Feb. 20, 1962 E. MEISTER ET AL 3,021,781

STRAPPING APPARATUS

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Fig. 1

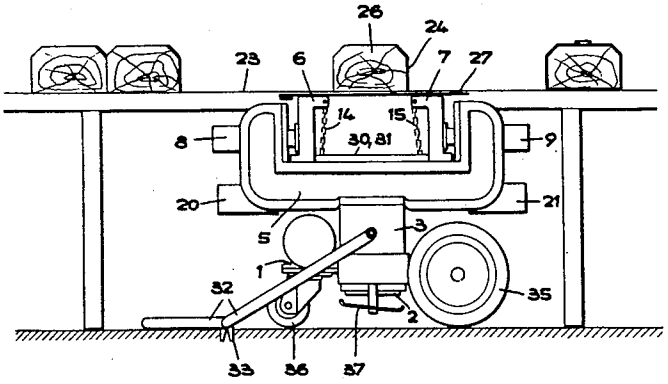
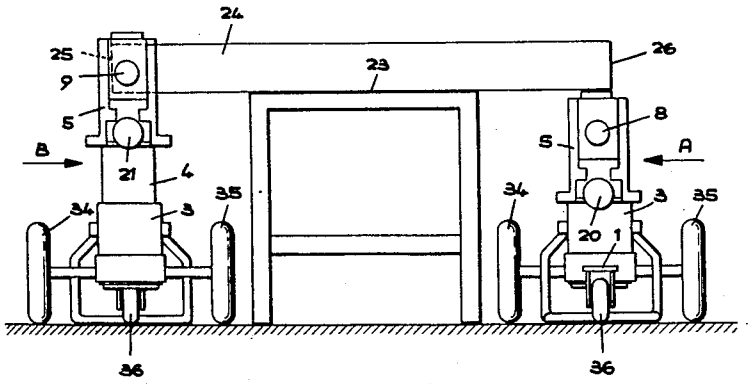


Fig. 2



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Fig. 3

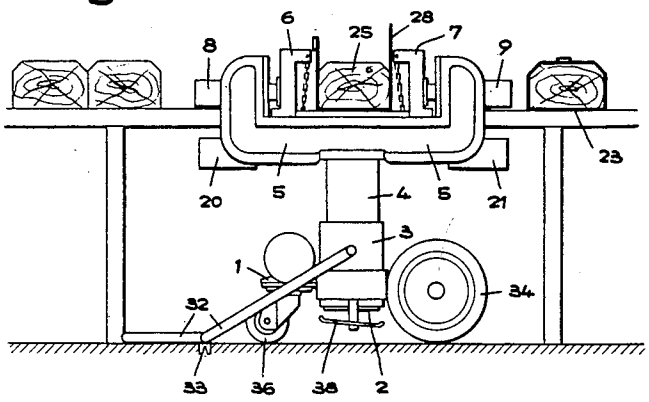
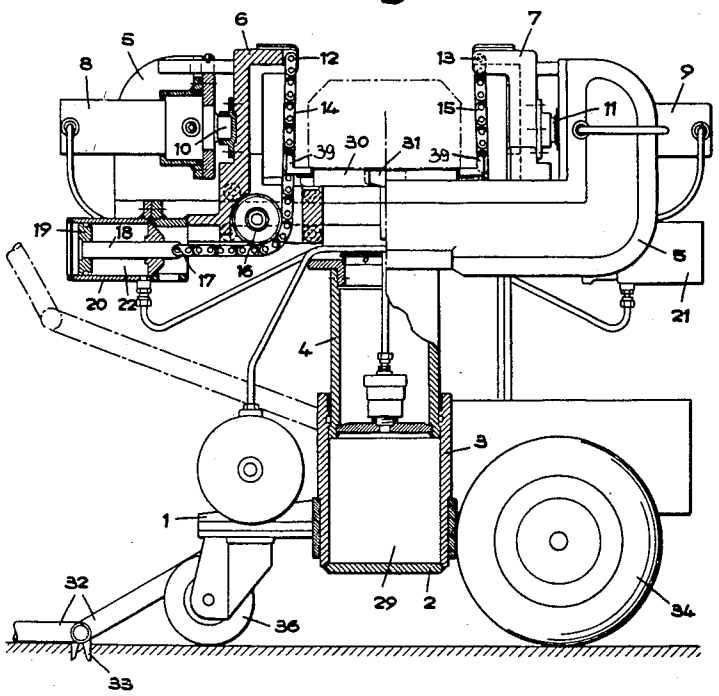


Fig. 4



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Fig. 5

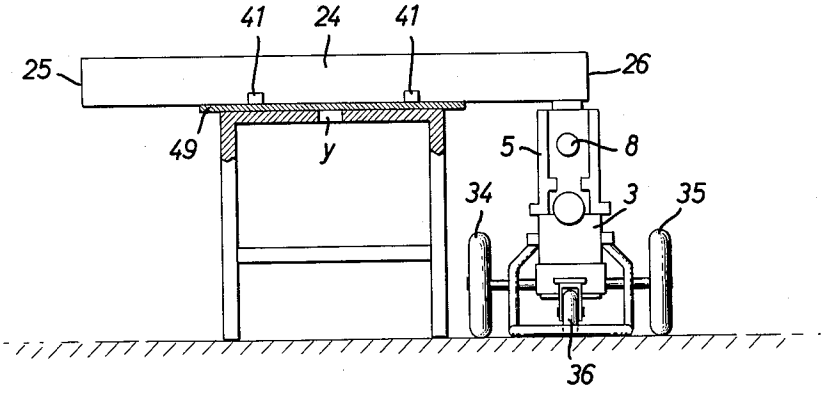
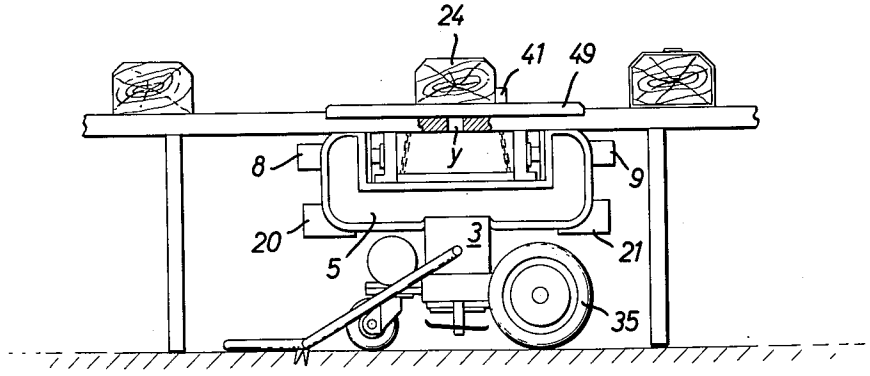


Fig. 6



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Fig. 7

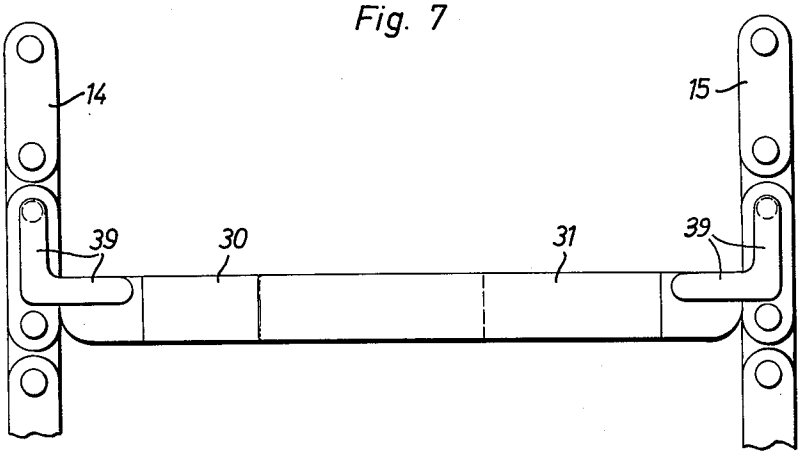
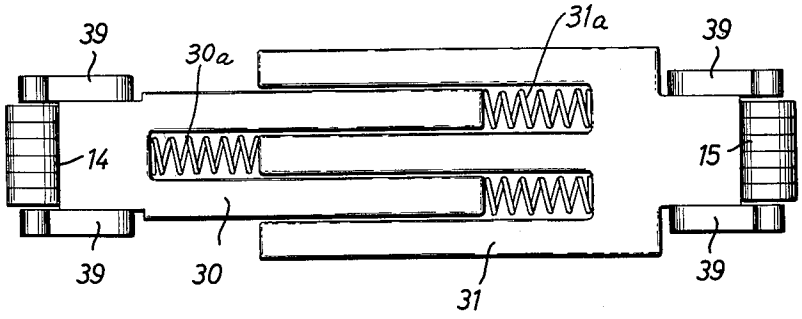


Fig. 8



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United States Patent Office 3,021,781 Patented Feb. 20, 1962

3,021,781
STRAPPING APPARATUS

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Claims priority, application Germany June 12, 1956
9 Claims. (Cl. 100—8)

The present invention relates to new improvements in apparatus for strapping wooden poles, beams, and the like, and particularly railroad ties by means of steel bands or straps.

It is the principal object of the present invention to provide a strapping apparatus of the general type which, however, is so devised and improved as to be operated and manipulated much more easily and safely than previous apparatus.

The apparatus according to the present invention is therefore based upon an apparatus of a known type for strapping wooden poles, beams, and the like, and particularly railroad ties which engages and grips the object to be strapped from below and along two sides and is provided with means for compressing the tie and applying a steel strap thereon and securing the same under tension. Such apparatus further includes or is used in combination with a feed track for passing railroad ties or similar objects to the apparatus and extending in a direction transverse to the direction of the ties while being worked upon by the apparatus. Such feed track may be either level or inclined at both sides of the apparatus, and, if desired, it may be provided with a roller surface. It should have a width so that one or both ends of the tie will project freely over its sides and may thus be worked upon by the apparatus.

In order to overcome the disadvantages of the known apparatus and machines of this type, the present invention provides a mechanism for raising and lowering not the tie itself with respect to the stationary level of the strapping apparatus as was done in the operation of the previous machines, but the strapping apparatus with respect to the stationary level of the feed track. The feed track therefore does not have to have a central gap through which the tie is lowered into the machine, but it may consist of a continuous flat surface like that of a table top. If only a single strapping machine according to the invention is provided for strapping both ends of the ties, the invention further proposes to use a turntable or the like which permits a tie to be reversed in position after one end thereof has been strapped so that the other end will then be in the proper position relative to the machine in order to be strapped thereby.

The carriage of each strapping apparatus is preferably provided with three wheels with pneumatic or solid rubber tires, one of which is pivotably mounted about a vertical axis. Each strapping machine is preferably also provided with a yoke-like bar for pulling it behind a truck or the like and for manipulating it into the proper position for its operation. This bar preferably also has one or more prongs or the like on its lower side so that, when the front end of the bar is lowered to the ground, these prongs may be pressed into the ground so as to anchor the machine to such position.

Further objects, features, and advantages of the present invention will appear from the following detailed description thereof, particularly when read with reference to the accompanying diagrammatical drawings, in which—

FIG. 1 shows a side view of the new apparatus consisting of two mobile strapping machines and a feed track on which one tie is shown in the position before one of the strapping machines is elevated to carry out the strapping operation;

FIG. 2 shows a front view of the apparatus according to FIG. 1 with one strapping machine in the same position as illustrated in FIG. 1 and the other strapping machine in the elevated position during the strapping operation;

FIG. 3 shows a side view similar to FIG. 1 but of the other strapping machine and such machine in the elevated position during the strapping operation;

FIG. 4 shows a side view of a strapping machine on a slightly larger scale and partly in cross section;

FIG. 5 shows a front view of a modified apparatus of the invention;

FIG. 6 is a side view of the apparatus of FIG. 5;

FIG. 7 is a side view illustrating a part of the strapping machine on a larger scale; and

FIG. 8 is a plan view of the part shown in FIG. 7.

Referring to the drawings, each strapping machine consists of a mobile carriage 1 which is supported on wheels, preferably with pneumatic tires and carries a cylinder 3 which is closed at its lower end and has a cylinderlike piston 4 vertically slidable therein. Piston 4 is rigidly secured to a U-shaped frame 5, the two arms of which extend in the upward direction. The two side walls of frame 5 support and guide slide members 6 and 7 which are movable horizontally along frame 5 by means of pistons 10 and 11 which are slidable in cylinders 8 and 9, respectively. A short upper arm on each slide member 6 and 7 has a tension element, for example, a roller chain 14 or 15, secured to its outer end 12 or 13, respectively. Each chain is curved near its lower end about an angle of 90°, for example, by means of a roller 16, and then placed under tension. According to the preferred embodiment of the invention, as shown in the drawings, this may be attained by connecting the lower end 17 of each chain 14 and 15 to the outer end of a piston rod 18, the piston 19 of which is slidable in the cylinder chamber 22 of a pair of cylinders 20 and 21 mounted on frame 5. By supplying a certain adjusted pressure to cylinders 20 and 21, chains 14 and 15 will always be under the same tension even though pistons 19 therein might shift within the cylinders.

Although in the particular embodiment as illustrated in the drawings, the feed track 23 is shown as being level, it may also be inclined. It may also be provided with rollers so that the heavy ties may be more easily shifted along the track. Suitable removable stops or the like may also be provided for locating the tie to be strapped in the proper position relative to the machine.

If two strapping machines are available and a tie 24 is to be strapped therein, the tie is first moved along feed track 23 until its ends 25 and 26 come to rest at a point above and between the lowered slide members 6 and 7 on frame 5 and in such a position that both ends of the tie extend far enough beyond the vertical longitudinal plane of each machine so that they will be properly strapped in the subsequent operation. Steel straps 27 and 28 are then placed upon the upper surfaces of slide members 6 and 7 of both machines, whereupon frames 5 of both machines are elevated by suitable control means, not shown, whereby chamber 29 of the elevating cylinder 3 of each machine is supplied with compressed air or another pressure medium. By such elevation of frames 5, slide members 6 and 7 merely bend straps 27 and 28 upwardly along the sides of the tie to the position shown in FIG. 3.

In previous strapping machines such upward bending of the strap ends was produced by the weight of the tie and by lowering the entire tie from the level of the feed track to the level of the stationary frame and between the slide members. Since the workers operating the machine usually guide the steel straps by hand during the bending movement, there was previously always a con-

siderable danger that during such lowering movement, the worker's hands might be caught between the tie and strap or the strap and the slide members and might be seriously injured.

Since in the strapping machine according to the invention the ties remain during the entire strapping operation at their feeding level, and frame 5 together with slide members 6 and 7 are elevated to the level of the ties rather than that the ties are suddenly dropped to the level of the frames, the danger that the hands even of a careless worker might be injured during the strapping operation is almost completely avoided.

At the end of the elevating operation of the machine, the two ends of the tie rest upon a pair of plates 30 and 31, as shown particularly in FIG. 4 which are preferably movable relative to each other during the following operation by projecting stops 39 on chains 14 and 15 to insure that the outer ends of these plates will not project beyond the side walls of the tie. Resilient means 30*a*, 31*a* may be interposed between plates 30 and 31, as shown in FIGS. 7 and 8, to return them to their extended position. Cylinders 8 and 9 of each machine are then supplied with compressed air or another pressure medium so that slide members 6 and 7 will move toward each other until chains 14 and 15 are in tight engagement with the upwardly bent portions of strap 27 or 28 and then fold the free ends of the strap over, press them flatly against the upper surface of the tie, and at the same time firmly compress the tie itself. After the two ends of each strap 27 and 28 have then been tightly and firmly secured to each other, frames 5 are lowered so that the fully strapped tie may be moved away and a new tie be placed in the proper position as shown in FIG. 1 for the next strapping operation.

The strapping machines according to the invention are preferably provided with a yoke-like member 32 which is provided with one or more prongs 33 or similar means at the lower side. Member 32 serves as a wagon pole for pulling the machine or attaching it to a truck or the like, and it also serves as an anchor of the machine when prongs 33 are pressed into the ground. In order to insure a firmer locking engagement of member 32 with the ground the front end portion thereof is preferably bent at an angle relative to the rear portion as shown in FIGS. 1 and 3, or the two portions may be pivotally connected to each other, as shown in FIG. 4, so that the front portion may be placed flatly on the ground. For moving the machine and for setting it up in any suitable position, the carriage thereof is movable on a pair of wheels 34 and 35 of the same size and a smaller pivotable front wheel 36.

The operation of the hydraulic means of each machine for raising and lowering frame 5 and also for shifting the slide members 6 and 7 toward or away from each other is preferably controlled by a single foot lever 37 and 38, respectively.

Each foot lever operates a valve (not shown), the valves respectively controlling the flow of an operating liquid into and out of cylinders 20, 21, and chamber 29 of cylinder 3, respectively.

Although in the previous description it was assumed that the strapping operation on the two ends of a tie is carried out by two separate machines, this may also very easily be done with only one machine according to the invention. Since the ties rest on a flat smooth surface, for example, a table top, they may be turned around thereon relatively easily so as first to present one end to the machine and then the other to be strapped thereby. As shown in FIGS. 5 and 6, reversal of each tie relative to the machine may be further facilitated by providing the feed track with a turntable 49, the pivot *y* of which is located in line with the proper clamping position of the machine. The upper surface of such turntable is preferably made flush with the upper surface of the adjacent parts of the feed track, and it is preferably also provided with removable stops 41 so that the tie to be strapped only has to be pushed against such stops to insure that it will be in the proper position relative to the machine. Then, after one end of the tie has been strapped and frame 5 of the machine has again been lowered to its inoperative levels below that of the turntable the latter is turned about an angle of 180° about its pivot *y* to reverse the tie relative to the machine so that the other end of the tie may then be strapped.

Afer a pile of ties has thus been strapped at both ends, the strapping machine or machines, as well as the feed track, may then be wheeled to another pile of ties and be set up there and secured in a fixed position, whereupon these ties may also be strapped. The mobility of the entire apparatus may be further improved if the feed track 23 is likewise designed so as to be easily moved, for example, by being made of several parts which can be easily assembled or taken apart.

Although our invention has been illustrated and described with reference to the preferred embodiments thereof, we wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed our invention, what we claim is:

1. In a strapping apparatus for strapping an article having a plurality of face portions, in combination, a stationary support for holding the article to be strapped in a fixed position; a bending assembly including a support member; means for moving said bending assembly toward and away from a position in which said support member abuttingly engages a first face portion of said article held by said support; a bending member mounted on said bending assembly for movement therewith and having a flexible portion moving with said bending member in a path adjacently spaced from and extending along a second face portion of said article adjacent said first face portion when said assembly is moved by said means; and means for moving said bending member relative to said bending assembly in a direction transverse to said path for movement along a third face portion of said article adjacent said second face portion, when said bending assembly is in said position thereof, whereby a strap interposed between said first face portion and said support member and projecting into said path will be clamped between said support member and said first face portion and will be bent along said second face portion during movement of said assembly toward said position thereof, and will be bent by a part of said flexible portion along said third face portion during said movement of said bending member relative to said assembly.

2. In a strapping apparatus for strapping an article having a plurality of face portions sequentially arranged along the circumference of the article at substantially right angles to one another, in combination, a stationary support for holding the article to be strapped in a fixed position; a bending assembly including a support member; means for moving said bending assembly toward and away from a position in which said support member abuttingly engages a first face portion of said article held by said support; a bending member mounted on said bending assembly for movement therewith and having a flexible portion moving with said bending member in a path adjacently spaced from and extending along a second face portion of said article adjacent said first face portion when said assembly is moved by said means; and means for moving said bending member relative to said bending assembly in a direction substantially perpendicular to said path for movement along a third face portion of said article adjacent said second face portion, when said bending assembly is in said position thereof, whereby a strap interposed between said first face portion and said support member and projecting into said path will be clamped between said support member and said

first face portion and will be bent along said second face portion during movement of said assembly toward said position thereof, and will be bent by a part of said flexible portion along said third face portion during said movement of said bending member relative to said assembly.

3. In a strapping apparatus for strapping an article having a plurality of face portions, including a pair of face portions on opposite sides of said article and substantially parallel to each other, in combination, a stationary support for holding the article to be strapped in a fixed position; a bending assembly including a support member; means for moving said bending assembly toward and away from a position in which said support member abuttingly engages a first face portion of said pair of face portions of said article held by said support; a bending member mounted on said bending assembly for movement therewith and having a flexible yieldingly tensioned portion moving with said bending member in a path adjacently spaced from and extending along another face portion of said article adjacent said first face portion when said assembly is moved by said means; and means for moving said bending member relative to said bending assembly in a direction transverse to said path for movement along a second face portion of said pair of face portions of said article adjacent said other face portion, when said bending assembly is in said position thereof, whereby a strap interposed between said first face portion and said support member and projecting into said path will be clamped between said support member and said first face portion and will be bent along said other face portion during movement of said assembly toward said position thereof, and will be bent by a part of said flexible portion along said second face portion during said movement of said bending member relative to said assembly.

4. In a strapping apparatus for strapping an article having a plurality of face portions, in combination, a stationary support for holding the article to be strapped in a fixed position; a bending assembly including a support member; means for moving said bending assembly toward and away from a position in which said support member abuttingly engages a first face portion of said article held by said supports; two rigid bending members mounted on said bending assembly for movement therewith in respective paths adjacently spaced from and extending along respective second face portions of said article adjacent opposite sides of said first face portion when said assembly is moved by said means; a pair of flexible yieldingly tensioned members secured to said bending members and moving with the same along said second face portions, respectively; and means for moving said bending members with said flexible members relative to said bending assembly in a direction transverse to said respective paths thereof for movement toward one another along a third face portion of said article opposite said first face portion, when said bending assembly is in said position thereof, whereby a strap interposed between said first face portion and said support member and projecting into said paths will be clamped between said support member and said first face portion and will be bent along said second face portions adjacent said first face portion during movement of said assembly toward said position thereof, and will be bent by parts of said flexible members along said third face portion opposite said first face portion during said movement of said bending members relative to said assembly.

5. In a strapping apparatus for strapping an article, in combination, stationary supporting means for the article; a bending assembly mounted for movement toward the article supported by said supporting means, said bending assembly having a pair of spaced rigid bending portions moving in one direction along and closely adjacent to a pair of faces, respectively, of the article during movement of said assembly for bending a strap located between said bending assembly and the article along said pair of faces during movement of said assembly, and a pair of yieldingly tensioned retaining portions secured to said bending portions, respectively, said bending portions with said tensioned retaining portions being movable toward each other in a direction transverse to said one direction so that parts of said tensioned retaining portions move along another face of the article for bending portions of said strap along the other face of the article after movement of said assembly in said one direction; and moving means for moving said bending assembly first toward the article and for then moving said bending portions and retaining portions of said bending assembly in said transverse direction whereby the strap is tightly placed about the article.

6. In a strapping apparatus for strapping an article, in combination, stationary supporting means for the article; a bending assembly mounted for movement toward the article supported by said supporting means, said bending assembly having a pair of spaced rigid bending portions moving in one direction along and closely adjacent to a pair of faces, respectively, of the article during movement of said assembly for bending a strap located between said bending assembly and the article along said pair of faces during movement of said assembly, and a pair of flexible retaining portions secured to said bending portions, respectively, means for yieldably tensioning said flexible retaining portions, said bending portions with said flexible retaining portions being movable toward each other in a direction transverse to said one direction so that parts of said flexible retaining portions are pressed against said pair of first mentioned faces for pressing portions of the strap against the same and then are pressed against another face of the article for bending and pressing portions of said strap along the other face of the article after movement of said assembly in said one direction; and moving means for moving said bending assembly first toward the article and for then moving said bending portions and flexible retaining portions of said bending assembly in said transverse direction whereby the strap is tightly placed about the article.

7. In a strapping apparatus for strapping an article, in combination, stationary supporting means for the article; a bending assembly mounted for movement toward the article supported by said supporting means, said bending assembly having a pair of spaced rigid bending portions moving in one direction along and closely adjacent to a pair of faces, respectively, of the article during movement of said assembly for bending a strap located between said bending assembly and the article along said pair of faces during movement of said assembly, and a pair of flexible retaining chains secured to said bending portions, respectively, means for yieldably tensioning said flexible retaining chains, said bending portions with said flexible retaining chains being movable toward each other in a direction transverse to said one direction so that parts of said flexible retaining chains are pressed against said pair of first mentioned faces for pressing portions of the strap against the same and then are pressed against another face of the article for bending and pressing portions of said strap along the other face of the article after movement of said assembly in said one direction; and moving means for moving said bending assembly first toward the article and for then moving said bending portions and flexible retaining chains of said bending assembly in said transverse direction whereby the strap is tightly placed about the article.

8. In a strapping apparatus for strapping an article, in combination, a stationary support for supporting the article to be strapped in a fixed position; a supporting means adjacent said stationary support and movable relative to the same and to the article between a supporting position for supporting the article and an inoperative position; a bending member having a bending portion and a yieldingly tensioned flexible portion and being mounted on

said movable supporting means for movement thereon in a direction transverse to the direction of movement of said supporting means so that said bending portion moves along one face of the article during movement of said supporting means, and along another face adjacent said one face during movement of said bending member relative to said supporting means so that said flexible portion abuts said one face and said other face of the article; and actuating means for actuating said movement of said movable support means relative to the article and for actuating said transverse movement of said bending portion relative to said movable supporting means so that a strap interposed between said flexible portion of said bending member and the article will first be bent upon said one face of the article during movement of said bending member with said supporting means and then bent by said flexible portion upon said other face during movement of said bending member relative to said supporting means.

9. In a strapping apparatus for strapping an article, in combination, a turnable support for supporting the article to be strapped for movement in a plane between two fixed positions; a supporting means adjacent said turnable support and movable relative to the same and to the article and transverse to said plane between a supporting position for supporting the article in any one of said fixed positions and an inoperative position; a bending member having a bending portion and a yieldingly tensioned flexible portion and being mounted on said movable supporting means for movement thereon in a direction transverse to the direction of movement of said supporting means so that said bending portion moves along one face of the article during movement of said supporting means, and along another face adjacent said one face during movement of said bending member relative to said supporting means so that said flexible portion abuts said one face and said other face of the article; and actuating means for actuating said movement of said movable support means relative to the article and for actuating said transverse movement of said bending portion relative to said movable supporting means so that a strap interposed between said flexible portion of said bending member and the article in any one of said fixed positions will first be bent upon said one face of the article during movement of said bending member with said supporting means and then bent by said flexible portion upon said other face during movement of said bending member relative to said supporting means.

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