Jan. 4, 1955 M. A. SCHWARTZ ET AL 2,698,694

PACKAGE DISCHARGE AND STACKING DEVICE

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Fig. 1.

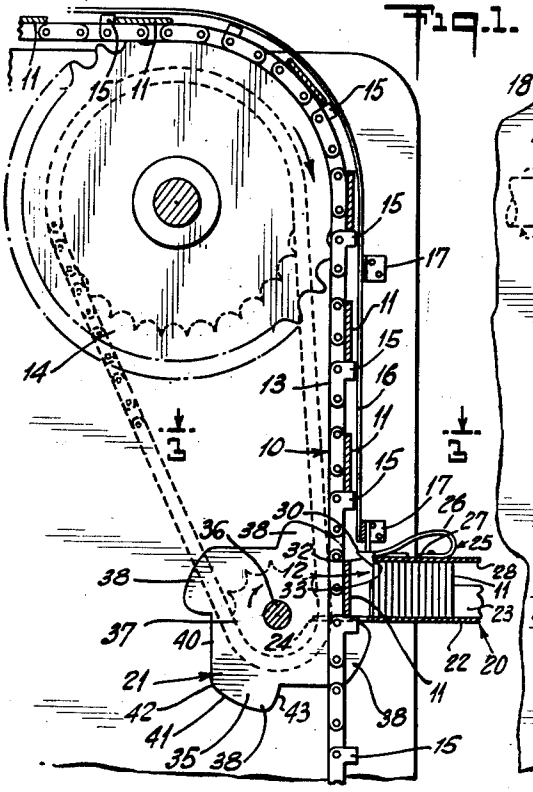


Fig. 2.

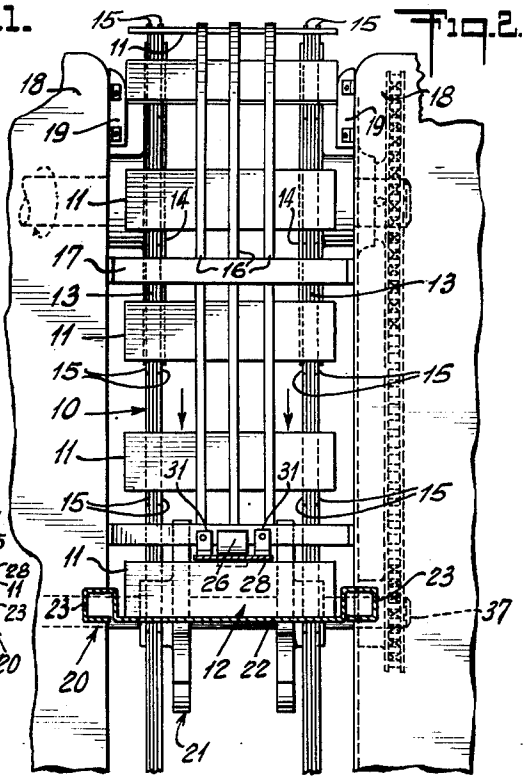
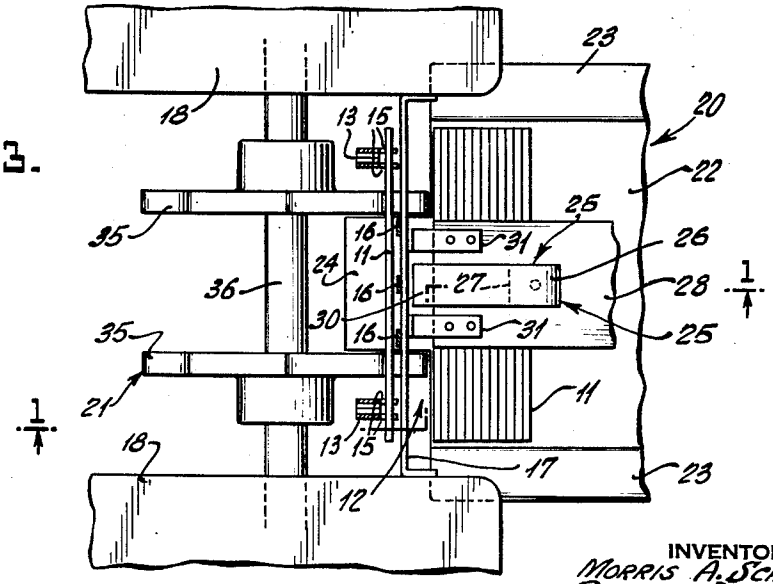


Fig. 3.



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FIG. 4.

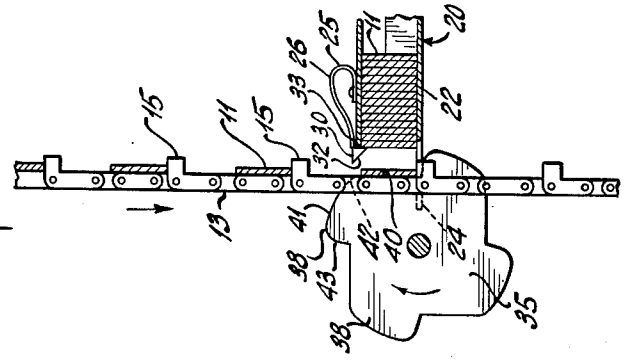


FIG. 7.

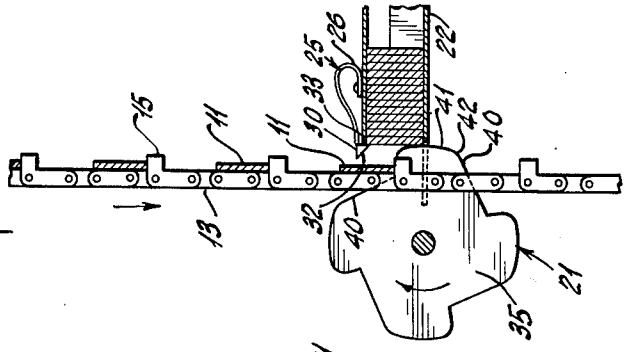


FIG. 6.

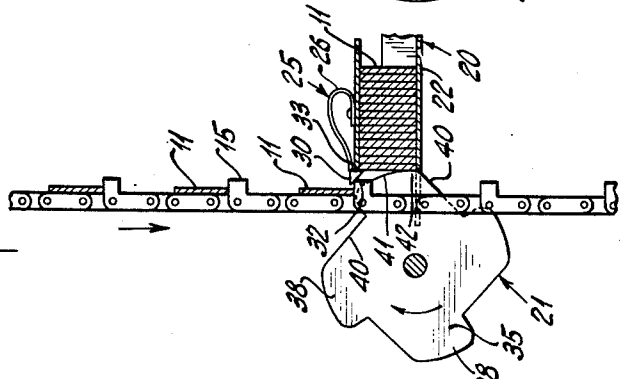
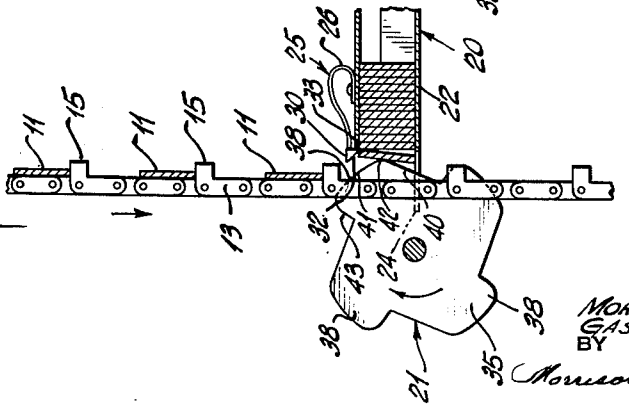


FIG. 5.



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PACKAGE DISCHARGE AND STACKING DEVICE

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Application June 1, 1950, Serial No. 165,413

5 Claims. (Cl. 214—7)

The present invention relates to a device for ejecting flat or sheet-like products from a conveyor and for stacking the ejected products.

The present invention may be used in connection with automatic machines for operating upon or making substantially flat products, such as adhesive bandage units. Each of these adhesive bandage units ordinarily comprises a strip of adhesive tape of rectangular oblong shape centrally carrying a small gauze pad and enclosed in suitable wrapping material, such as glassine.

One object of the present invention is to provide a new and improved device for ejecting substantially flat products from a conveyor and for stacking these products neatly and efficiently for convenient retrievement and/or packaging.

Another object of the present invention is to provide an ejecting and stacking device of the improved character described particularly suitable for use in connection with adhesive bandage units.

As a feature of the present invention, the flat products, and more specifically the bandage units, are carried by a conveyor continuously and in succession past an ejecting and stacking station. At this station, an ejector device, in the form of a rotary lobated cam member is operated in predetermined time relationship with respect to the conveyor, to eject the bandage units from the conveyor as they reach this station, and to move them towards stacking position.

As a further feature, a latch is employed operable to permit the ejected bandage units to be moved successively into the magazine for stacking, but holding the stack in the magazine at its entry end against expansion or displacement out of the magazine.

Various other objects, features and advantages of the invention are apparent from the following particular description and from an inspection of the accompanying drawings, in which:

Fig. 1 is a vertical section of an assembly comprising a conveyor and an ejecting and stacking device operable in connection therewith and embodying the present invention;

Fig. 2 is a front elevation of the assembly;

Fig. 3 is a horizontal section taken along the lines 3—3 of Fig. 1;

Fig. 4 is a vertical section of the ejecting and stacking device shown while the unit is about to be ejected from the conveyor towards the stacking magazine;

Fig. 5 is a vertical section of the ejecting and stacking device but shown at a later phase, as the ejected unit is being moved past the latch into the stacking magazine;

Fig. 6 is a vertical section of the ejecting and stacking device, but shown at a still later phase, after the ejected unit has been moved past the latch; and

Fig. 7 is a vertical section of the ejecting and stacking device and shown in the final stages of the stacking cycle, after the ejected unit has been moved completely into the stacking magazine.

Referring to the drawings, there is shown a conveyor **10** which is adapted to advance continuously and successively the flat articles **11**, and more specifically the adhesive bandage units described, towards the field of action of an ejecting and stacking device **12** embodying the present invention and which may constitute part of an automatic machine for operating on, processing or making these units.

The conveyor **10** comprises a pair of parallel spaced endless conveyor chains **13** shown of the articulated link type, and more specifically of the Morse silent type, and passing over drive sprockets **14** and over idler sprockets (not shown) to support and drive the chains in unison at a predetermined rate. These conveyor chains **13** carry unit supporting lugs **15** arranged on the two chains in aligned paired relationship to engage the longitudinal edge of each unit **11** at spaced sections thereof and to cause the unit to advance edgewise and sidewise through the machine. The conveyor **10** has a substantially vertical run, as shown, constituting the discharge section of the machine and the units **11** are supported on edge on the chain lugs **15** across the conveyor chains **13** and are arranged therealong at intervals for advancement in succession into the field of action of the ejecting and stacking device **12**. The conveyor chains **13** have horizontal runs extending through the automatic machine and adapted to carry the units **11** from one operating station to another. The lugs **15** on these horizontal runs act as pushers to move the units **11** along the machine as shown in Fig. 1 and as the conveyor chains **13** move over the sprockets **14**, these units slide on to the next pair of aligned lugs to be supported thereon during the vertical run of the chains.

Guide strips **16** between the conveyor chains **13**, and secured to bars **17** mounted on side frames **18** flanking the conveyor **10**, are desirably provided to maintain the units **11** in transversely upright positions on the chain lugs **15**, as these units are moved downwardly by said chains. To maintain the units **11** centrally with respect to the conveyors **13** as these units are moved downwardly, side guide rails **19** may be provided secured to the side frames **18**.

The ejecting and stacking device **12** comprises a stacking magazine **20** and a rotary member **21** for ejecting the units from the conveyor **10**, as the units reach a position opposite the inlet of the magazine and for pushing them into the magazine for stacking. The stacking magazine **20** comprises a horizontal table or base plate **22** and side walls **23** integral with or otherwise secured to the base plate and defining therewith a stacking tray in which the ejected units **11** are collected and piled. The width of this stacking tray between the confronting faces of its side walls **23** is substantially equal to the lengths of the units **11** and the height of these side walls is desirably less than the height of the units **11**, to permit the easy removal of these units from the tray.

The base plate **22** of the stacking tray **20** has its inner end section **24** extending into the space between the two conveyor chains **13** to form a stop for the units **11** on the chain, as these units reach a position opposite the stacking tray, and to form a support for the units, as they are ejected from the chains and are pushed by the rotary ejector **21** towards the tray.

For holding the stack of units **11** in the tray **20** at a sufficient distance from the common plane of the two conveyor chains **13** to permit the free operation of the rotary ejector **21** and at the same time to permit the addition of successive units to the stack, there is provided the latch **25**. This latch comprises a leaf spring **26** secured at one end **27** to a finger **28** and carrying at its other end, as for example by welding, a detent or pawl **30** in the space between this finger and the plane of the two conveyor chains **13**. This latch supporting finger **28** is in the form of a plate and is mounted in position spaced from the plane of the two conveyor chains **13**, as for example by means of angle brackets **31** secured to the lower frame bar **17**.

The latch detent **30** is of triangular cross-section to present a cam surface **32** inclined downwardly away from the plane of the two conveyor chains **13** and a substantially vertical surface **33** defining a stop shoulder to prevent the stack from expanding inwardly towards this plane. The leaf spring **26** is curvedly bent, as shown, to urge yieldably and resiliently the latch detent **30** downwardly in stack holding position.

The rotary ejector **21** is in the general form of a cam and comprises two similar axially registering discs **35** parallel to each other and located between the planes of the two conveyor chains **13**. These discs **35** are connected

for rotation in unison to a shaft **36** which is driven in time sequence with the movement of the conveyor **10** by any suitable means, as for example by means of a sprocket and chain drive transmission **37** operating between this shaft and the shaft of the conveyor drives **14** and which is spaced inwardly from the inner side of the conveyor.

Each of the cam discs **35** is provided with a plurality of cogs or lobes **38**, four being shown, equally spaced and adapted to extend successively through the space between the conveyor chains **13**, as the disc is rotated, and to engage peripherally thereby the confronting faces of the units **11** on the chains for ejection operations as these units successively reach the stop end section **24** of the base tray plate **22**. Each of these lobes **38** is shaped to define a substantially straight clearance edge **40**, whose distance from the center of the disc **35** along a direction normal to this edge is equal to the distance between the center of the disc and the inner plane of the faces of the units **11** supported on the conveyor **10**, a substantially circular edge **41** merging at one end into one end of the straight edge **40** through a rounded heel edge **42** and extending substantially concentrically with respect to the axis of rotation of the disc and a substantially radial edge **43** connecting the other end of this circular edge and the end of the straight edge **40** of the next successive lobe **38**. The cam **21** is rotated at such a speed with respect to the conveyor **10** and its rotative position is so arranged with respect to the position of the conveyor that, as a unit **11** on the conveyor reaches the stop section **24** of the base tray plate **22**, the two straight edges **40** on the registering lobes **38** of the two cam discs **35** are in face contact with the inner face of this unit, as shown in Fig. 4. Also, the cam **21** and the conveyor **10** are relatively timed to bring the lobes **38** successively into operation, as the units on the conveyor are moved successively in position opposite the stacking tray **20**.

In the operation of the apparatus described, as the conveyor **10** carries the units **11** successively downward, the cam **21** is rotating clockwise in time sequence therewith. As a unit **11** on the conveyor **10** reaches the inner end section **24** of the base tray plate **22**, it is stopped thereby, as shown in Fig. 4, while the conveyor continues its downward movement. At the same time, the corresponding straight edges **40** on the two registering lobes **38** of the cam discs **35** reach a position in substantially continuous contact with the inner face of the stopped unit **11**. As the cam discs **35** continue their clockwise rotation, the two heel edges **42**, engaging the upper section of the stopped unit **11**, eject the unit from the conveyor chains **13** and move it along the inclined surface **32** of the latch detent **30**, as shown in Fig. 5. This causes the latch detent **30** to be cammed upwardly out of the way of the unit being ejected and stacked, until the upper section of this unit passes beyond the detent. At that instant, the latch detent **30** snaps down under the action of the spring **26** into position to hold the upper section of the last ejected unit behind the detent.

As the cam **21** continues its rotation, the circular edges **41** of the active registering lobes **38** engaging the face of the last ejected unit **11** ride downwardly along this face, to straighten the unit into transversely upright position, as shown in Fig. 6. As these circular lobe edges **41** are leaving the last ejected unit **11**, the next unit **11** on the conveyor **10** is moving towards the stop end section **24** of the base tray plate **22** and, at the same time, the straight edges **40** of the next successive pair of registering lobes **38** are moving into position to engage the inner face of the latter unit and to repeat the ejecting and stacking operation therewith, as shown in Fig. 7. These successive ejecting and stacking operations are continued with successive units **11**. Each time a unit is added to the stack, the stack is pushed ahead to make room for the addition.

No follower or packing head is shown in the tray **20** for the stack and none is necessary. The units **11** may tilt with progressively increasing inclination towards the outer end of the stack, without such a follower, but the units **11** in the inner end section of the stack will be maintained in transversely upright position, as shown.

The operator can grab a bunch of the units in the outer end section of the stack with his fingers conveniently and without disturbing the relative positions of these units and can insert them into a box or carton for packaging.

What is claimed is:

1. In combination, a pair of opposed conveyor belts operable continuously in unison and having substantially horizontal runs as well as substantially vertical runs to advance flat rectangular oblong units from a receiving station to a discharge station, said belts being provided with an endless series of pairs of projecting lugs, the pairs being spaced apart in the direction of travel at a distance substantially greater than the width of each individual unit to allow each said unit when traveling along the vertical runs of the belts to fall by gravity out of contact at its trailing edge with one pair of lugs, which pushes it along the horizontal runs, into contact at its leading edge with the next preceding pair of lugs, which then supports the unit and presents it under the action of gravity to the discharge station, a continuously operated rotary ejector arranged at the discharge station for ejecting the units one at a time from the vertical run of the conveyor belts as they reach the station, and means for operating the rotary ejector and the conveyor belts in timed relation.

2. In combination, a pair of opposed conveyor belts operable continuously in unison and having substantially horizontal runs as well as substantially vertical runs to advance flat rectangular oblong units from a receiving station to a discharge station, said belts being provided with an endless series of pairs of projecting lugs, the pairs being spaced apart in the direction of travel at a distance substantially greater than the width of each individual unit to allow each said unit when traveling along the vertical runs of the belts to fall by gravity out of contact at its trailing edge with one pair of lugs, which pushes it along the horizontal runs, into contact at its leading edge with the next preceding pair of lugs, which then supports the unit and presents it under the action of gravity to the discharge station, a stationary stop arranged in the path of travel of the advancing units to arrest them one by one at the discharge station and to support them at said station as the conveyor belts continue their operation, a continuously operated rotary ejector arranged at the discharge station for ejecting the units one at a time from the vertical run of the conveyor belts as they reach the station, and means for operating the rotary ejector and the conveyor belts in timed relation.

3. In combination, a continuously movable endless conveyor having a substantially vertical run and having means for supporting substantially flat units in predetermined spaced relationship on said run and positively advancing them edgewise successively downward in said spaced relationship, a stop for the units in the path of the vertical conveyor run, a rotary cam separate from and near the stop and having a lobe with a clearance edge spaced at every point from the axis of the cam a distance no greater than the distance from said axis to any part of the cam confronting face of a unit supported against the conveyor and resting on the stop, whereby when the clearance edge is opposite a unit supported against the conveyor and resting on the stop, it affords clearance for the latter unit, means for operating the cam and the conveyor in time sequence to bring the clearance edge in one phase opposite a unit supported on the conveyor, as the latter unit reaches the stop, whereby the latter unit reaches the stop under the positive advancing action of the conveyor free from interference from the cam, said cam lobe also having a unit ejecting edge adjoining the clearance edge arranged at a distance from said axis greater than the distance from said axis to said clearance edge and contoured to engage the unit on the conveyor resting on the stop as the cam continues to rotate from said phase and thereby to eject the latter unit from the conveyor and along the stop.

4. In combination, a continuously movable endless conveyor having a substantially vertical run and having means for supporting substantially flat units in predetermined spaced relationship on said run and positively advancing them edgewise successively downward in said spaced relationship, a stop for the units in the path of the vertical conveyor run, a rotary cam separate from and near said stop and having a lobe with a substantially straight clearance edge and a convexly curved adjoining ejecting cam edge, said clearance edge being located to afford clearance for the unit on the conveyor when said unit reaches the stop and when said edge is in position nearest the latter unit and parallel to the vertical con-

veyor run, and means for operating the cam and the conveyor in time sequence to bring said clearance edge in one phase parallel to said run and opposite a unit on the conveyor as said unit reaches the stop, whereby said unit reaches the stop under the positive advancing action of the conveyor free from interference from said cam, said ejecting edge being located and contoured to engage the unit on the conveyor resting on the stop as the cam continues to rotate from said phase and thereby to eject the latter unit from the conveyor and along the stop.

5. In combination, a continuously movable endless conveyor having a substantially vertical run and having means for supporting substantially flat units in predetermined spaced relationship on said run and positively advancing them edgewise successively downward in said spaced relationship, a stop for the units in the path of the vertical conveyor run, a rotary cam separate from and near the stop and having a series of similar lobes equally spaced therearound, each of said lobes having a substantially straight clearance edge whose distance from the axis of said cam along a direction normal to said edge is no greater than the perpendicular distance between the axis of said cam and the inner plane of the faces of the units supported on said run, said straight edge being located to extend in one rotative phase of the cam in position parallel to said run and along the face of a unit on the conveyor resting on the stop to afford clearance for the unit on the stop, and means for operating the cam and the conveyor in time sequence to bring the straight edge in one phase opposite a unit supported on the conveyor, as the latter unit reaches the stop, whereby the latter unit reaches the stop under the positive advancing action of the conveyor free from interference from the cam, said cam lobe also having a circular cam edge merging at one end into one end of said straight edge through a rounded heel edge and extending substantially concentrically with respect to the cam axis at a distance from said axis greater than that of said straight edge, and a substantially radial edge connecting the other end of said circular edge and the end of the straight edge of the next successive lobe, and means for operating the cam and the conveyor in time sequence to bring the straight edges of said lobes successively into positions parallel to said run and opposite said units as said units successively reach said stop, said circular edges being contoured to engage the units successively on the conveyor resting on the stop as the cam rotates and to eject the latter units from the conveyor and along the stop.

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