a circle concentric therewith. The circle of pins 40 is spaced at a sufficient distance from the inner face of flange 42 so that when hooks 44 are picked up by pins 40, such hooks 44 may be freely suspended on pins 40 during the rotation of drum 12 without interference by annular flange 42.

The hooks 44 that are hoppered in the accompanying drawings are shown in Figure 5. These hooks are especially suitable for manufacture of adhesive cloth picture hangers, and include a bight portion 46 and an annular flange portion 48 which is perpendicular to the main body portion 50 of the hook 44. It is, of course, to be understood that other forms of hooks may be hoppered by the hopper mechanism 10 of the present invention.

The rotation of drum 12 causes the hooks 44 to be suspended upon pins 40, as the pins 40 pass through the mass of hooks 44 which are retained in the bottom portion of drum 12 between rear wall 38, flange 42 and retaining plate 32. The hooks 44 may be picked up by pins 40 in the variety of possible positions shown in Figure 2 at pins 40*a*, 40*b*, 40*c*, 40*d*, 40*e*, 40*f* and 40*g*. The operation of the hopper mechanism of the present invention in relation to hooks picked up in each of the aforesaid positions will be more fully set forth below.

A pickup blade 52 of curved sheet metal is spaced at a small distance from rear wall 38 of drum 12. The upper portion 54 of pickup blade 52 includes an arc whose upper edge 55 passes very close to pins 40. The curvature of the arc formed by upper edge 55 in the portion of upper portion 54 of pickup blade 52 most proximate to pins 40 is substantially the curvature of a co-extensive arc of a circle concentric with the circle formed by pins 40. The distance between this portion of pickup blade 52 and pins 40 is such that hooks carried on individual pins 40, such as pins 40*a*, 40*b*, 40*c*, 40*f* and 40*g* will be cammed therefrom, and will slide downwardly on pickup blade 52 due to the force of gravity.

Pickup blade 52 is curved downwardly away from its uppermost arc-shaped contour in a direction generally normal to the plane of rear wall 38 of drum 12.

The bottom portion 56 of pickup blade 52 is supported by support 58 which is fixedly secured as by screws, rivets or the like to the inner face of retaining plate 32. Bottom portion 56 is provided with a deflector pillow 60 which projects outwardly as a rectangularly cross-sectioned block from the face of pickup blade 52 facing pins 40 (see Figure 5).

A receiving blade 62, of curved sheet metal having the same thickness as pickup blade 52, is fixedly secured to support 58. Pickup blade 52 and receiving blade 62 when viewed from the side appear as one continuous blade member (see Figure 1). Thus, the upper edge of receiving blade 62 when viewed from the side appears to constitute a continuation of the upper edge of pickup blade 52.

However, as will be apparent from the view shown in Figure 2, the upper portion 64 of receiving blade 62 is not continuous with the bottom portion 56 of pickup blade 52, but there is a gap between the blades 52 and 62, with the bottom portion 56 being apposed to upper portion 64 across a gap space. This gap is such that a hook such as hook 44*x* (see Figure 5) which is sliding down pickup blade 52 with its main body portion 50 juxtaposed to the face of pickup blade 52 carrying deflector pillow 60 will traverse such gap and be received on receiving blade 62 in identical disposition to which it traveled down pickup blade 52, namely with its annular flange portion 48 disposed toward the center of drum 12. However, a hook positioned such as hook 44*y* in Figure 5 with its annular flange portion 48 disposed away from the center of drum 12 by virtue of its center of gravity being to the right of a hook disposed such as hook 44*x* will not traverse the gap and therefore will not be received on receiving blade 62. Thus, the upper portion 64 of receiving blade 62 is diverted and spaced from the bottom portion 56 of pickup blade 52 a sufficient distance to discriminate between hooks positioned as hook 44*x* and hooks positioned as hook 44*y*, and in favor of the former. Hooks positioned such as hook 44*y* will fall downwardly into the reservoir of hooks retained in the bottom of rotating drum 12.

The exact spacing between upper portion 64, of receiving blade 62 and bottom portion 56 of pickup blade 52 cannot be optimally set forth for all types and sizes of hooks, but will vary depending upon the speed of rotation of drum 12, the profile of the hooks, the surface finishing of the hooks and the weight of the hooks. The gap between pickup blade 52 and receiving blade 62 forms a means for classifying those hooks which are correctly positioned for feeding through the remainder of the hopper mechanism from those hooks which are not so positioned.

A classifying means for hooks is necessary as pins 40 will pick up the hooks in more or less random disposition (as shown in Figure 2 at 40*a* to 40*g*). Thus, hooks which are received in the disposition shown at pins 40*a*, 40*f*, and 40*g* will traverse the gap between blades 52 and 62. However, pins which are received in the disposition shown at pin 40*c* will not traverse such gap and will be returned to the reservoir of hooks at the bottom of rotating drum 12, as the disposition of hooks positioned such as at 40*c* on pickup blade 52 will be in the disposition of hook 44*y*.

In the case of hooks which are joined in tandem, with the bight portion 46 of one hook received in the annular flange portion 48 of another hook, such as the hooks shown on pin 40*b*, such hooks will traverse pickup blade 52 and then will be deflected at the bottom portion 56 thereof by deflector pillow 60, which will so deflect such hooks as to cause them to fail to traverse the gap between blades 52 and 62. As will be seen in Figure 5, deflector pillow 60 is positioned at a greater distance from the upper edge of pickup blade 52 than the height of a single hook, so that a hook in the position of 44*x* will not contact deflector pillow 60. However, where two hooks are joined together in tandem as at 40*b* the deflector pillow 60 will contact the lower of the two hooks and deflect the tandem train of hooks into drum 12.

In the case of a hook carried upon a plurality of pins, such as the hook shown at pins 40*d* and 40*e* which traverses both pins simultaneously, such hook will be cammed off the pins and fall into the reservoir at the bottom of drum 12 at the moment of contact with the upper portion 54 of pickup blade 52.

The upper edge 36 of retaining plate 32 is notched at 66 to permit the passage of receiving blade 62 across retaining plate 32. The bottom portion 68 of receiving blade 62 is operatively positioned in respect to the upper end of the chute designated 70.

The upper end of chute 70 is provided with a damping spur 72, which dampens the oscillatory motion of hooks 44 which may be oscillating while downwardly traversing the bottom portion 68 of receiving blade 62. Thus, oscillating hooks 44 will strike damping spur 72 which is in itself somewhat resilient and fixedly secured to chute 70 at one end, and such hooks 44 will convey part of their oscillatory energy to spur 72. This materially facilitates the accurate and facile transfer of hooks 44 from bottom portion 68 to chute 70.

As shown particularly in Figure 2, chute 70 is divided into a vertically disposed upper portion designated 74 and an angularly disposed lower portion designated 76. A cross-section through upper portion 74 of chute 70 is shown in Figure 6, and a cross-section through the lower portion 76 of chute 70 is shown in Figure 7.

As will be seen by comparing Figures 6 and 7 in the upper portion 74 of chute 70 the main body portion 50 of hook 44 is superposed by flexible inwardly directed flange members 78, with the annular flange portion 48 of the hook received in a U-shaped slot. Flanges 78 are spaced from each other a sufficient distance to permit the upwardly projecting hook and bight portion 46 of the hook 44 to extend out of the plane of upper portion 74 of chute 70.

The lower portion 76 of chute 70 is provided with a basal slot 80 in which the annular flange portion 48 of each hook 44 is received, with the body portion 50 of the hook 44 resting on flat 81 thereabove.

The variation in construction between upper portion 74 and lower portion 76 has been found to facilitate the discharge of hooks 44, with the gradually increased frictional contact ensuring control.

The hooks 44 pass downwardly through lower portion 76 of chute 70 to the end thereof, at which point the hooks are gripped by hook positioner 82. Hook positioner 82, which is shown in cross-section in Figure 8, comprises a pair of spaced block members 84 having inwardly projecting spring fingers 86 on their upper surface.

As will be seen from Figures 2, 3 and 8 the hook positioner 82 retains the hook 44 angularly positioned until a pin 88 which projects upwardly from endless conveyor belt 90 through the space between block members 84 is received within the annular flange portion 48 of the hook. The forward motion of the conveyor belt 90 then removes the hook 44 from the hook positioner 82. In this fashion hooks will be automatically and rapidly mounted on the pins 88 of conveyor belt 90.

In case of malfunctioning of the conveyor belt 90 and the simultaneous negligence of the operator for hopper mechanism 10, jamming of the hooks and injury to hopper mechanism 10 is prevented by means of the open end of the upper portion 74 of chute 70. Thus, hooks 44 will be backed up through the entire portion of chute 70. Chute 70 will then no longer be able to receive hooks, and all hooks transferred from bottom portion 68 of receiving blade 62 will be discarded from upper portion 74 of chute 70. Such hooks can be received within a supply container 92 which can be positioned beneath the point of juncture of bottom portion 68 and the upper end of upper portion 74 to receive hooks. Such supply container 92 may also be used by the operator of hopper mechanism 10 for maintaining the reservoir of hooks in the bottom of rotating drum 12.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be

made to the appended claims, rather than to the foregoing specifications as indicating the scope of the invention.

We claim:

1. A hopper for delivering hooks in aligned position including an open-ended rotating drum, pins projecting inwardly from one wall of said drum, withdrawal means comprising a plurality of blade elements, said withdrawal means extending through the open end of said drum, one of said blade elements being closely proximate to said pins, said one blade element being included with its uppermost end disposed in such apposed relation to said pins that objects carried on said pins will be deflected therefrom and transferred onto the uppermost edge of said element upon rotation of said drum, another of said blade elements being longitudinally spaced by a gap from said first-mentioned blade element, the uppermost edge of said last-mentioned blade element being beneath the uppermost edge of said first-mentioned blade element, and receiving means outside said drum spaced from and beneath the outermost end portion of said withdrawal means, whereby when said receiving means is unable to receive hooks from said withdrawal means, withdrawn hooks from said withdrawal means are discharged without said receiving means.

2. A hopper for delivering hooks in aligned position including an open-ended rotating drum, pins projecting inwardly from one wall of said drum, withdrawal means comprising a plurality of blade elements, said withdrawal means extending through the open end of said drum, one of said blade elements being closely proximate to said pins, said one blade element being inclined with its uppermost end disposed in such apposed relation to said pins that objects carried on said pins will be deflected therefrom and transferred onto the uppermost edge of said element upon rotation of said drum, and another of said blade elements being longitudinally spaced by a gap from said first-mentioned blade element, the uppermost edge of said last-mentioned blade element being beneath the uppermost edge of said first-mentioned blade element, a slotted receiving track outside said drum spaced from and beneath the outermost end portion of said withdrawal means, the cross-sectional area of said slot in the portion of said track proximate said withdrawal means being appreciably greater than the cross-sectional area of the slot in the portion of said track remote from said withdrawal means.

3. A hopper for delivering hooks in a predetermined aligned position including an open-ended rotating drum, pins projecting inwardly from the end wall of said drum, withdrawal means comprising a rigidly fixed and inclined stationary pickup blade having both of its ends within said drum with its innermost end uppermost and apposite said pins, whereby hooks carried on said pins will be cammed from said pins onto the uppermost edge of said pickup blade upon the rotation of said drum, a rigidly fixed and stationary receiving blade extending through the open end of said drum, said pickup and receiving blades being separated from each other by a gap, said pickup blade having projecting deflecting means on its side spaced beneath its uppermost edge proximate the end opposite the receiving blade for deflecting hooks arranged in undesirable configurations from traversing the gap comprising the longitudinal space between the pickup blade and receiving blade, at least a part of the uppermost edge of the innermost end of said receiving blade being longitudinally spaced from and beneath the uppermost edge of said pickup blade.

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