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T. W. J. WILLCOX

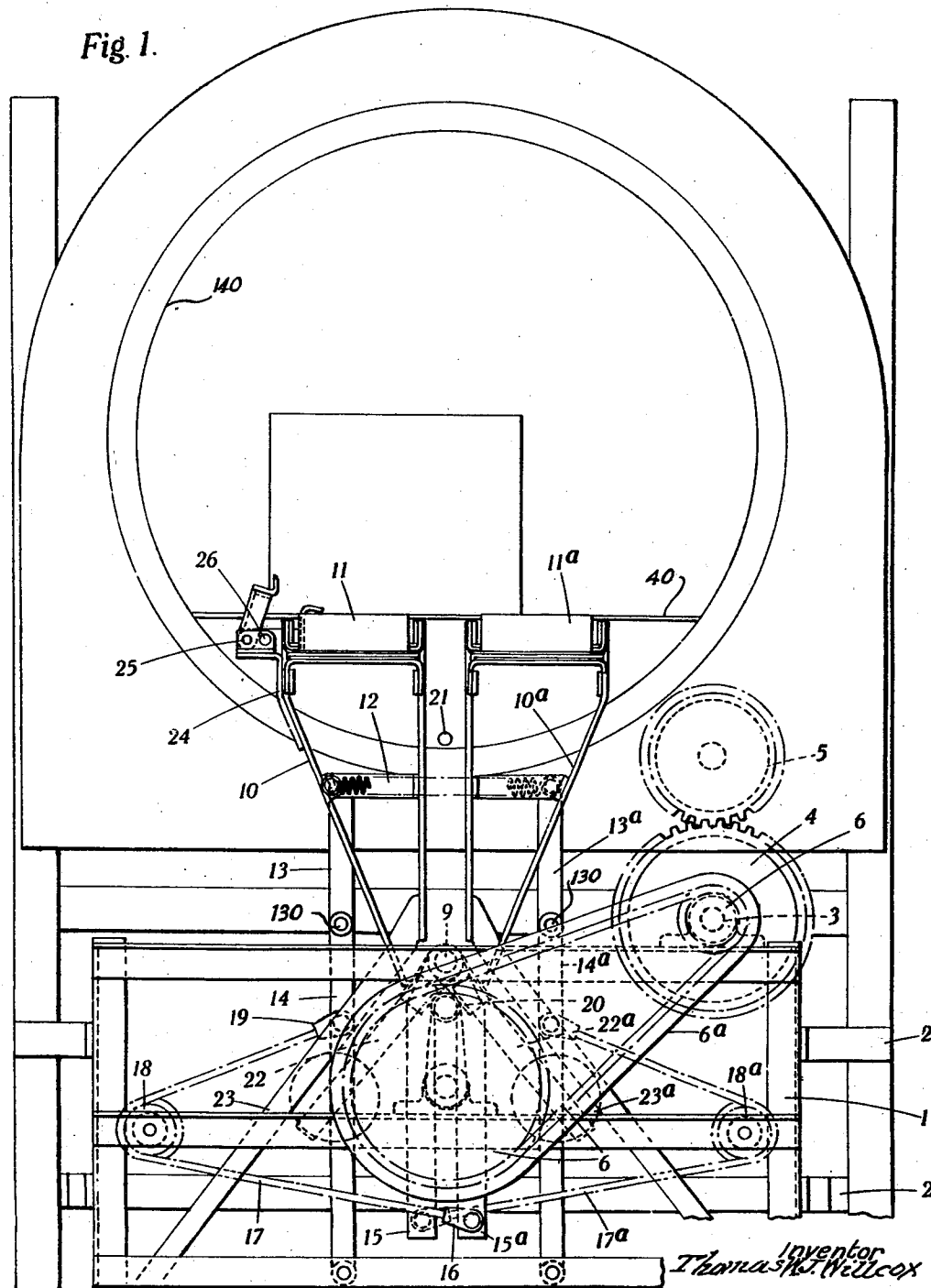
2,334,736

STRAPPING MACHINE

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3 Sheets-Sheet 1

Fig. 1.



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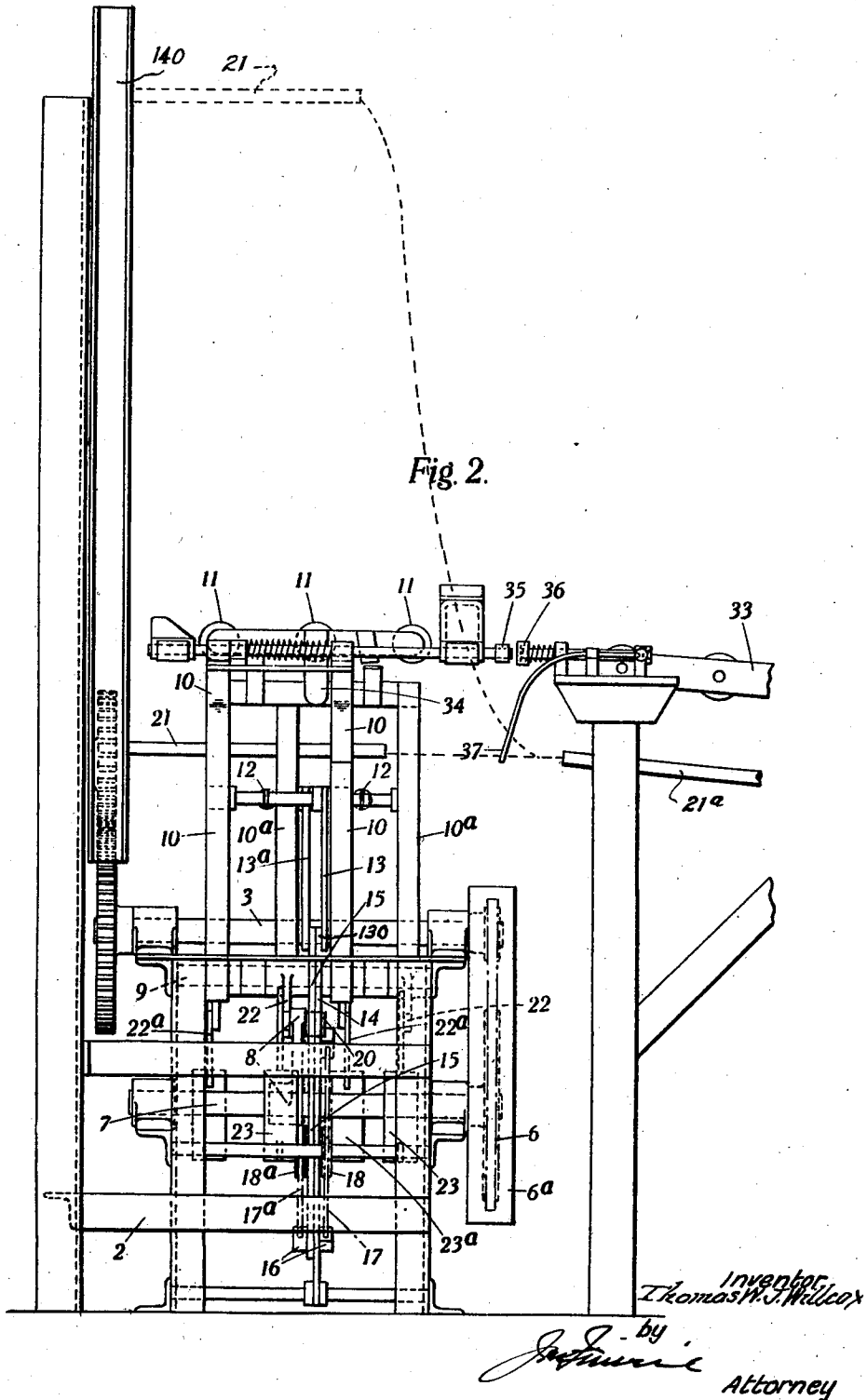
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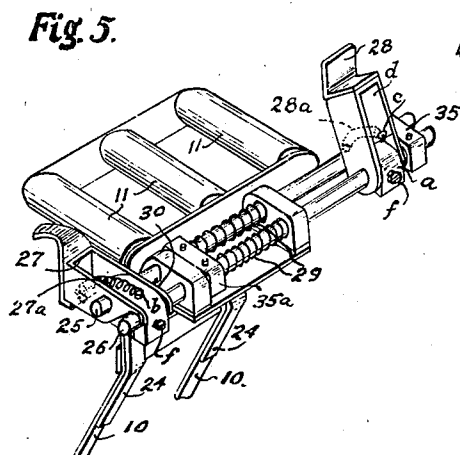
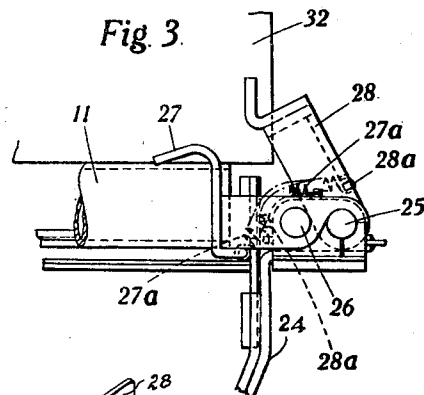
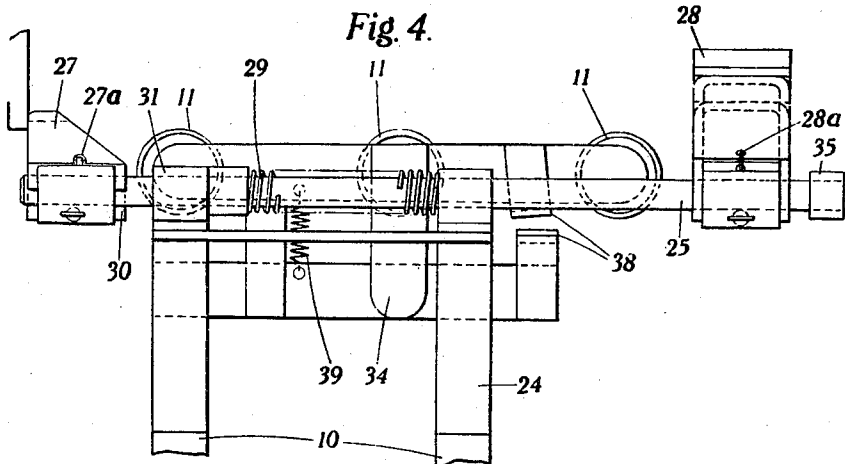
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3 Sheets-Sheet 3



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STRAPPING MACHINE

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11 Claims. (Cl. 100-31)

This invention relates to strapping machines.

In connection with power-operated strapping machines in which the bight of the strapping material is automatically fed round the package, difficulty has been experienced in providing for the feeding forward to a delivery conveyor (or other destination) of strapped packages, owing to fouling of the strapping material by the delivery conveyor or by an intermediate support between the conveyor and the supporting table or the like of the strapping machine. The present invention provides a supporting device comprising two portions which move in turn to permit the strapping material to pass. In a preferred form, the device comprises two members each arranged to support, during the strapping operation, part of that portion of a package projecting beyond the front of the supporting table or the like of a strapping machine and, during the wire-training operation, to swing away from and return to the package-supporting position.

The invention also provides stop devices for locating packages relatively to associated strapping mechanism which are automatically moved to permit the discharge of strapped packages. In a preferred arrangement, a stop is moved forward to a package-arresting position upon contact by the front of a moving package and is subsequently automatically moved from the path of the package, whereupon it returns behind the level of the front of the arrested package.

A stop in accordance with the invention can be conveniently applied to apparatus including a package-supporting device as described above, being carried by one of the supporting members, the movement of which from the supporting position provides the automatic removal of the stop from the path of the package. This feature of the invention is, however, capable of other applications, the movement of the stop being provided for in any suitable way.

When it is desired to determine automatically the correct successive positions of a package relatively to strapping mechanism for the successive applications of a plurality of strappings, a corresponding number of stops may be provided. Moreover, the force of impact between a package and a stop may be employed to control the operation of associated mechanism.

The accompanying drawings illustrate a typical form of the invention applied to an automatic wire tying machine in which wire from a coil is fed to wire-training means from the front of the machine, that is to say is fed to the machine in

the direction the reverse of that in which the packages are discharged after strapping.

In the drawings:

Fig. 1 is a front elevation,

Fig. 2 is a side elevation, and

Figs. 3 and 4 are details to a larger scale.

Figure 5 is a perspective view showing the automatic stops.

The present improvements are directed to the type of machine illustrated particularly in British Patent No. 523,786, issued to H. Harvey, January 13, 1939, and many of the details of that patent are embodied in the present showing as conventional parts to show the application of the improved structure, and will be identified in the following description.

As will be clear from the British patent referred to, the wire is carried about the package by ring 140, Figure 2, to which the wire is fed from a source of supply, the details of the wire tying, cutting, and handling being unimportant to the present invention.

As shown, there is a steel angle framework 1 which is attached at a number of points 2 to the main frame of any suitable automatic strapping machine, a platform of which is indicated at 40.

The shaft 3 is mounted on bearings of the framework and at one end carries a gear wheel 4 which receives its motion from a pinion 5 of the main machine. This pinion may, as shown, be that which drives the device by which the bight of the wire is carried round successive packages. The drive is transmitted from this shaft 3 by means of a chain and sprockets indicated at 6 and enclosed in chain case 6a to another shaft 7 upon which is mounted the crank arm 8. Immediately above the shaft 7 is a spindle 9 mounted parallel to the shaft below. Two steel structure frame works 10 and 10a are mounted on the spindle 9 and carry a series of conveyor rollers 11 and 11a at the top. The frame works 10 and 10a are each arranged to pivot independently in an outward direction on the spindle 9. They are urged towards each other by the springs 12 and are locked in a vertical position by the links 13 and 14, and 13a and 14a. The respective pairs of links 13 and 14 and 13a and 14a are clearly shown in Figure 2 of the drawings as separate link parts, and as apparent from Figure 1, these link parts in order to perfect the desired operation are pivotally connected, as at 130.

From the spindle 9 two arms 15 and 15a are suspended vertically downwards, one on each side of the shaft 7 and are also free to pivot in an outward direction. To the ends of the arms 15

and 15a are attached chain links 16, and the chains 17 and 17a are carried round sprockets 18 and 18a and are attached to the links 14 and 14a as shown at 19. The ratio of the gears and chain sprockets are the same as that between pinion 5 and the device carrying the wire round a box or other package, so that shaft 7 makes one complete revolution simultaneously with each such operation.

This rotates the crank arm 8 in an anti-clockwise direction and the crank arm roller 20 engages with the left hand suspended arm 15 swinging it in an outward direction. This pulls the right hand chain 17a which pulls on the vertical link to which it is attached and causes the right hand frame work 10a to swing outwardly, thus allowing a wire carrying tube 21 or other part of the main machine which carries the bight of the wire coming from the fixed tube 21a round the box, to move to the right without obstruction. When the crank arm 8 has moved half way round it will have allowed the suspended arm 15, and consequently the frame work 10a to return to the normal position. The platform 40 and the three rollers 11 or 11a or one framework can always support a box of normal proportions. It is apparent that a pair of links, as 13 and 14, are held against possibility of inward movement, obvious from the centers of the connected framework 10 and the pivot 130 and the bottom pivot of link 14, and also the restrain of chain 17. Furthermore, the relation is such that the operated framework 10 can only move outwardly on spindle 9 in operation and cannot affect the remaining framework 10a, which is independently pivoted and held by its link parts 13a and 14a and the chain 17a.

In continuing its revolution however it then engages with the right hand suspended arm 15a which is swung in an outward direction pulling the left hand chain 17 and consequently the link 14 which swings the left hand framework 10 outwards allowing freedom of passage to the wire carrying tube 21 to its original position after completing the encircling of the box. An extension to the frame works 10 and 10a is shown in arms 22 and 22a which carry counterbalance weights 23 and 23a which retain the mechanism in equilibrium, apart from the pull exerted by the springs 12. As will be seen in the British patent referred to, the wire is fed from a source of supply to a clamp for delivery to the ring 140. In connection with the present construction, and particularly the movable frameworks 10, it is desirable that the incoming wire be prevented from being entangled in the moving parts. For this purpose, the wire is led through a tube 21a fixed to the machine frame, and then through a tube 21, secured to and carried by the ring 140, and delivering the wire to the appropriate relation to such ring for the operation described in the British patent, and with which the present invention is not particularly concerned. The tube 21 extends from the ring 140 laterally thereof and between the frameworks 10, as shown in Figure 1, to avoid wire entanglement. The course of the wire being fed is illustrated in dotted lines in Figure 2.

On the left-hand framework a carrier 24 is attached supporting two parallel horizontal rods 25 and 26 upon which automatic stops are mounted. These are shown in detail in Figs. 3, 4 and 5. The first stop 27 is mounted on the inner rod 25 and is free to pivot against the action of a return spring 27a in a downward direction to the

underside of the box. When the box comes into contact with the first stop as shown in Figures 3 and 4, the stop and the rods upon which it is mounted are, by the force of contact, pushed away to the right (Fig. 4), compressing the springs 29 until the collar 30 is in abutment with the bearing 31.

The box is then stopped in this position and the wire is at this stage carried around it for the tie to be made. During this operation the framework swings away as previously described, and in doing so the spring 29 exerts itself and the stop returns to its normal position. When the framework returns the stop comes up underneath the box instead of remaining at the end of it, slightly extending the return spring 27a, the final return of the stop to its initial position taking place when the box moves past it. When the tie is completed, the box is then free to slide forward over the rollers 11 and 11a until it reaches the second stop 28, which has a return spring 28a. Here a similar operation occurs, but in this case the stop is brought in contact with the side of the box 32 and not underneath it. When the second tie is completed the box is then free to slide forward on to the conveyor 33 waiting to carry it away. The side supports of the rollers 11 and 11a are however pivoted at 34 which enables the rollers to tip at a slight angle immediately the centre of gravity of the box has passed this point, thus accelerating the motion of the box in its exit from the machine. Abutments 33 and a return spring 35 control this action.

The locking collar 35 attached to the ends of the rods 25 and 26 is arranged to contact with the head of the spring plunger 36 to which is attached a Bowden cable 37. The other end of the Bowden cable operates a trip key or other suitable device which actuates the mechanism of the tying machine and thus, each time the box contacts with one of these stops, they and the rods upon which they are carried, move forward to pass on this motion to the Bowden cable, thus automatically operating the tying machine.

The machine described above in considerable detail is a typical example of the invention and it is not intended that the monopoly claimed should be limited to the specific constructions and expedients illustrated. Various modifications and equivalents may obviously be employed without departing from the terms of the claims. It will be plain that the wire is fed from a coil through the fixed tube 21a to the tube 21 which performs the function of the operator's arm in the hand-encircled machines, and is carried round the circle indicated in front of the platform, with the bight of the wire, after the end of the wire has been gripped in the gripper of a conventional tying mechanism, located under the edge of the table in a conventional manner.

I claim:

1. In apparatus for strapping packages the combination of means to train a bight of strapping material about a package with a plurality of package supports and means to move the supports in turn out of the way of the bight to permit it to pass.

2. A supporting device for supporting that part of a package which projects beyond the strapping position in automatic strapping apparatus having means to train strapping material about a package and driving means therefor, the said device comprising alternative supports and means, driven in synchronism with the said training

means, for successively moving the said supports out of the path of the bight of the strapping material as the latter is trained about the package.

3. A supporting device for supporting that part of a package which projects beyond the strapping position in automatic strapping apparatus having means to train strapping material about a package and driving means therefor, the said device comprising movable supports and means to synchronise the movement of the supports to move successively away from and back into supporting position as a bight of the strapping material is trained about the package.

4. Apparatus for stopping boxes or other suitable packages in position on a strapping machine while the strapping material is trained about them and secured, in which a member carrying a stop is moved away from the package by means synchronised to operate during the latter part of the cycle and is returned with the stop in such a position that it no longer operates as a stop until released to return to the original position when the package is moved away.

5. Apparatus for stopping boxes or other suitable packages in position on a strapping machine while the strapping material is trained about them and secured, in which the front supporting means for the package carries several stops giving successive strapping positions and moved away to clear the package by means synchronised to operate during the latter part of the successive strapping cycles, all the stops being released to return to their original positions when the package is moved away.

6. A supporting device for supporting that part of a package which projects beyond the strapping position in automatic strapping apparatus having means to train strapping material about a package and driving means therefor, the said device comprising alternative supports and means, driven in synchronism with the said training means, for successively moving the said supports out of the path of the bight of the strapping material as the latter is trained about the package together with a stop in the path of the packages a means actuated by the impact of a package against the stop automatically to start the strapping mechanism.

7. In apparatus for strapping packages the

combination of means to train a bight of strapping material about a package with two supports for that part of the package projecting beyond the strapping position, means to guide the strapping material between the said supports, a member between the said supports driven synchronously with the training means, the said member causing one of the said supports to move aside temporarily to permit the material to pass away from the position between the supports to encircle the package and the other of said supports to move aside temporarily to allow the material to return to its initial position.

8. In apparatus for strapping packages the combination of means to train a bight of strapping material about a package with a plurality of package supports and means to move the supports in turn out of the way of the bight to permit it to pass the said supports including sets of rollers on a pivoted mounting enabling them to tip slightly as soon as the centre of gravity of the package has passed the pivot and accelerating its movement away from the machine.

9. In an automatic strapping machine, stop devices for locating boxes or other suitable packages relatively to associated strapping mechanism wherein one or more stops are moved forward to a package arresting position upon contact by the front of a moving package and subsequently automatically moved from the path of the package and returned behind the position at which they serve to arrest the package.

10. In an automatic strapping machine, devices according to claim 9 in which the stop or stops are returned behind the position at which they serve to arrest the package but within the length of the package, lying against it until the package is discharged, when they return to the position which the front of a subsequent package will contact.

11. In an automatic strapping machine having strapping mechanism, stop devices for locating packages relative to such strapping mechanism, a front support for the package carrying said stop devices, and means synchronized with the strapping mechanism for automatically moving said stop devices to permit the discharge of strapped packages.

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