July 7, 1925. 1,545,407

C. L. DREW ET AL

BOX STRAPPING MACHINE

Original Filed Oct. 1, 1920 3 Sheets-Sheet 1

FIG. 1.

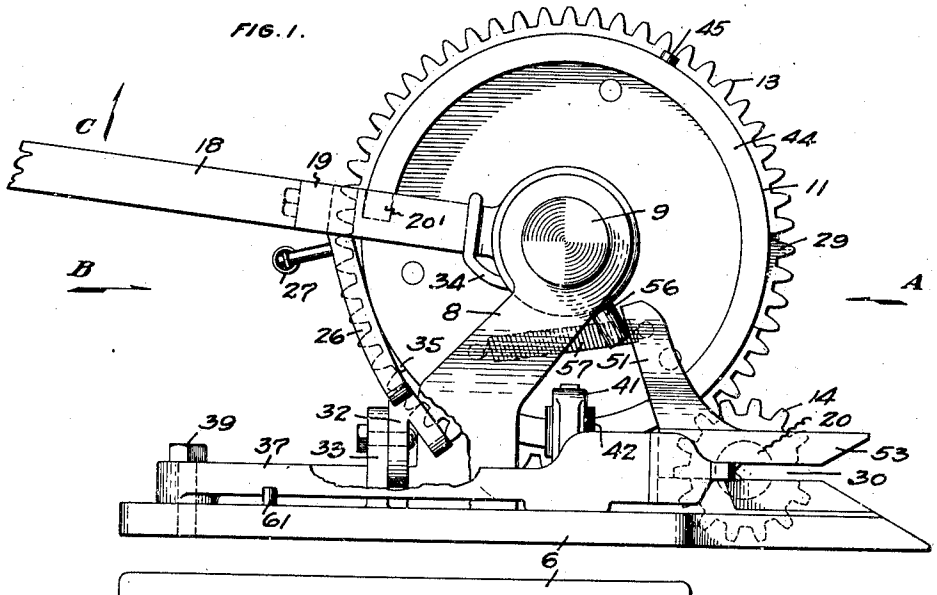
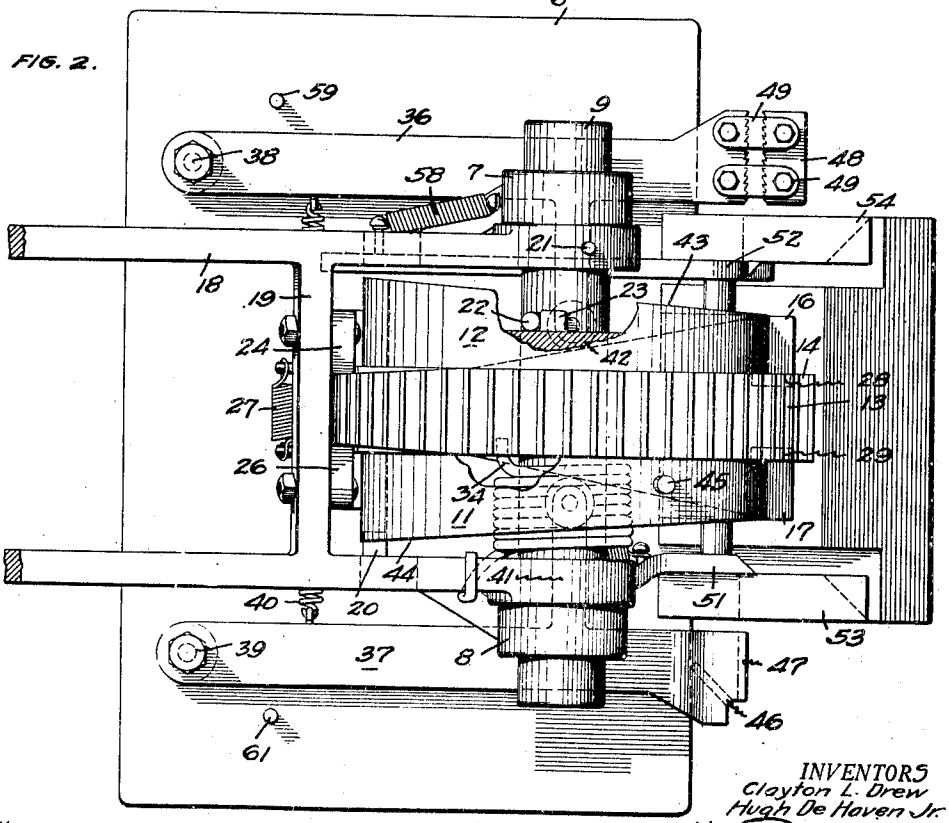


FIG. 2.



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Original Filed Oct. 1, 1920 3 Sheets-Sheet 2

FIG. 3.

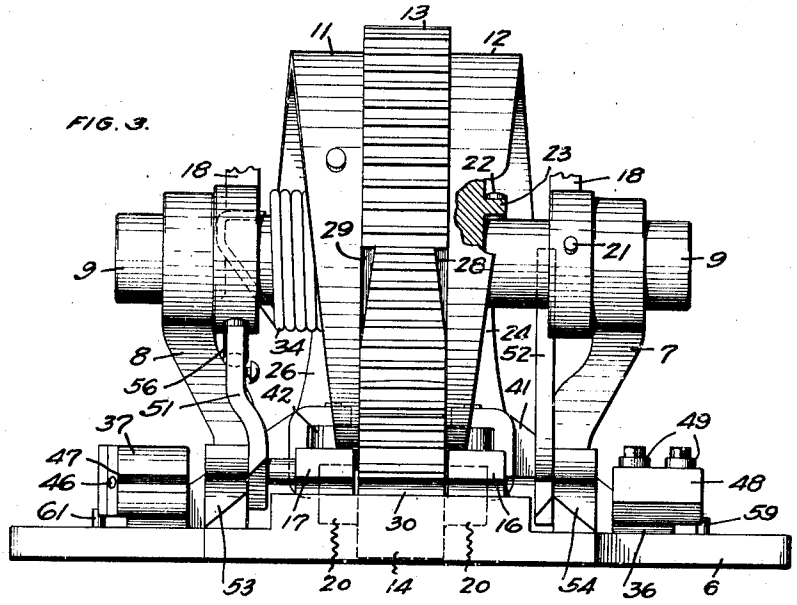


FIG. 4.

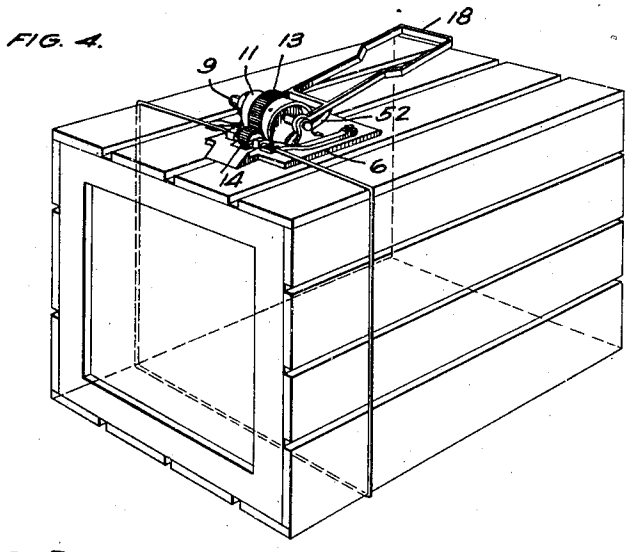
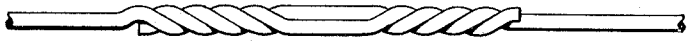


FIG. 5.



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BOX STRAPPING MACHINE

Original Filed Oct. 1, 1920 3 Sheets-Sheet 3

FIG. 6.

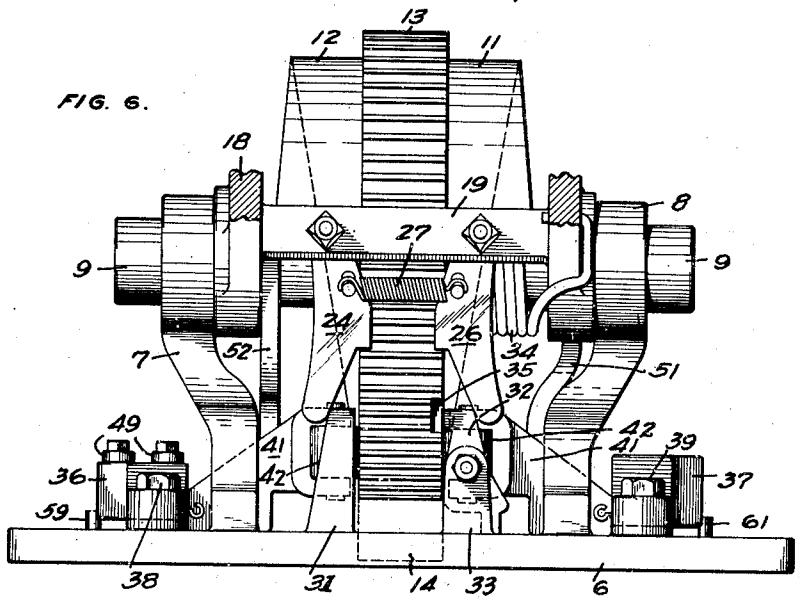


FIG. 7.

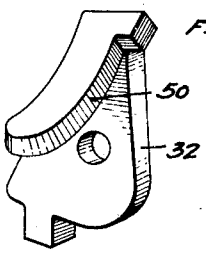


FIG. 9.

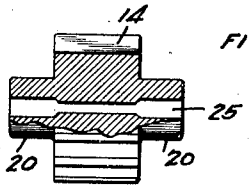
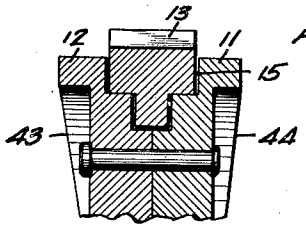


FIG. 8.



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UNITED STATES PATENT OFFICE.

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BOX-STRAPPING MACHINE.

Continuation of application Serial No. 414,108, filed October 1, 1920. This application filed September 27, 1922. Serial No. 590,958.

To all whom it may concern:

Be it known that we, CLAYTON L. DREW and HUGH DE HAVEN, Jr., citizens of the United States of America, residing at San Francisco, State of California, have invented certain new and useful Improvements in Box-Strapping Machines, of which the following is a specification.

This application is a continuation of our application Serial Number 414,108, filed October 1st, 1920.

This invention relates to a new, novel and useful improvement in box strapping machines wherein a strand of wire is placed about a box for the purpose of protecting the box during shipment.

An object of the invention is to provide a machine for tightening and securing a wire around a box or package, in which a single operating lever is employed, movement of the lever in one direction serving to draw the wire tightly around the package and movement of the lever in the reverse direction back to its normal position, serving to twist adjacent portions of the wire together to form a tie and also preferably to cut the ends of the wire extending beyond the tie.

Another object of the invention is to construct a machine of this character which will be portable, light in weight and consequently easy to handle without fatiguing the operator.

Another object is to construct a machine which will be simple of operation, with a result that an ordinary unskilled laborer can manipulate the same.

Another object is to construct a machine which will be simple to manufacture and consequently can be marketed at a price well within the reach of the average individual.

Other objects and advantages will be seen in the description which follows:

In this specification and the annexed drawings the invention is illustrated in a form considered to be the best, but it is to be understood that the invention is not limited to said form because it may be embodied in other forms, and it is also to be understood that in and by the claims following the description, it is desired to cover the invention in whatsoever form it may be embodied.

In the accompanying drawings:

Figure 1 is a side elevation of the complete machine, having a portion broken away.

Figure 2 is a top plan view of the machine as shown in Figure 1.

Figure 3 is an elevation taken looking in the direction of the arrow "*a*" of Figure 1.

Figure 4 is a perspective view of the machine in use upon a box.

Figure 5 is a portion of a strand of wire, illustrating the twist made by the machine.

Figure 6 is an elevation of the machine looking in the direction of the arrow "*b*" of Figure 1.

Figure 7 is a perspective view of a gear lock.

Figure 8 is a section, illustrating the manner of mounting the gear upon the cams.

Figure 9 is a partial longitudinal section through the twisting gear.

The machine of our invention consists generally of a portable tool, adapted to rest on the package to be strapped, having means for tightening a wire around the package, means for twisting together the adjacent or overlapping end portions of the wire to form a tie and means for cutting off the ends of the wire extending beyond the tie and a single operating lever, movement of the lever from its normal position serving to tighten the wire and movement of the lever in the reverse direction back to normal position serving to twist the end portions of the wire together to form a tie and to cut off the ends of the wire extending beyond the tie. The cutting off means may be omitted when desired and the movement of the lever from and back to normal position serve to tighten and tie the wire, but we prefer to incorporate the cutting means, thus pro-

viding a tool by which the entire operation is performed by one complete movement of the single lever.

Referring to the drawings in detail, the numeral 6 designates a base plate, having a contour as is best shown in Figure 2. This base plate supports standards 7 and 8, which standards form journals for a shaft 9, which shaft is free to rotate therein, as will be later described.

The shaft 9 forms a support for cam members 11 and 12, which are also free to rotate about the shaft 9 within certain limits, as will be later described.

By referring to Figure 8, it will be noted that the cams are recessed as at 15 so as to provide for the floating gear 13.

This gear 13 is adapted to mesh with a gear 14, which gear is formed with stub shafts 20 projecting therefrom and supported in pillow blocks 16 and 17, to provide suitable journal bearings for the gear, the construction of which gear is shown at Figure 9, wherein it will be noted that the slot 25 therein is narrowed midway of its length to provide for engaging the parallel wires while the wide portion of the slot accommodates the twisted portion when completed.

Attached to the shaft 9 by the pin 21 is a bifurcated handle 18 having an integral yoke portion 19.

A pin 22 projecting from the shaft 9 is adapted to contact with a lug 23 formed upon the cam member 12.

The yoke 19 serves to pivotally support gear dogs 24 and 26, as is best shown in Figures 1, 2 and 6. These gear dogs are held towards each other by a spring 27 and are adapted to engage recesses cut in the side faces of the gear 13, as is best shown in Figure 3 at 28 and 29, it being understood that there are two sets of these recesses diametrically opposite each other.

In order to withdraw these gear dogs from their engagement with the recesses 28 and 29 at a predetermined point, they are adapted to contact with members 31 and 32.

The member 31 is a lug cast upon the base and the member 32 is a gear lock pivoted to the lug 33, also cast upon the base 6, which gear lock is adapted to enter a recess 35, cut in the side of a gear 13.

This gear lock is maintained in fixed positions by the placing of a lock washer (not shown) between it and its pivotal connection. The function of a lock washer is well known and needs no further description.

The numeral 34 refers to a spring wound about the shaft 9, and having one end engaging a portion of the yoke 19, and having its opposite end engaging cam 11. This spring is coiled in a direction which will cause further tightening when the handle 18 is moved in the direction indicated by the arrow "*c*" of Figure 1. The purpose of this spring will be later described.

The numerals 36 and 37 refer to arms pivoted, as shown at 38 and 39 upon the base 6. These arms each have an inwardly projecting portion 41 and each carries a roller 42 at the extremity of said projection. The object of said roller is to contact with the vertical cam, faces 43 and 44, as is best seen in Figures 1 and 3.

These arms 36 and 37 carry or have formed at their free ends wire holding means. The holding means, shown upon the arm 37, consists of an opening 46 formed in the end of the arm on a slant, so that when the end of the strand of wire is placed therein it may be bent so as to lie in a milled groove 47.

The gripper, shown on the arm 36 consists of a block 48 pivoted at the end of the arm by means of links 49. The opposing faces of the block and the arm having teeth formed thereon, so that when the block is swung upon the links it will cause a gripping action upon any object which may be there between.

By referring to Figures 1 and 3, it will be noted that cutters 51 and 52 are pivoted to wire guides 53 and 54 which guides are attached to the base 6.

The cutter 51 is actuated thru its contact with a pin 56 carried upon the yoke 19 and is held in contact therewith by a spring 57. The cutter 52 is likewise actuated by having its extremity abut the rear end of the yoke 19 as the handle is returned from its forward position as is best shown in Figures 4 and 3. This cutter is also kept in contact therewith through the medium of a spring, as shown at 58.

In order that the parallel portions of the wire may be received by the twisting device an elongated slot 25 is provided by recessing the pillow blocks 16 and 17. Stub shafts 20, and the guides 53 are likewise slotted or divided, as at 30, in order that the wire ends may pass there through.

Pins 59 and 61 are provided to limit the movement of the arms 36 and 37.

The operation of the machine is as follows:—

Assuming the machine to be placed upon the top of the box to be strapped, as shown in Figure 4, the one end of the strand of wire is grasped and the end inserted in the opening 46. The wire is then bent so as to lie in a groove 47, passed thru the guide 53, slotted pillow blocks 16 and 17 and slotted gear 14 and guide 54; thence around the box or other object; thence through the guides and gears, as before mentioned, in such a manner that the free end will be gripped in the space between the end of the arm 36 and the block 48 to the left as shown in the drawing, a gripping action is com-

menced. By now grasping the handle 18 and revolving in the direction of the arrow "c" of Figure 1, the following will take place:

The lug 20' formed on the yoke 19 will contact with the cam 11 and the pin 22 will contact with the lug 23 of the cam 12 and will impart rotation thereto about the shaft 9. This rotation will act upon the rollers 42 and cause the arms 36 and 37 to move about their pivot points 38 and 39, thereby drawing the ends of the wire and tightening the strand which passes around the box. At the same time, as the ends of these arms travel in an arc, the wires will be drawn toward the center of the gear, or, in other words, into proper alignment in the slot, passing across the entire front of the machine.

During the forward movement of the handle 18 the gear 13 is held against rotation by the gear lock 32, which has its nose in the recess 35 formed in the gear 13, and as a spring washer is placed between the gear lock 32 and its pivot support, the same will stay in engagement therewith until withdrawn. When the handle 18 reaches a point substantially 180° from its illustrated position, the dogs 24 and 26 will engage the recesses in the gear 13, as shown at 28 and 29 in Figure 3, and at this point a pin 45 carried upon the face of the cam 11 will have come into contact with the cam face 50 of the gear lock, and will have withdrawn the same from its recess 35.

At this period, the wire will be under tension from the action of the cams and the gear lock will have been withdrawn. The dogs 24 and 26 will have engaged the gear recesses 28 and 29 and the machine is ready for a twisting or backward stroke.

This backward stroke causes the gear 13 to rotate the gear 14 and to twist the wire, as shown in Figure 5, the ends being held against twisting by passing through the guides 53 and 54. The openings or slots 30 are made large enough to accommodate only the thickness of a single strand of wire; in other words, the openings are not large enough to permit one strand to ride over the other—consequently they will be maintained in parallel relation in substantially the same horizontal plane.

When the handle reaches the position shown in Figure 6 the ends of the dogs 24 and 26 will engage the lug 31 and gear lock 32 respectively, which action will be to withdraw the dogs from contact with the gear lock into its recess 35. Further downward action of the handle will act upon the cutters as is obvious. The cutter 51 as shown in Figure 2 will cut the inner wire or first end passed through the slot 30, while the cutter 52 passes under the inner wire and cuts the outer wire or second end passed through the slot; one cutting from above and the other cutting from beneath, as is illustrated in Figure 3 where the rear of the cutter 52 is best shown.

As soon as these ends are cut, the tension is relieved from the cams, and the spring 34 will return them to their normal position as illustrated in Figure 1. As soon as these cams are returned, the spring 40 will return the arms 26 and 27 to their normal position. The springs on the cutters are of such a tension that they will withdraw the cutters so as to clear the slot across the front of the machine and at the same time will act upon the pin 56 to raise the handle 18 to its neutral position.

Thus it will be seen that a machine has been produced which will stretch, twist, and cut off the ends of the wire through the operation of a single lever, which is rotated first in the forward direction and then in the rearward direction and leave the machine in position for a repeated operation.

We claim:

1. A box strapping machine comprising in combination wire tensioning, twisting and cutting means, actuating means movable in one direction to actuate the tensioning means and movable in a reverse direction to actuate both the twisting and cutting means.

2. In a wire twisting machine, a base, a shaft journalled upon said base, a pair of co-axially mounted cams on said shaft, a gear mounted upon said cams, means movable in one direction for rotating the cams and capable of rotating the gear upon a movement in a reverse direction, a wire twisting device, including a slotted gear and meshing with said first named gear; the slot in said gear adapted to receive the wire to be twisted, guides operatively associated with the said slotted gear and disposed on opposite sides thereof, a wire tensioning device operatively associated with said guides, the rotation of said cams adapted to actuate said tensioning device and the rotation of the first named gear adapted to actuate said wire twisting device.

3. In a box strapping machine, a base, a shaft mounted above said base and parallel therewith, opposing cams mounted with freedom of rotation on said shaft and attached one to the other, a gear mounted with freedom of rotation between said cams and supported thereon, a slotted gear adapted to receive the wire to be twisted, a handle adapted to be rotated about said shaft, a U shaped yoke portion integral with said handle, and adapted to straddle said cams and said gear, dogs carried on said handle, said dogs being adapted to engage the sides of said gear for the purpose of imparting movement thereto when said handle is moved in one direction, means for rotating

said cams independently of said gear when said handle is moved in the opposite direction, and means co-operating with said cams for tensioning the opposite ends of a strand of wire.

4. In a device of the character described, a base, a shaft journaled upon said base, a pair of cams mounted upon said shaft, a gear mounted with freedom of rotation between said cams, a handle movable in one direction to rotate the cams, dogs carried by the handle adapted to engage said gear when the handle is moved in a reverse direction, a slotted gear carried upon the base meshing with said first named gear, said slotted gear adapted to receive the wire to be twisted, wire guides on opposite sides of said slotted gear, a wire tensioning device on opposite sides of said guides, said tensioning device being operatively associated with said cams, and cutters disposed on opposite sides of the slotted gear, said cutters being operatively associated with the handle, and adapted to be actuated thereby when the handle is moved in a direction to rotate the first named gear.

5. In a device of the character described, a base, a shaft supported above said base, opposing cams freely mounted on said shaft, a gear freely mounted between said cams, arms pivoted to said base, grippers carried at the free ends of said arms, rollers mounted on said arms and adapted to contact said cams, slotted guides carried on said base and in juxtaposition to the ends of said arms when in their retracted position, cutters pivoted to said guides, a gear provided with a slot mounted between said guides and adapted to mesh with said first mentioned gear, said slot being adapted to register with the slots in said guides, and a yoke carried on said shaft, which when moved in one direction about said shaft, rotates said cams, and when moved in a reverse direction, rotates said gears.

6. In a device of the character described, a base, a shaft supported above said base, opposing cams freely mounted on said shaft, a gear freely mounted between said cams, arms pivoted to said base, grippers carried at the free ends of said arms, rollers mounted on said arms and adapted to contact said cams, slotted guides carried on said base and in juxtaposition to the ends of said arms when in their retracted position, cutters pivoted to said guides, a gear provided with a slot mounted between said guides and adapted to mesh with said first mentioned gear, said slot being adapted to register with the slots in said guides, a yoke carried on said shaft, which when moved in one direction about said shaft, rotates said cams, and when moved in a reverse direction rotates said gears, and means for locking said gears against rotation, but in one direction.

7. In a device of the kind described means to hold the ends of a wire in overlapping position, wire twisting means disposed between the first mentioned means, and a single operating lever arranged to successively separate the wire holding means and therefore tension the wire and actuate the wire twisting means.

8. In a device of the kind described, means to engage the ends of a wire loop and hold the adjacent portions in overlapping position, wire twisting means intermediate the wire holding means, a cutting device at each side of the wire twisting means, an oscillating operating lever, and operative connections between said lever and the several means arranged upon reciprocation of the lever to successively separate the wire holding means and thereby tension the wire, actuate the wire twisting means and cut off the surplus wire.

9. In a device of the character described, the combination of means for tightening a wire around a box with the end portions thereof held substantially parallel to one another, means for twisting said end portions, and means common to both the tightening and twisting means for successively actuating the same, said means comprising a lever movable in one direction to tighten the wire and movable in a reverse direction to twist the same.

10. A box strapping machine provided with an operating lever which, by swinging in one direction exerts a cam-like action upon the gripping devices to produce the desired stretching of the box strapping and, by swinging in the opposite direction, drives the twisting mechanism and the cutting mechanism, whereby the successive operations of stretching, twisting, cutting and releasing of the box strapping are accomplished by each complete oscillation of said operating lever.

11. A box strapping machine comprising wire tensioning means, wire twisting means and actuating means movable from normal position to actuate the tensioning means and back to normal position to actuate the twisting means.

12. A box strapping machine comprising wire tensioning means, wire twisting means and a single lever movable in one direction from normal position to actuate the tensioning means and movable in the reverse direction back to normal position to actuate the twisting means.

13. A box strapping machine adapted to be placed on the box to be strapped comprising wire tensioning means, wire twisting means and actuating means adapted to be reciprocated to successively actuate said tensioning and twisting means.

14. In a wire tying machine, the combination of a frame, a lip projecting from the

front edge of the frame, members provided with slots for holding two portions of a wire in parallel contact arranged over opposite sides of the lip, a wire twisting gear journalled on said frame and disposed between said members, a pair of wire tensioning levers pivoted on the frame adjacent the opposite sides thereof, said levers projecting beyond the front edge of the frame on opposite sides of said lip, means on the levers adapted to engage and hold the wire and means for moving said levers to tension the wire.

In testimony whereof, we have hereunto set our hands.

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HUGH DE HAVEN, JR.