Jan. 28, 1941. A. S. FALCON 2,229,730

BOX STRAPPING MACHINE

Filed Dec. 6, 1938 2 Sheets-Sheet 1

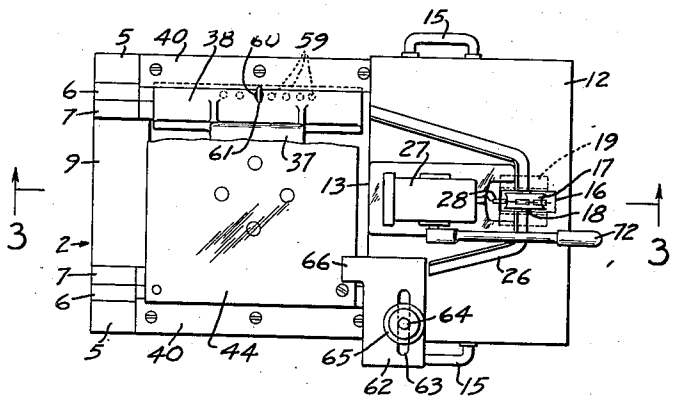



FIG. 2.

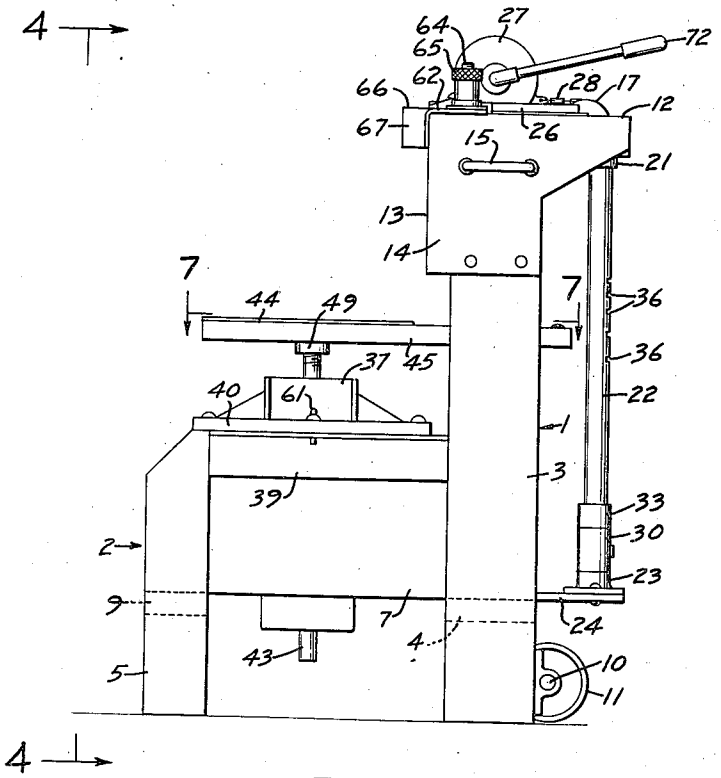



FIG. 1.

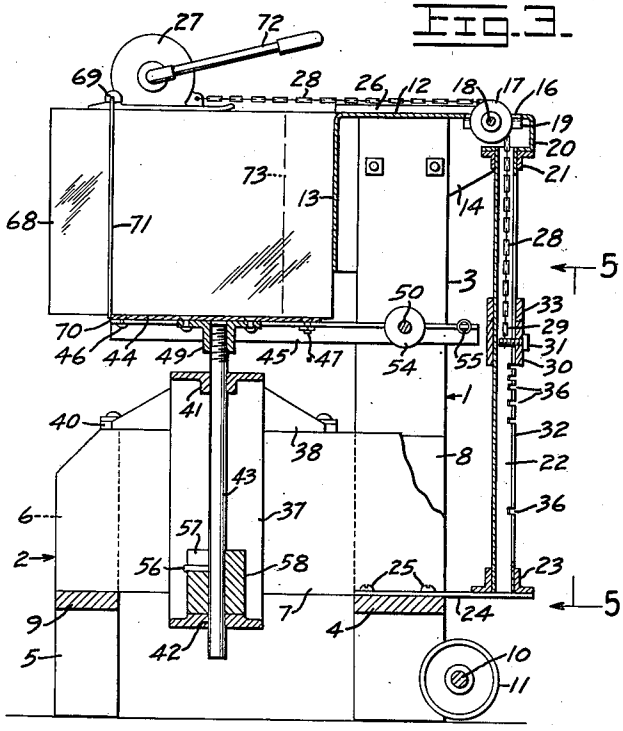
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Filed Dec. 6, 1938 2 Sheets-Sheet 2

Fig. 3.



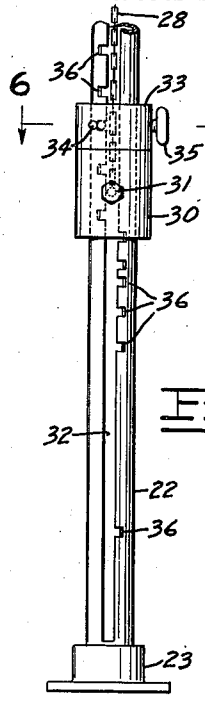




Fig. 5.

Fig. 4.

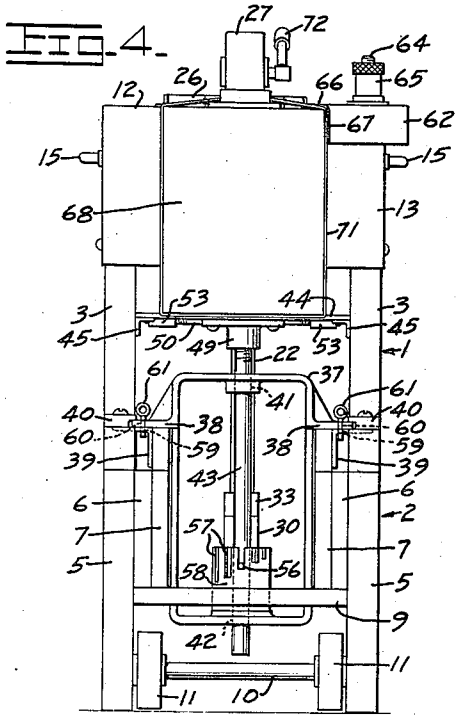
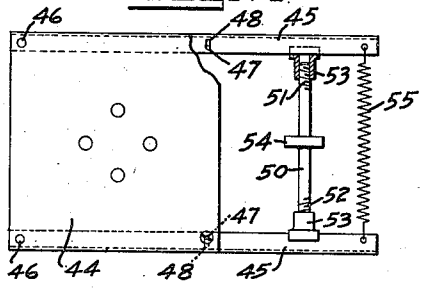



Fig. 7.



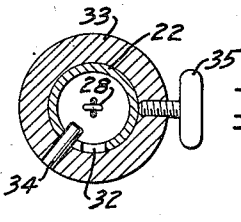




Fig. 6.

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# UNITED STATES PATENT OFFICE

2,229,730

## BOX STRAPPING MACHINE

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Application December 6, 1938, Serial No. 244,236

19 Claims. (Cl. 100—31)

The present invention appertains to a strapping machine for strapping packages such as boxes, crates, or similar objects preparatory to shipment thereof.

The principal object of the present invention is to provide a strapping or wire tying machine of a simple and inexpensive construction for facilitating uniform strapping of boxes in an efficient and expeditious manner.

Another object of the present invention is to provide a strapping machine for strapping boxes of various sizes in a pre-determined and uniform manner without the reliance upon the skill and judgment of the operator for proper positioning of the wire straps.

Other and further objects and advantages of the present invention will become apparent from the following description and drawings, in which:

Fig. 1 is a side elevation of the strapping machine of the present invention.

Fig. 2 shows a top view thereof, certain parts being broken away to facilitate illustration.

Fig. 3 illustrates a vertical section of the strapping machine, the view being taken along the lines 3—3 of Fig. 2, and shows a box in position for application of a wire strap thereto.

Fig. 4 is an end view of the device of the present invention, looking in the direction of the arrows 4—4 of Fig. 1.

Fig. 5 is an enlarged detail view in elevation of a portion of the tubular standard and its associated parts employed in the construction of the present invention, the view being taken in the direction of arrows 5—5 of Fig. 3.

Fig. 6 illustrates a section of Fig. 5 taken along the lines 6—6 of the latter.

Fig. 7 is a detail view of the working table of the present structure, certain parts being broken away and others shown in section.

Referring now to the drawings, the machine illustrated embodies a frame structure comprising a vertically extending portion 1, and a horizontally extending portion 2. The vertically extending portion of the frame structure consists of a pair of spaced standards 3 secured together adjacent their lower ends by means of a cross bar 4.

The horizontally extending portion of the frame structure includes a pair of legs 5 provided at their inner sides with spacer blocks 6 to which side boards 7 are secured. These side boards extend vertically between the standards 3 and legs 5 and inter-positioned between the latter and the side boards are spacer blocks 8 for permitting attachment of the side boards to the standards 3 in any convenient manner. A cross bar 9 positioned between the legs 5 retains the same in properly spaced relation with respect to each other.

Secured to the lower ends of the standards 3 by means of an axle 10 are truck wheels 11. These truck wheels are positioned adjacent the ends of the standards in such manner that they are normally out of contact with the floor surface upon which the frame structure is positioned, but may be engaged with the floor surface by tilting the frame structure so that the same may be moved from one location to another in the fashion of a wheelbarrow.

Attached to the upper portion of the standards 3 and bridging the space therebetween is a tool supporting table 12 having a depending apron 13 at its forward end, and depending portions 14 along its sides. The table 12 may be attached to the uprights in any suitable manner, and may be provided with handles 15.

The table 12 is further provided with a slot 16 within which a grooved roller 17 is rotatably mounted by means of a shaft 18 secured to the lower surface of the table by brackets 19.

The table 12 is provided along its rear edge with a reversely bent flange 20 for attachment of a socket 21 and the upper open end of a tubular standard 22 which extends through the flange directly below the circumference of the grooved roller 17. The opposite or lower end of tubular standard 22 carries a flange 23 secured to a supporting plate 24, which in turn is attached by means of screws 25 to the cross bar 4 previously referred to.

The upper surface of the tool supporting table 12 is furthermore provided with a generally V-shaped guide member 26, and carries a portable strapping or wire tying tool 27, slidably positioned thereon. The strapping or wire tying tool 27 may be of any conventional construction, consisting of a mechanism for twisting and thereby interconnecting the free ends of a wire placed around a box or a like object, and for simultaneously tightening the so formed wire strap to such object in well known fashion. Since such tying tools are well known to the art and the present invention is not concerned with the particular construction of the tool, a detailed description thereof is believed unnecessary.

Attached to the rear end of the strapping tool 27 is a guide chain 28 extending over the grooved roller 17 and into the tubular standard 22. The lower free end 29 of the chain is attached to a

counterweight 30 by means of a pin or screw 31 projecting into the tubular standard 22 through a vertically extending slot 32, running substantially the entire length of the standard. The counterweight 30 is manufactured in the form of a sleeve slidably positioned upon the tube 22.

The standard 22 is further provided with a movable stop collar 33 provided with an inwardly extending pin 34 and a lock screw 35. The pin 34 is engageable with any one of a series of lateral slots 36 projecting from the vertical slot 32 of the standard 22 and when so engaged serves to positively prevent longitudinal movement of the collar 33 along the standard. It will be apparent that upon loosening the screw 35 and twisting the collar to bring the pin into registry with the vertical slot 32, the collar may be shifted to any one of the lateral slots 36 as desired. By tightening the lock screw 35 the collar 33 may be firmly secured in such selected position against displacement during the operation of the device.

The lateral slots 36 of the tubular standard 22 are arranged in predetermined position, depending upon the length of objects to be strapped by the machine of the present invention, and depending upon the number of individual straps desired and the amount of spacing required therebetween. The lowermost lateral slot 36 permits placing of the collar 33 in a position in which it will retain the wire tying tool against accidental displacement when the device is out of use or being transported from one location to another. This position of the collar 33 is clearly illustrated in Fig. 2.

Supported by the horizontal portion 2 of the frame structure is a casting 37, including horizontal flanges 38, slidably arranged within guides formed by angle irons 39 secured to the outer surfaces of the side boards 7, and cooperating channel members 40 secured to the upper ends of the legs 5 and attached to the angle irons 39 in any convenient manner.

Vertically movable within bearings 41 and 42 in the casting 37 is a shaft 43 supporting a work table 44. This table 44 carries a pair of angle irons 45 pivotally secured thereto at their forward ends as at 46. Bolts 47 extending through slots 48 in the angle irons 45 are provided for attaching the rear portion of the table 44 to these angle irons while permitting a slight movement of the latter relative to the table for purposes as will be explained later. The table 44 carries also a threaded socket 49, which in turn establishes a rigid connection with the table supporting shaft 43 previously referred to.

Associated with opposing angle irons 45, which extend between the standards 3, is a clamping mechanism including a shaft 50 provided with oppositely threaded portions 51 and 52, cooperating with corresponding interiorly threaded pressure shoes 53, which engage the angle irons 45. A hand wheel 54 on shaft 50 permits manual rotation of the same to thereby produce a spreading of the angle irons 45 with respect to each other to cause frictional engagement thereof with the inner surfaces of the standards 3, so that after the table 44 is positioned at a certain desired elevation the same may be frictionally secured to said standards to insure rigidity. A spring 55, attached to the free ends of the angle irons 45, is adapted to move the latter out of contact with the uprights when the pressure shoes are retracted from their pressure exerting position.

The table 44 is vertically adjustable as previously stated, and for this purpose the shaft 43 is provided with a pin 56, adapted to engage the bottom portion of any of a series of slots 57 in a sleeve 58 rotatably supported by the casting 37. The depths of the slots 57 of the sleeve 58 are accurately calibrated with respect to the several sizes of boxes or other packages upon which the machine is intended to be used, whereby to permit proper vertical adjustment of the table 44 according to the particular size of box or package to be operated on, so as to position the box with its upper surface on a level with the tool supporting table 12 as shown in Fig. 3.

To accomplish the adjustment of the table 44, the operator of the machine raises the same until the pin 56 disengages from a respective slot 57, and the sleeve 58 may now be rotated so as to bring another slot 57 in position for engagement with the pin 56, whereupon the table 44 and shaft 43 are lowered until the pin 56 has entered such slot and will be supported by the lower surface of the same to position the table at a different elevation.

The casting 37 is horizontally slidable within the guides 39 and 40 as previously mentioned, and to retain the casting 37 in any desired horizontal position, the horizontal portions of the angle irons 39 are provided with a plurality of openings 59 as clearly shown in Fig. 2. The flanges 38 of the casting 37 are likewise provided with openings 60 adapted to register with the holes 59 when the casting 37 is moved to various positions of adjustment. Pins 61 are adapted to be inserted in the openings 60 and the corresponding openings 59 in the angle members 39 in registration therewith. In this way, the table carried by the casting 37 may be effectively locked against horizontal displacement.

The tool table 12, as best seen in Figs. 1 and 4, carries an abutment or gauge plate 62, which is provided with a longitudinal slot 63 through which extends a threaded stud 64, secured to the tool table 12. A nut 65 cooperating with the threaded stud 64 is adapted to clamp the gauge member 62 in any desired position of adjustment. The gauge member 62 is further provided with a horizontally extending portion 66 and a vertically depending portion 67. These portions are so positioned as to project forwardly of the apron 13 of the tool table 12, and are adapted to facilitate the proper positioning of a box or like object placed upon the working table 44 for strapping operations in a manner as clearly shown in Fig. 4. The portion 66 of the gauge 62 is adapted to engage the upper surface of the box to prevent tipping thereof in case it is slightly overbalanced with respect to the table 44, as may be the case when a wire strap is to be placed around the center of the box, because in such instance, as will hereinafter become apparent, the greater portion of the box will protrude from the work table 44, and obviously without the provision of the portion 66 the box will have a tendency to tip over.

In the operation of the machine of the present invention, a box or similar object 68 is placed upon the table 44, which has been adjusted in a vertical direction in such a manner as to align the upper surface of the box 68 with the surface of the tool table 12, and which has been further adjusted in a horizontal direction in such a way that when the box is properly positioned upon the table 44 in contact with the apron 13 the

same will protrude a certain predetermined distance from said table, as clearly shown in Fig. 3. The collar 33 is now adjusted and interlocked in such position with respect to the tubular standard 22 that upon sliding the wire tying tool from the working table 12 and across the upper surface of the box 68 to the extent permitted by the chain 28, the same is placed with its wire receiving portion 69 directly above the outer edge 70 of the table 44.

The operator may now place a wire strap 71 around the protruding end of the box 68 in such a manner that the lower portion of the wire abuts against the edge 70 of the table 44, while the upper free ends thereof are inserted into the wire receiving portion 69 of the wire tying tool, which is thereupon operated by movement of the handle 72 to twist the wire ends together and to secure the wire strap in a taut position around the box. The tool 27 is thereupon returned upon the tool support 12 and the box 68 is now turned around upon the table 44 to an opposite position from that shown in Fig. 3, whereupon another wire strap may be attached to the other end thereof, at the place indicated at 73 in Fig. 3. In this way, accurate placing of the wire straps and uniform spacing thereof with respect to each other is obtained without relying upon the skill or judgment of the operator in this regard.

In view of the fact that the forward movement of the wire tying tool 27 is accurately gauged by the position of the collar 33, the positioning of the tool 27 may be accomplished simply by pulling the same forward upon the upper surface of the box 68 until the counterweight 30 abuts against the stop collar 33. The gauge member 62, which assists in positioning the box 68 upon the working table 44, retains the box properly in position thereon as already specifically referred to in the above.

In like manner, if it is desired to place only one wire strap around the center of a box, the table 44 and collar 33 may be adjusted so as to effect the proper positioning of the box 68 and wire tying tool 27 for such operation, as will be obvious to those versed in the art.

When the table 44 is moved from one to another position, the clamping mechanism is released to permit such adjustment, and thereafter tightened again to properly secure the working table in place in cooperation with the pins 56 and 61.

While I have described a particular embodiment of the present invention, it will be obvious that various changes and modifications may be made in the details of the apparatus shown herein without departing from the spirit of the present invention and the scope of the appended claims.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A strapping machine comprising a table for supporting an object to be strapped, a tool supporting bench, a strapping tool slidably positioned on said supporting bench and movable relative thereto and out of supporting engagement therewith upon said object supported by said table, and means for limiting the extent of movement of said tool to a predetermined position upon said object.

2. A strapping machine comprising a table for supporting an object to be strapped, a tool supporting bench, means for positioning said object relative to said tool supporting bench and table to cause a portion thereof to protrude from said table, and a strapping tool slidably positioned upon said supporting bench and movable relative thereto and out of supporting engagement therewith upon said object to a predetermined position thereupon for attachment of a strap around said object at its point of protrusion from said table, and means for restraining said tool against movement beyond said position.

3. A strapping machine comprising a package supporting table, means engageable by a package on said table for positioning said package to cause a portion thereof to project beyond an edge of said table, a tool support, a strapping tool associated therewith and movable therefrom onto and over said package into operative position directly above said table edge, and means for restraining said tool against movement beyond said position.

4. A strapping machine comprising a table for supporting an object to be strapped, a tool support, a strapping tool on said support and movable therefrom upon an object supported by said table, and adjustable means for limiting the extent of movement of said tool to a predetermined position upon said object.

5. A strapping machine comprising a table for supporting an object to be strapped, a tool support, a strapping tool on said support and movable therefrom upon an object supported by said table, means for adjusting said table relative to said tool support, and means for limiting the extent of movement of the strapping tool to a predetermined position upon said object.

6. A strapping machine comprising a table for supporting an object to be strapped, a tool support adjacent said table, a strapping tool on said support and horizontally movable therefrom upon an object supported by said table, means for vertically adjusting said table relative to said tool support, and means for limiting the extent of horizontal movement of said tool to a predetermined position upon said object.

7. A strapping machine comprising a frame having a longitudinally and a vertically extending portion, a table on said horizontally extending portion for supporting an object to the strapped, a tool support on said vertically extending portion, means for adjusting said table relative to the tool support, for presenting the upper surface of said object level to said support, a strapping tool on the tool support and movable therefrom upon said object, means for limiting the extent of movement of said tool to a predetermined position upon said object and table, and means for locking said table in adjusted positions.

8. A strapping machine comprising a table for supporting an object to be strapped, a supporting structure for said table, a tool support on said supporting structure, a rotatable sleeve on said supporting structure and comprising a plurality of vertical slots of various depths, a shaft vertically movable within said sleeve for supporting said table on said supporting structure, means on said shaft for engaging a selected one of said slots and for maintaining the table at a desired elevation relative to said tool support for presenting said object with the upper surface thereof in alignment with said tool support, a strapping tool on said support and movable upon said object to operative position, and means for controlling the extent of movement of said tool relative to said object.

9. A strapping machine comprising a table for supporting an object to be strapped, a supporting

structure for said table, a tool support on said supporting structure, a rotatable sleeve on said supporting structure and comprising a plurality of radially extending vertical slots of various depths, a shaft vertically movable within said sleeve for supporting said table on said supporting structure, a pin on said shaft for engaging a selected one of said slots and for maintaining the table at a desired elevation relative to said tool support for presenting said object with the upper surface thereof in horizontal alignment with said tool support, a strapping tool on said support and horizontally movable upon said object to operative position, and adjustable means for controlling the extent of movement of said tool relative to said object.

10. A strapping machine comprising, in combination, a frame, a table for supporting an object to be strapped on said frame, a tool support on said frame, means for vertically and horizontally adjusting said table with respect to said tool support for presenting said object with the upper surface thereof in horizontal alignment relative to said tool support, a strapping tool on said support and horizontally movable therefrom upon said object to operative position, and means for controlling the extent of horizontal movement of said tool relative to said object, including a standard, a member vertically slidable on said standard, an abutment on said standard, and flexible means for operatively interconnecting the strapping tool to said member.

11. A strapping machine comprising, in combination, a frame, a table for supporting an object to be strapped on said frame, a tool support on said frame, means for vertically and horizontally adjusting said table with respect to said tool support for presenting said object with the upper surface thereof in horizontal alignment relative to said tool support, a strapping tool on said support and horizontally movable therefrom upon said object to operative position, and means for controlling the extent of horizontal movement of said tool relative to said object, including a tubular standard having a vertically extending slot and a plurality of horizontally extending slots communicating with the vertical slot, a vertically adjustable abutment on said standard comprising a pin extending into the vertical slot of the standard and adapted to engage a selected one of said horizontal slots upon movement of said abutment to a predetermined position to thereby lock the abutment in said position, a movable sleeve on said standard for cooperation with said abutment, and flexible means for operatively interconnecting the strapping tool to said movable sleeve.

12. A strapping machine comprising a frame, a tool support on said frame, a horizontally movable strapping tool on said tool support, a vertically and horizontally adjustable table on said frame for presenting the upper surface of an object to be strapped adjacent said tool support and level with the tool supporting surface, and means for controlling the extent of horizontal movement of said strapping tool upon and over an object presented thereto, including a vertical tubular standard adjacent said frame and having a vertically extending slot and a plurality of horizontally extending slots communicating with the same, an adjustable abutment on said standard, means on said abutment extending into the vertical slot and shiftable into engagement with one of said horizontal slots for adjusting said abutment into predetermined position, means for locking said abutment in said position, means movable on said standard for cooperation with said abutment, and means for interconnecting said movable means with the strapping tool.

13. A strapping machine comprising a frame, a tool support on said frame, a horizontally movable strapping tool on said tool support, a vertically and horizontally adjustable table on said frame for presenting the upper surface of an object to be strapped adjacent said tool support and level with the tool supporting surface, means for locking said table against horizontal and vertical movement, and means for controlling the extent of horizontal movement of said strapping tool upon and over an object presented thereto, including a vertical tubular standard adjacent said frame and having a vertically extending slot and a plurality of horizontally extending slots communicating with the same, an adjustable abutment on said standard, means on said abutment extending into the vertical slot and shiftable into engagement with one of said horizontal slots for adjusting said abutment into predetermined position, means for locking said abutment in said position, means movable on said standard for cooperation with said abutment, and means for interconnecting said movable means with the strapping tool.

14. A strapping machine comprising a table, a tool support adjacent said table, a movable strapping tool upon said support, gauge means on said tool support for engagement by an object placed upon the table to locate said object in predetermined position relative to the tool support and said strapping tool, and means for controlling the extent of movement of said strapping tool for placing the same into predetermined strapping position relative to said object.

15. A strapping machine comprising a vertically and horizontally adjustable table, a tool support adjacent said table, a movable strapping tool upon said support, adjustable gauge means on said tool support for engagement by an object placed upon the table to locate said object in predetermined position relative to the tool support and said strapping tool, and means for controlling the extent of movement of said strapping tool for placing the same into predetermined strapping position relative to said object and table.

16. A strapping machine comprising a frame having a vertical and horizontal portion, a vertically and horizontally adjustable table on the horizontal portion of said frame, a tool support adjacent said table on the vertical portion of said frame, a movable strapping tool upon said tool support, adjustable gauge means on said tool support for engagement by an object placed upon the table to locate said object in predetermined position relative to the tool support and strapping tool, means for locking said table in adjusted position against vertical and horizontal movement including means for frictionally arresting said table on the vertical portion of said frame, and means for controlling the extent of movement of said strapping tool relative to said object for placing the same into strapping position with respect to object and table.

17. A strapping machine comprising a table for supporting an object to be strapped, a tool support having a tool supporting surface, a strapping tool slidably mounted on said supporting surface and movable therefrom upon the upper surface of said object, means for limiting

the extent of movement of said tool to a predetermined position upon said object, and means for adjusting said working table for presenting the upper surface of said object in substantial alignment with the tool supporting surface of said tool support, whereby the strapping tool may be slid from said support onto said object and back again without the necessity of lifting it.

18. A strapping machine comprising a table for supporting an object to be strapped, a stationary tool support adjacent said table, a strapping tool on said support and horizontally movable therefrom upon an object supported by said table, means for limiting the horizontal movement of said tool to a predetermined position upon said object, and means for vertically and horizontally adjusting said table relative to said tool support, to present the upper surface of said object level to said support, whereby the strapping tool may be slid from said support onto said object and back again without the necessity of lifting it.

19. A strapping machine comprising a frame having a longitudinally and a vertically extending portion, a table on said horizontally extending portion for supporting an object to be strapped, a tool support on said vertically extending portion, a strapping tool slidably mounted on the tool support and movable therefrom upon an object to be strapped, means for limiting the extent of movement of said tool to a predetermined position upon said object, and means for adjusting said working table relative to the tool support, for presenting the upper surface of said object level to said tool support, whereby the strapping tool may be slid from said support onto said object and back again without the necessity of lifting it.

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