Aug. 11, 1964 J. J. BOYD 3,144,169

APPARATUS FOR POSITIONING, STACKING, AND DISPENSING COTTON TIE BUCKLES

Filed May 2, 1961 5 Sheets-Sheet 1

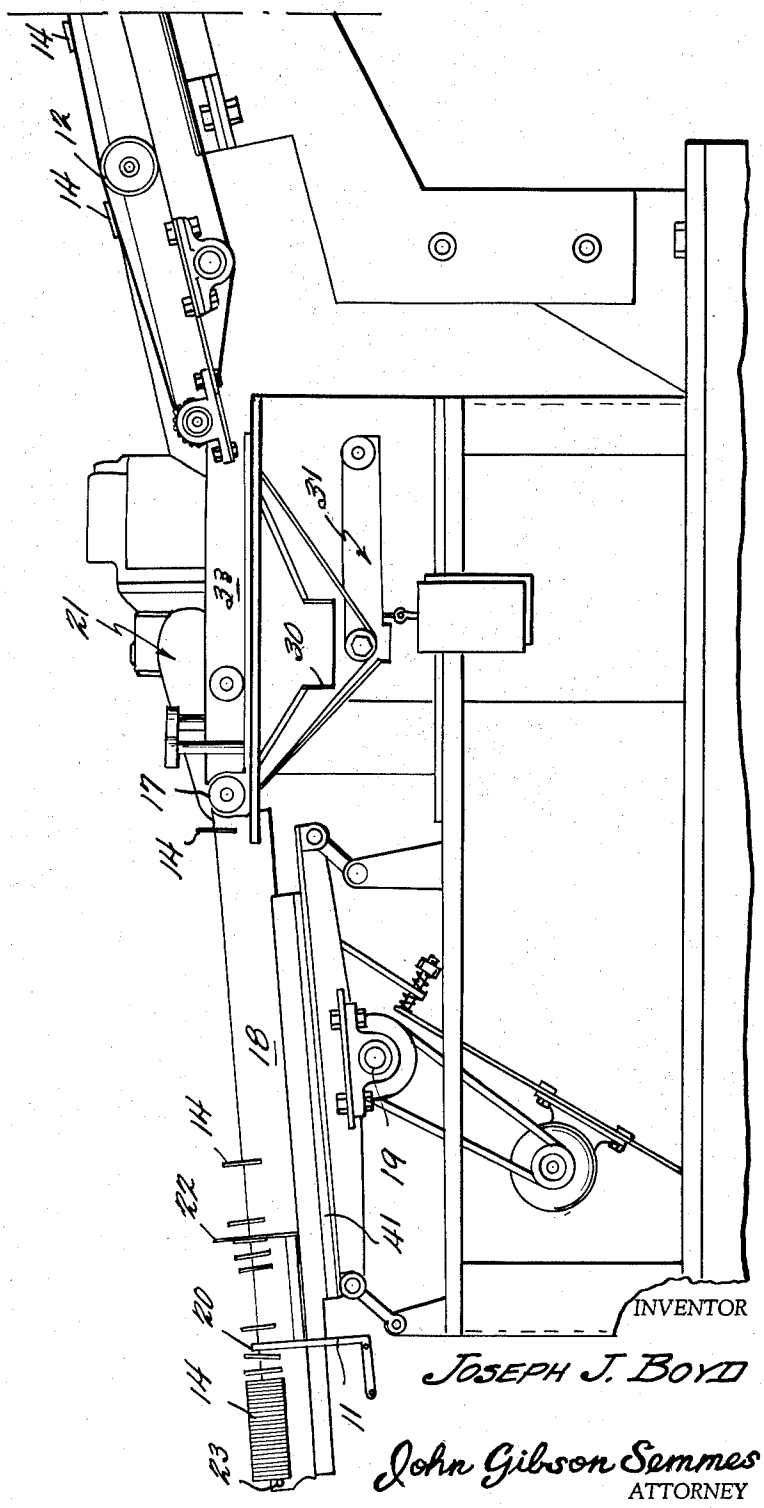


FIG. 1

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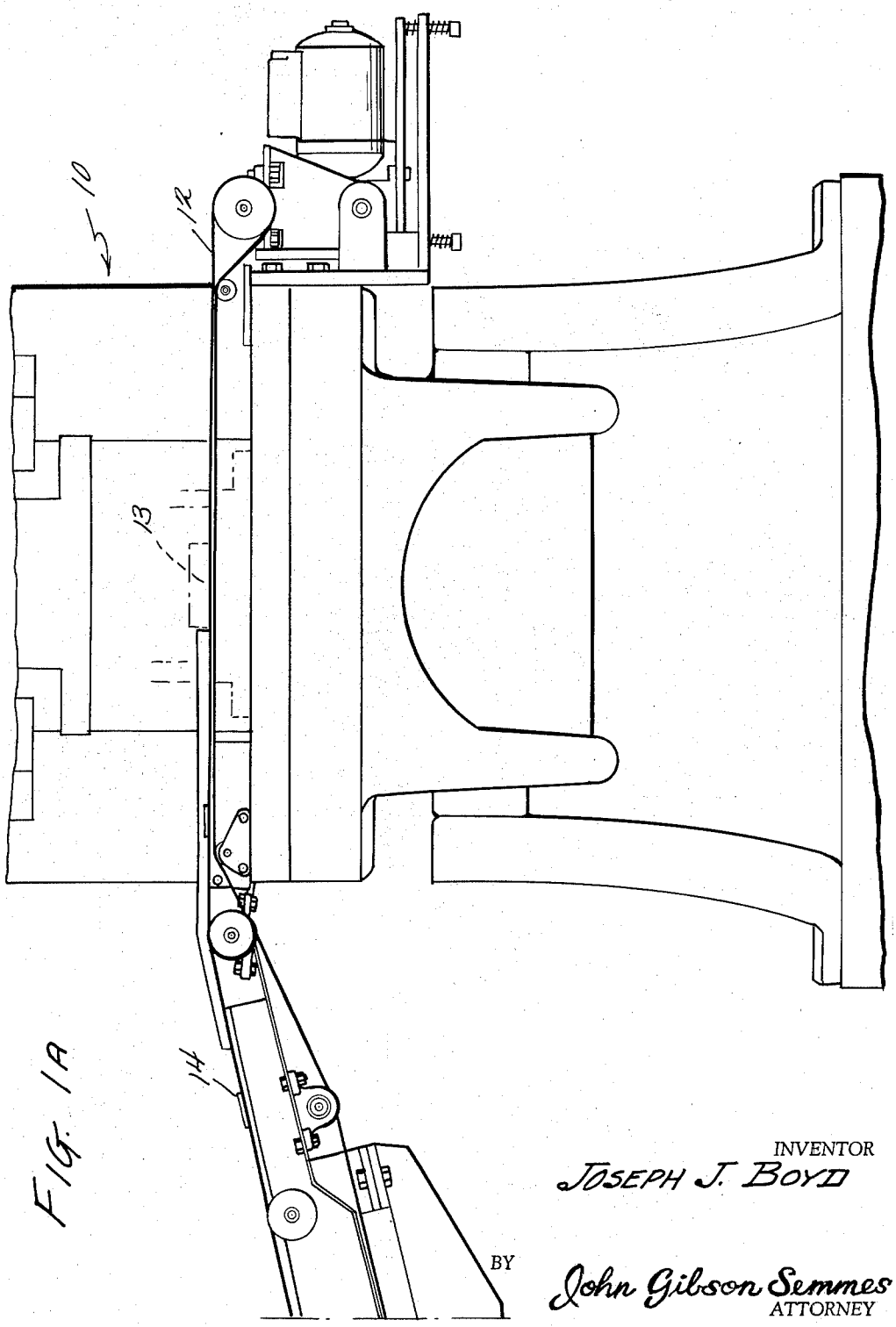


FIG. 1A

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APPARATUS FOR POSITIONING, STACKING, AND DISPENSING COTTON TIE BUCKLES

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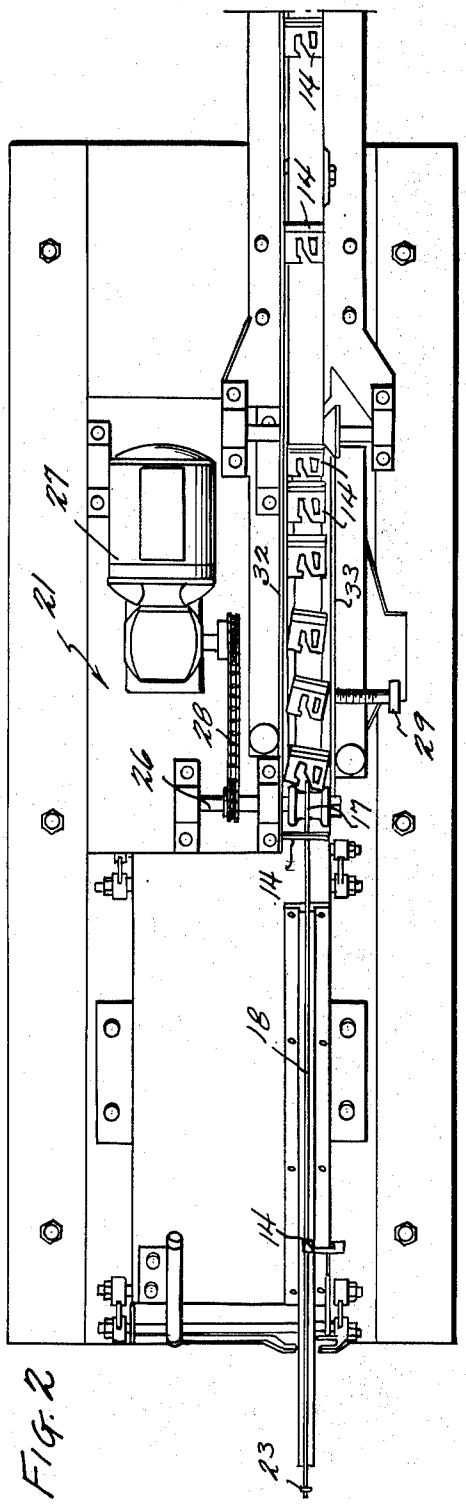


FIG. 2

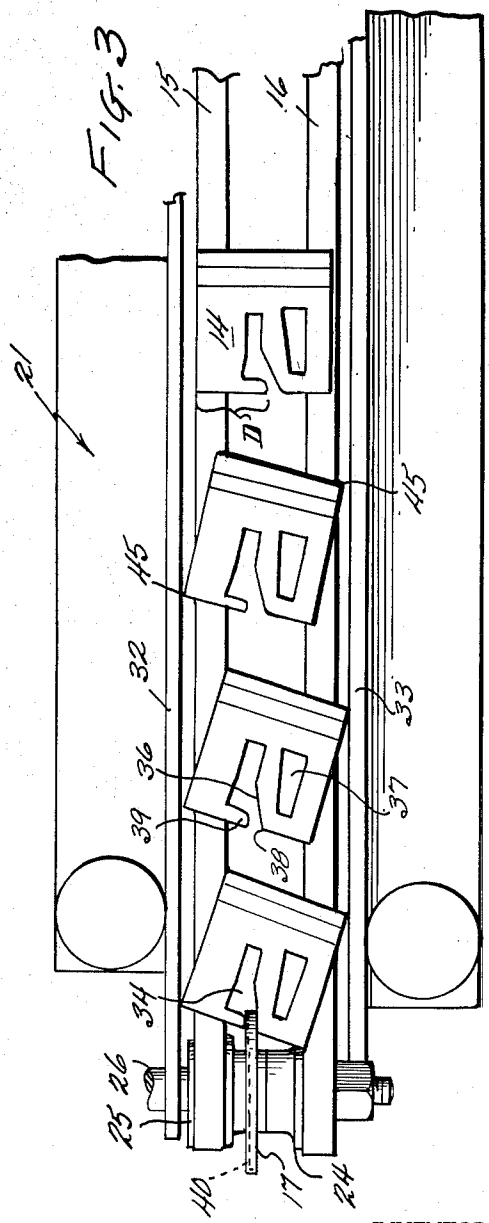


FIG. 3

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APPARATUS FOR POSITIONING, STACKING, AND DISPENSING COTTON TIE BUCKLES

Filed May 2, 1961 5 Sheets-Sheet 4

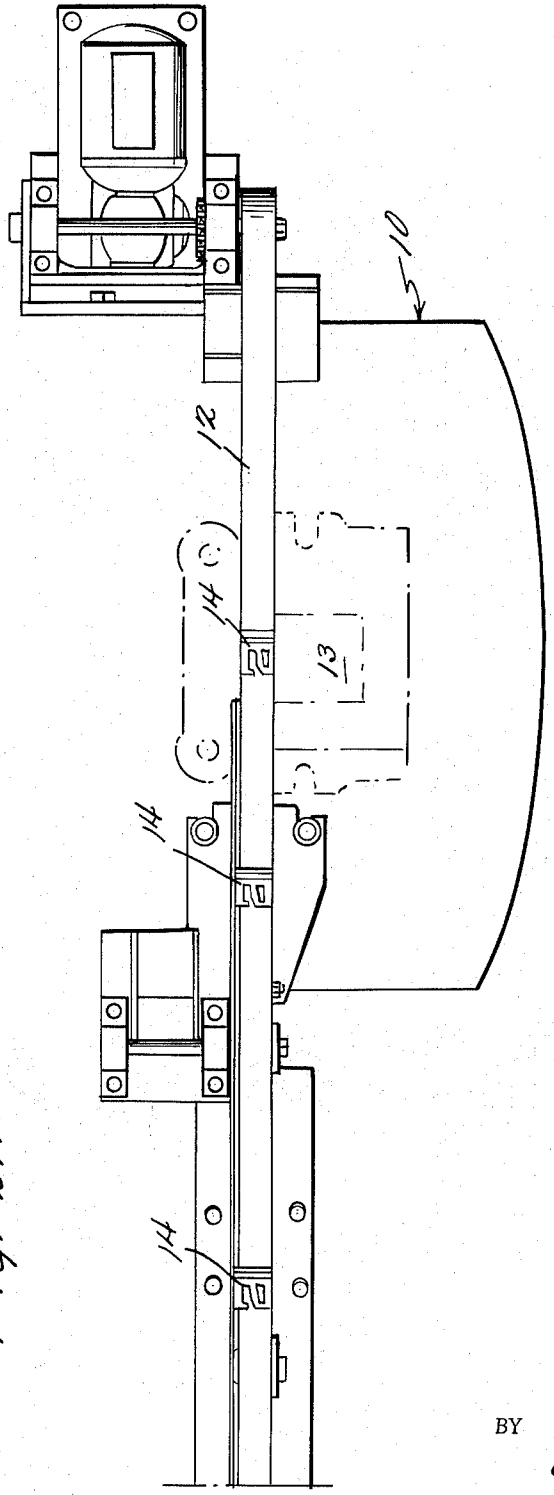


FIG. 2A

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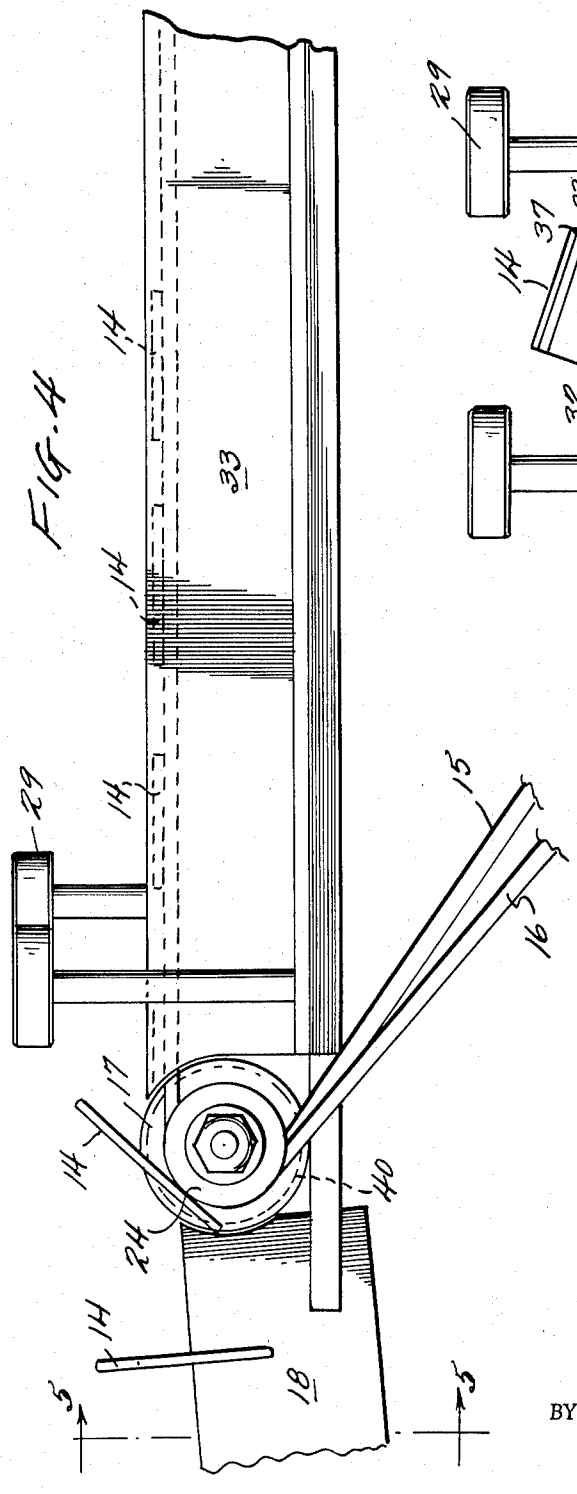


FIG. 4

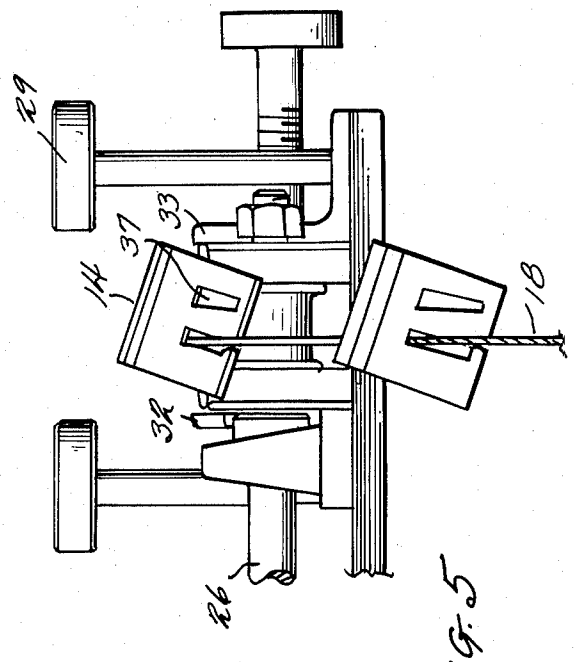


FIG. 5

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United States Patent Office 3,144,169 Patented Aug. 11, 1964

3,144,169

APPARATUS FOR POSITIONING, STACKING, AND DISPENSING COTTON TIE BUCKLES

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Filed May 2, 1961, Ser. No. 107,214
4 Claims. (Cl. 221—175)

The present application relates to method and apparatus for positioning for packaging cotton tie buckles of the side opening type.

In the packaging of cotton ties it is desirable, from the customer's point of view, to receive the cotton ties in bundles of thirty with the necessary thirty buckles tied into each bundle. It is customary to place all thirty buckles on one band, to one side of center on top of a bundle of ties, and to fold the other half of the band back over to cover the buckles, thereby putting the buckles in the center of the bundle. The bundle is then banded with three tight straps, making a neat hand package of thirty cotton ties and thirty buckles.

The thirty buckles, being approximately 2" x 2" x ⅛" each, are more easily placed on the bands prior to folding if they are first stacked on a strip or spike of metal passing through the closed opening in each buckle. This flat strip of metal or spike is approximately 8" long by 1" wide and 3/32" thick, and is bent at right angles on one end to give a hand hold, and pointed at the other end for insertion within the buckle closed opening. A spike full of buckles is known in the trade as a "clip."

In the single punch manufacture of the older type cotton tie buckle, it was simple to let each buckle fall, as it was sheared, onto a curved piece of steel or "flat" which could pass easily through the buckle closed opening. The buckles slid down the curved piece of steel to a lower end where they stacked up, one against another, and were removed thirty at a time by inserting the spike into the opening and lifting them off. The clips of buckles were then stacked in trays to be carried to the bundling operation.

In recent years the trade has gone almost entirely to a side-opening buckle. All efforts to catch side opening buckles in the machine on a curved blade, as had been done before, failed because of the shape of the buckle and because the side-opening die involved two punching or pressing stages, instead of one. Early efforts to stack side opening buckles outside of the die failed due to the configuration of the buckle.

The present invention overcomes these problems and also removes the buckle positioning equipment from the die press itself where the heavy shock loads disturb adjustments and create maintenance problems. Additionally, the present method affords almost 100 percent inspection of the buckle positioning operation.

According to the present invention, side opening buckles are flatly conveyed upon two or more belts variantly rotated so as to turn or pivot the buckles throughout a substantially horizontal plane. At an end point of rotation of these belts a flipper disc is supported in vertical alignment with the side openings of the buckles and rotated so as to engage these side openings as each buckle is delivered by said variantly rotated belts. The disc includes in one side surface an annular groove which is engageable with a complementary protuberance upon said buckles. As buckle and disc engage, the disc flips or lifts up the buckle from a horizontal to a vertical plane and conveys the buckle onto an upstanding blade. The blade is vibrated so as to convey the buckles away from the turning and flipping operation. At the end of the blade metering means and impaling means may be employed for individually packaging the buckles. It is believed that novel features of the invention reside in the

combined employment of variantly rotated belts to horizontally pivot the buckles, the employment of means to flip the buckles from horizontal to vertical position and the employment of vibrating blade means to convey the buckle away from the turning and flipping operation.

Accordingly, it is an object of invention to provide a method for recovering side opening buckles from a die press and vertically positioning said buckles.

Another object of invention is to provide a method and apparatus for horizontally pivoting cotton tie buckles as received from a die press.

Another object of invention is to provide a method and apparatus for flipping a cotton tie buckle from horizontal to vertical position.

Another object of invention is to provide a combined means for conveying a cotton buckle from a die press operation into vertically positioned relationship for packaging in bundles of predetermined number.

Yet additional objects of invention will become apparent from the ensuing specification and attached drawings wherein:

FIG. 1 is a partially fragmentary side elevation of the proposed apparatus, showing buckles **14** being conveyed upon vibrating blade **18** away from flipper disc **17**;

FIG. 1A is a partially fragmentary side elevation of die press **10**, showing belt **12** horizontally conveying buckles **14** to the turning and flipping operation illustrated in FIG. 1;

FIG. 2 is a top plan of the apparatus illustrated in FIG. 1;

FIG. 2*a* is a top plan of the die press and conveyor belt apparatus illustrated in FIG. 1A;

FIG. 3 is an enlarged top plan, partially fragmentary showing belts **15** and **16** horizontally turning buckles **14** and flipper disc **17** engaging the side opening of said buckles prior to lifting or flipping said buckles to vertical position;

FIG. 4 is a fragmentary side elevation of the operation illustrated in FIG. 3 and showing flipper disc **17** flipping buckle **14** upon vibrating blade **18**; and

FIG. 5 is an end elevation taken along section line 5—5 of FIG. 4.

As illustrated in FIGS. 1 and 1A, punch or die press **10** punches buckles **14** and drops them one at a time on conveyor belt **12** passing through die **13**. Buckles **14** are conveyed horizontally upon belt **12** down to turner **21**, which contains belts **15** and **16** rotated at variant speeds. Belts **15** and **16** are caused to move at slightly different speeds by different sized pulleys **24** and **25** positively fastened to shaft **26**. Shaft **26** is driven by motor and gear unit **27** through chain **28**. This drive, of course, is conventional. Belt **16** moves faster than belt **15** thereby causing the buckles **14** to turn or pivot horizontally and aligning the buckle slot-side opening **34** with flipper disc **17**. Disc **17** flips buckles **14** into vertical position and deposits buckles **14** upright on the thin, flat vibrating blade **18**. Vibrator **19** affixed to vibrating table **41** causes buckles **14** to move down blade **18** to stop **20** which blocks them. After thirty or more buckles have accumulated, the operator presses handle **11** which pivots stop **20** downward and causes gauge **22** to slice off thirty buckles. The thirty buckles slide to the end of blade **18** and against a pin **23** where they may be speared by a spike inserted through the buckle closed opening **37** and lifted off as a clip of buckles.

Adjusting knobs **29** permit quick setting of belt guides **32** and **33**, thus adjusting the degree of horizontal pivot of the buckles relative to flipper disc **17**. Buckle size and lots vary slightly from different dies; some variation in widths may occur between buckles from the same die. No material variation ever occurs in dimension D shown

in FIG. 3, on buckles from the same die, since slot **34** is punched and buckles **14** are sheared simultaneously. Scrap pan **30**, belt tightener **31**, and other construction features are minor requirements which may be dictated from the maintenance and operating needs.

As previously described flipper disc **17** is used to lift or flip buckles **14** from a horizontal plane to a vertical one. Disc **17** is clamped solid between the two pulleys **24** and **25** and of course rotates at shaft **26** speed. Although various means of flipping buckles **14** may be employed, a preferred means is described below.

Buckle **14** is carried forward at a speed

$$V_3=\frac{V_1+V_2}{2}$$

and is caused to turn or pivot horizontally by the difference in velocity of the two belts (V_1-V_2). As illustrated in FIG. 3 and after diagonally opposed corners **45** of the buckles strike the side guides **32** and **33**, slot **34** is aligned with the disc **17** and buckle **14** is positioned to thread on the rotating disc **17**. The sloping shoulder **36** of the slot **34**, now acts as a cam forcing buckle **14** to turn about corner **38** hooking boss **39** into slot **40** in one face of disc **17**. This action locks buckle **14** to disc **17**, causing buckle **14** to rotate with disc **17**. As soon as buckle **14** leaves the confines of the guides **32** and **33** its locking action ceases, but it has been given an initial rotational velocity which flips or lifts buckle **17** into a vertical position where it is stripped from disc **17** by blade **18**.

Blade **18** was formed to fit buckle slot **34** and is inclined for gravity feed of buckle **14** from disc **17**. Blade **18** is mounted upon vibrating table **41** which is actuated by vibrator **19** causing buckles **14** to feed away from the disc **17**. Optionally, blade **18** may be a hardened ground steel flat 3″ wide by 1/16″ thick by 36″ long. It has been found that a buckle with the proper unbalance will stand vertically when supported by blade **18** engaging slot **34** and may be conveyed a great distance without falling over or dropping off. Other means, such as a chute, may be used to put the buckles on the blade.

Side-opening buckles **14** are punched in two stages, including a shear. The first stage punches the closed opening **37**, the second stage punches the slot **34** and shears buckles **14** from the full width of material. There are short, long, narrow and wide buckles to contend with. There are one-half, one quarter, and one eighth buckles, and buckles with no holes or with holes out of place. Perfect buckles, as well as culls, fall out of the shear onto belt **12** which flatly conveys buckles **14** onto parallel belts **15** and **16**. The short pieces or culls fall between the belts **15** and **16** into the scrap pan **30**. Blank buckles and those with holes out of place will not thread on flipper disc **17** and will fall off into scrap pan **30**. The few bad buckles which do get onto blade **18** are easily lifted off by hand and dropped manually into scrap pan **30**.

Blade **18** may be thought of as a conveyor with self-contained vibratory forces of sufficient magnitude to convey the buckle three feet or a hundred. It might be used to convey buckles **14** up hill or around corners, by the proper application of vibratory force. In the illustrated apparatus, blade **18** is used to move the buckles **14** away from the disc **17** rapidly enough to prevent interference with the next buckle on the disc, and to stack the buckles one against the other for gauging and removal.

As will be seen from the foregoing, two variantly rotated belts are employed to horizontally turn or pivot a buckle in combination with disc means for flipping the buckle into a vertical plane and an upright horizontal blade with vibratory force for conveying the buckle into packaging position. Manifestly, various other means and modifications of these particular members may be employed without departing from the scope and spirit of invention, as defined in the subjoined claims.

I claim:

1. Apparatus for positioning tie buckles of the side-opening type having a protrusion extending partially across said opening, comprising:

(*a*) a buckle turner, including at least two parallel belts moved at different speeds throughout a substantially horizontal plane so as to turn buckles resting thereon in one direction;

(*b*) conveyor means flatly introducing said buckles, side opening leading, upon said belts;

(*c*) guide means positioned on both sides of said belts so as to position said side opening of said buckles by limiting turning of said buckles;

(*d*) a vertical flipper disc positioned medially of said belts and aligned with said side openings and rotated adjacent an end of said turner, said disc having an annular groove in one face thereof near the outer edge to be aligned with said protrusion, and complementally engagable therewith, said buckle frictionally gripping said disc to be flipped thereby from a horizontal position on the turner to a vertical position; and

(*e*) a vibrating blade juxtaposed and aligned with said disc and said side openings to receive buckles from said disc in said vertical position and to remove said buckles.

2. An apparatus for positioning of buckles as in claim 1, said vibrating blade having metering means pivoted thereto and delivering, on each operation, a pre-determined number of buckles from the stack formed on the blade.

3. An apparatus for positioning cotton tie buckles of the side opening type having a protrusion extending partially across said opening, comprising:

(*a*) a turner including at least two parallel substantially horizontal belts moved at different speeds about two or more horizontally disposed shafts so as to turn said buckles resting thereon in one direction in a horizontal plane;

(*b*) guide means mounted on either side of said belts so as to position said side opening of said buckles by limiting horizontal pivoting or turning of said buckles;

(*c*) conveyor means flatly introducing said buckles, side opening leading, upon said belts;

(*d*) a vertical flipper disc supported upon one of said horizontal shafts medially of said belts and aligned with said side openings of said buckles and rotated with said belts, said disc having an annular groove in one face thereof near the outer edge to be complementally engagable with said buckle protrusion; said buckle frictionally gripping said disc to be flipped thereby from a horizontal position on the turner to a vertical position;

(*e*) a vibrating blade juxtaposed and aligned with said flipper disc and said side openings to receive buckles from said disc in said vertical position and to remove said buckles; and

(*f*) means pivoted to said blade delivering on each operation a pre-determined number of buckles from the stack formed on the blade.

4. Apparatus for positioning cotton tie buckles as in claim 3, including tensioning means engaging said belts moved at different speeds.

References Cited in the file of this patent

UNITED STATES PATENTS

1,069,362	Wegner	Aug. 5, 1913
1,326,925	Goldberg	Jan. 6, 1920
1,598,371	Goldberg	Aug. 31, 1926
2,547,473	Klem	Apr. 3, 1951
2,825,489	Batchelder	Mar. 4, 1958
2,832,457	Randles	Apr. 29, 1958