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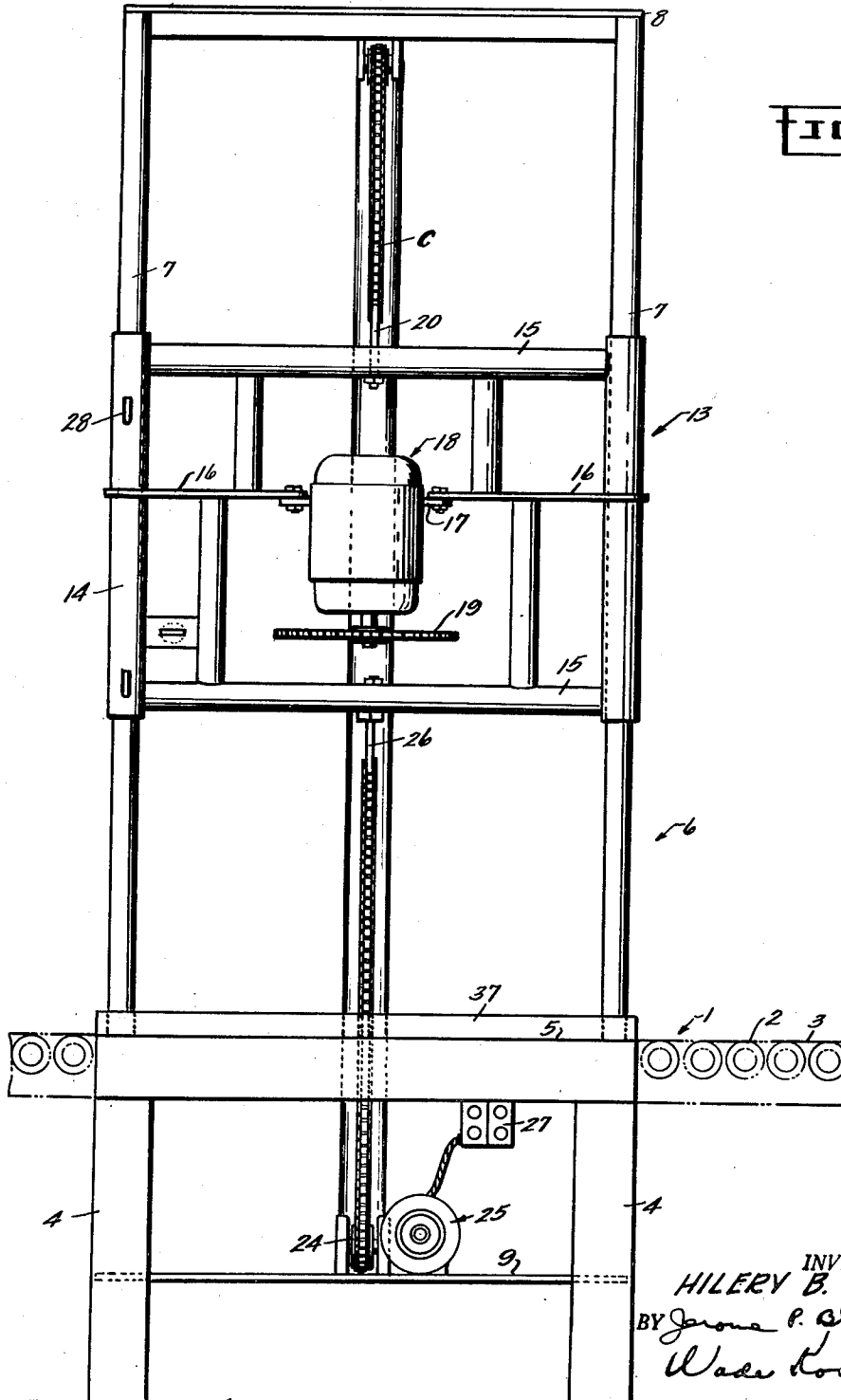
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APPARATUS FOR CUTTING FASTENING BETWEEN BOX AND BOX COVER

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3 Sheets-Sheet 1



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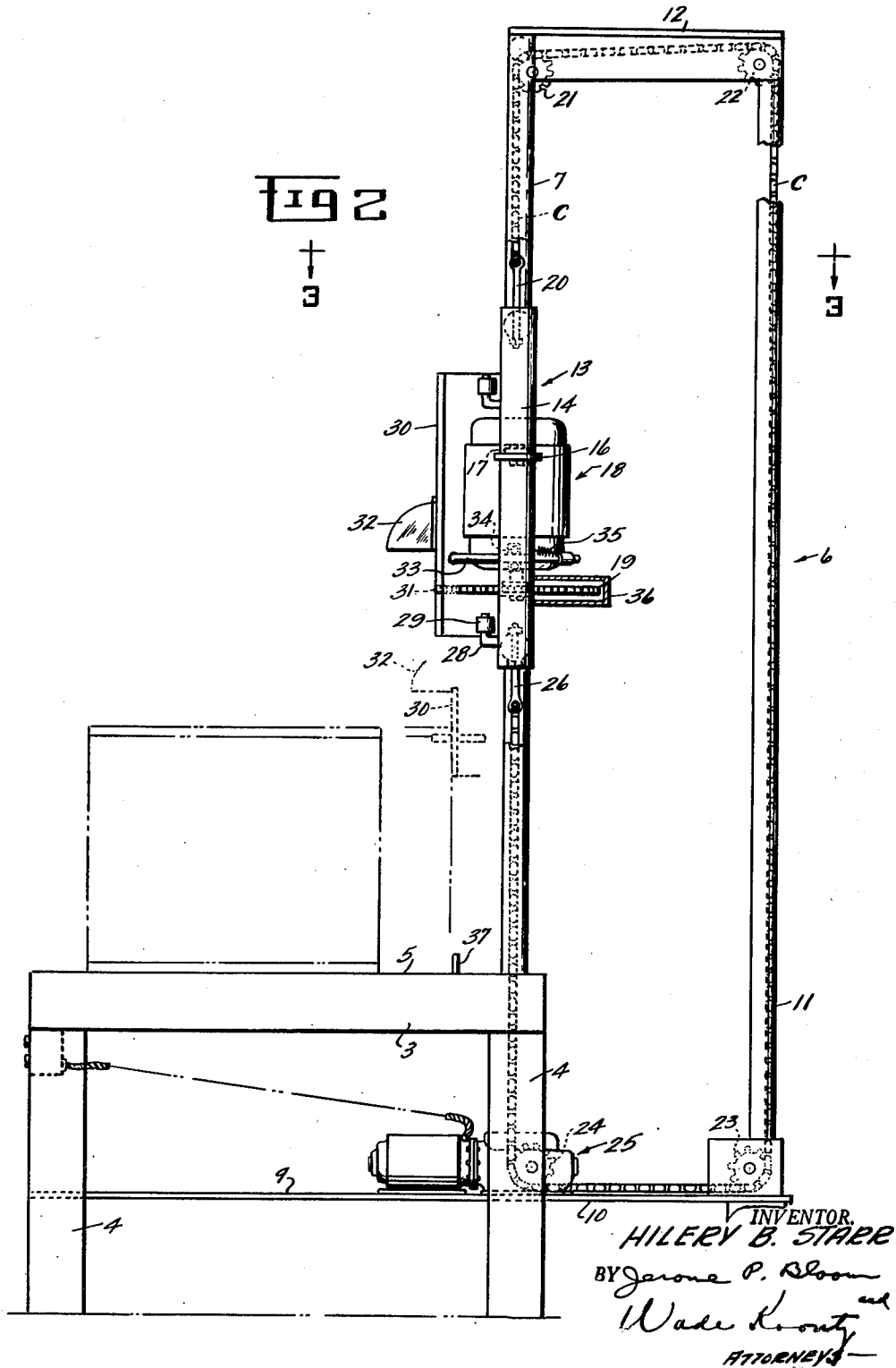
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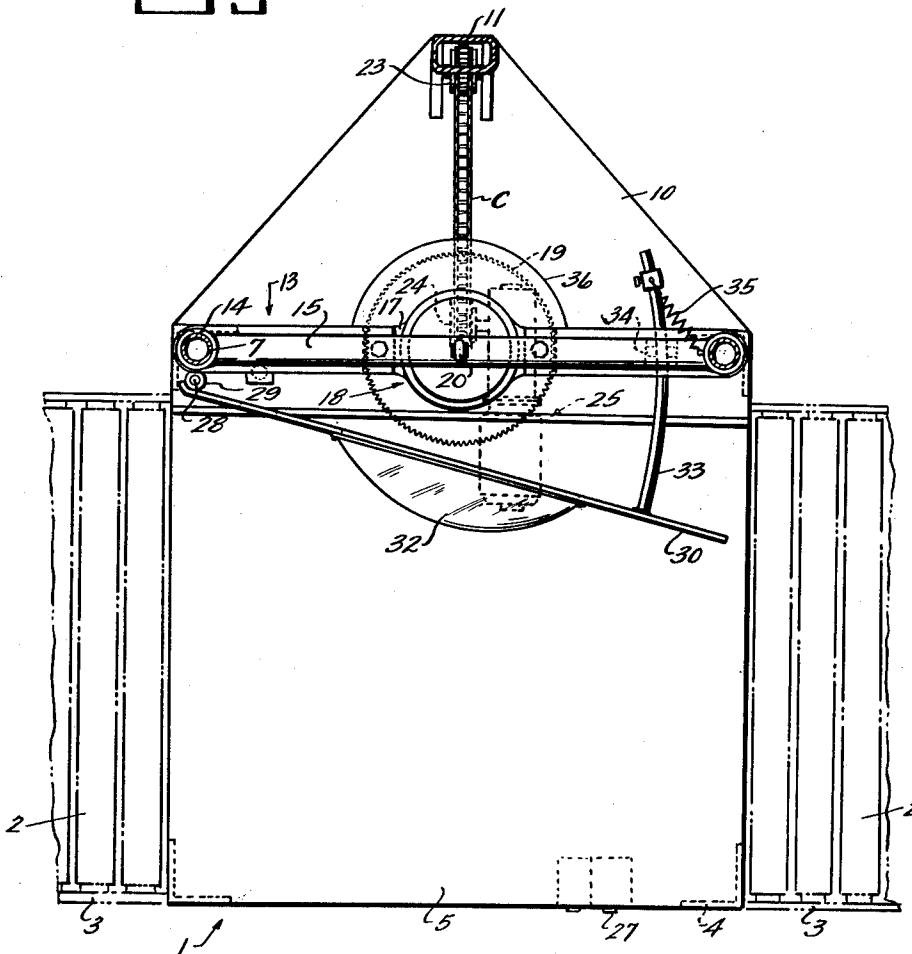
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Fig 3



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APPARATUS FOR CUTTING FASTENING BETWEEN BOX AND BOX COVER

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5 Claims. (Cl. 143—37)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to an improved apparatus for opening boxes and the like without any damage thereto which simply removes the lid of each in a manner so as to result in a box which is re-usable. This improved apparatus moreover does the work quickly and efficiently with a great saving of time as well as expense.

The subject invention consists of a conveyor type table supported by legs which has a support structure adjacent one side thereof in secured relation thereto on which a saw member is supported for adjustment vertically with respect to the table top so that as boxes are delivered to the table they are directed adjacent the saw element which has been adjusted to align in the plane intermediate the upper surface of the box and the inner surface of the connected cover in which plane the saw engages the box and severs the connection between the cover and the box at one side thereof. The top of the table at the cutting station has a surface providing minimum frictional resistance which permits a turning of the box manually thereon with ease to cut the other side of the cover from the box in a similar manner leaving the cover free for removal by merely manually lifting it off as the box is sent on for removal of its undamaged contents. The empty box may then be sent to storage for re-use.

There have been many previous efforts to provide devices of a similar nature and purpose which border on the improved apparatus of the subject invention but none of the previous efforts have resulted in an apparatus which has the simplicity or efficiency of the subject invention apparatus or have provided the specific combination of elements which produces the degree of improvement in the art as does the subject invention which results in a practical means to meet a need long recognized in the art.

An object of this invention is to provide a new and improved box opening apparatus.

A further object of the invention is to provide a new and improved box or container opening apparatus which removes only the cover leaving the box or container re-usable.

Another object of the invention is to provide an improved box opening apparatus employing a vertically adjustable circular saw in conjunction with a spring biased guard member to insure safety in handling of the apparatus.

An additional object of the invention is to provide an improved box opening apparatus employing a saw member adjustable relative to the box being opened so that only the cover is removed leaving the box re-usable.

Other objects and advantages of the invention will be readily apparent to those versed in the art from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a front view of the invention apparatus at the cutting station;

Fig. 2 is a side view of the invention apparatus at the cutting station;

Fig. 3 is a top view with a detail showing of the saw with its associated spring biased guard means.

The simple nature of the improved apparatus of the subject invention may be seen with reference to the drawings. While the support structure herein in the preferred embodiment employs metal for fabrication, the material is considered to involve a matter of choice as long as similar construction can result. The table 1 has an extending roller top composed of trains of parallel rollers 2 rotatively

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mounted to angle members 3 forming the sides of the table top. The table is supported by spaced legs 4. At an intermediate section of the table is the cutting station at which station the upper surface of the table is composed of a smooth polished plate 5. Mounted in fixed relation to the table at one side thereof is a vertical framework 6 having cylindrical upright members 7 fixed to the table frame at one side thereof connected at the top by a cross bar 8 removably secured thereto. Intermediate the height of the table a platform 9 is connected and in the practical embodiment shown is welded to the legs thereof and has a triangular extension 10 rearwardly of the table with an additional support leg at the apex thereof. Channel members 11 opening to each other extend vertically from the apex of the platform and are joined at the top by a cross bar 12 to the center of the cross bar 8. A motor support 13 is mounted on the cylindrical elements 7 for movement vertically thereof and comprises stainless steel tubing elements 14 slidably mounted around the cylindrical elements 7 and joined transversely by cross tubes 15 welded thereto in vertically spaced relation. Flat bars 16 secured transversely of the vertical tubes 14 intermediate the transverse tubes 15 are bolted to the yoke 17 of a motor 18 to support the motor vertically. The motor shaft emerges below the motor and rigidly carries a circular saw blade 19 for rotation in a horizontal plane. A threaded bolt 20 extends through the upper transverse tube vertically, the upper end thereof having an eye to which is linked one end of a sprocket chain C and the lower end of the bolt being secured to tube member 15 by a nut. The sprocket chain extends vertically over an idler sprocket wheel 21 mounted to the rearwardly extending bar 12 at its forward portion and then over an aligned identical wheel 22 mounted similarly at the rearward portion of the bar as shown in Fig. 2. The chain then extends downwardly between the back supports to a further idler 23 adjacent the platform section 10 mounted on a bolt secured to the vertical support members. The chain continues around a drive gear 24 extending from a motor 25 mounted on the platform 9 up to engage the lower transverse tube 15 of the motor support, being secured to the eye of a bolt 26 extending through and bolted to the lower transverse tube member. Thus is provided a device in the nature of a continuous chain C which is power driven and in turn drives the circular saw assembly supported on the vertical support 13 up and down. The motor 25 is reversible and a panel 27 at the front of the table carries appropriate push button switches to control the desired direction of travel of the chain. Also on the panel are stop and start control switches for the motor 18. Extending from a vertical tube 14 of the motor support 13 are vertical spaced hinge rods 28 on which are mounted bearings 29 supporting a guard plate 30 (Figs. 2 and 3) having on opening 31 therein in alignment with the saw blade to permit the saw blade to extend through. A further hood 32 for the saw blade overlying the blade opening but spaced therefrom vertically is mounted on the guard. A curved rod 33 secured to the guard at the opposite side to the hinges serves as a guide means extending through roller bearings 34 mounted in the support 13. A spring 35 connecting the end of the rod and the support having an adjustable connection relative to the rod biases the guard to an outer position shielding the saw blade which extends out over the table. A guard 36 for the inner side of the blade is fixed to the rear of the support frame.

The table portion in front of the mounted saw in the preferred form is smooth. However it is contemplated that any equivalent surface may be used at the cutting station of the table that will permit easy turning of boxes and the like. Rising from the table 5 at its rear is an abutment 37 which acts as a guide and gage plate along which the boxes are successively fed through the cutting station. The saw blade is arranged so it overlaps the guide plate a predetermined amount depending on the depth of cut or penetration to be made by the blade in severing the fastening between a box and its cover.

In the use of the invention apparatus unopened boxes are brought by conveyor onto the roller table top and each is moved up to the table section adjacent the supported saw which has been adjusted so that the blade of the saw is in line with the plane between the cover and

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the box proper. The box is brought up to abut the plate 37 at the rear end thereof at the rear of the table adjacent the support. In doing so it engages the guard 30 to cam it away from the table to expose the saw blade through the opening 31 which saw blade on energization of its motor is rotating in the direction of the box movement to cut the connection between the box and the cover. The box is moved along guided by the plate 37 as the saw engages the box to cut the cover therefrom. The plate 37 limits the inward movement of the box and the amount of engagement in cutting. The box is then turned at the cutting station and the cover cut from the box at the other side thereof to free the cover for easy manual removal by lifting the free cover from the box and the box is then moved on to be unpacked and the contents removed. The empty box may then be re-used since the box proper is not damaged or altered from its original conformation due to the novel apparatus for so insuring.

As can be readily seen the invention apparatus, while elements thereof have been known previously, has presented the elements in such an improved arrangement as to simply and efficiently effect an improved and novel apparatus for removing covers from boxes and the like to meet a need long evident in the art and thus enables the boxes to be re-used without any alteration.

What is claimed is:

1. Apparatus to sever the fastening between a box and its cover, comprising a fixed frame including a generally horizontal table along which boxes are to be fed in upright position, one after another, with their covers uppermost, said frame also including a vertically extending guide structure to one side of the table, a carriage slidably mounted on the guide structure for vertical adjustment, a cutter unit in fixed position on the carriage and including an electric motor and a horizontally rotating knife blade driven by the motor, means to adjust the carriage vertically to position the knife blade at the height of the joint between the box and its cover, and a guide and gage member rising from the table, in a position overhung by a segment of the horizontally rotating knife blade, for engaging a side of each successive box fed along the table to guide the box across the knife blade and limit the depth of horizontal penetration by the rotating knife blade into said joint in severing the box-to-cover fastening at the joint.

2. Apparatus as defined in claim 1, said means to adjust the carriage vertically including a reversible electric motor and two-way connections between the latter motor and the carriage.

3. Apparatus as defined in claim 1, further comprising a knife guard plate movably mounted on the carriage in fixed vertical relation to the knife blade and formed with a slot facing the blade, and means mounting the guard plate for horizontal displacement, by the pressure of a box ad-

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vancing along said guide and gage member, from a normal front knife blade guarding position to a rear position in which the knife blade protrudes forwardly through the slot to sever the box-to-cover fastening.

4. Apparatus to sever the fastening between a box and its cover, comprising a fixed frame including a generally horizontal table along which boxes are to be fed in upright position, one after another, with their covers uppermost, said frame also including a vertically extending guide structure to one side of the table, a carriage slidably mounted on the guide structure for vertical adjustment, a cutter unit in fixed position on the carriage and including a horizontally rotating knife blade, means to adjust the carriage vertically to position the knife blade at the height of the joint between the box and its cover, a guide and gage member rising from the table, in a position overhung by a segment of the horizontally rotating knife blade, for engaging a side of each successive box fed along the table to guide the box across the knife blade and limit the depth of horizontal penetration by the rotating knife blade into said joint in severing the box-to-cover fastening at the joint, a knife guard plate movably mounted on the carriage in fixed vertical relation to the knife blade and formed with a slot facing the blade, and means mounting the guard plate for horizontal displacement, by the pressure of a box advancing along said guide and gage member, from a normal front knife blade guarding position to a rear position in which the knife blade protrudes forwardly through the slot to sever the box-to-cover fastening.

5. Apparatus as defined in claim 4, said mounting means for the guard plate comprising a vertical hinge connection between the plate and the carriage, and means for biasing the plate to a front knife blade guarding position inclined toward and intersecting the path of travel of the box advancing along the guide and gage member so as to be cammed by the box to its rear position during the severing of the box-to-cover fastening by the knife blade.

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