

Oct. 30, 1962

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STEEL STRAPPING DISPENSER

Filed Sept. 24, 1959

2 Sheets-Sheet 1

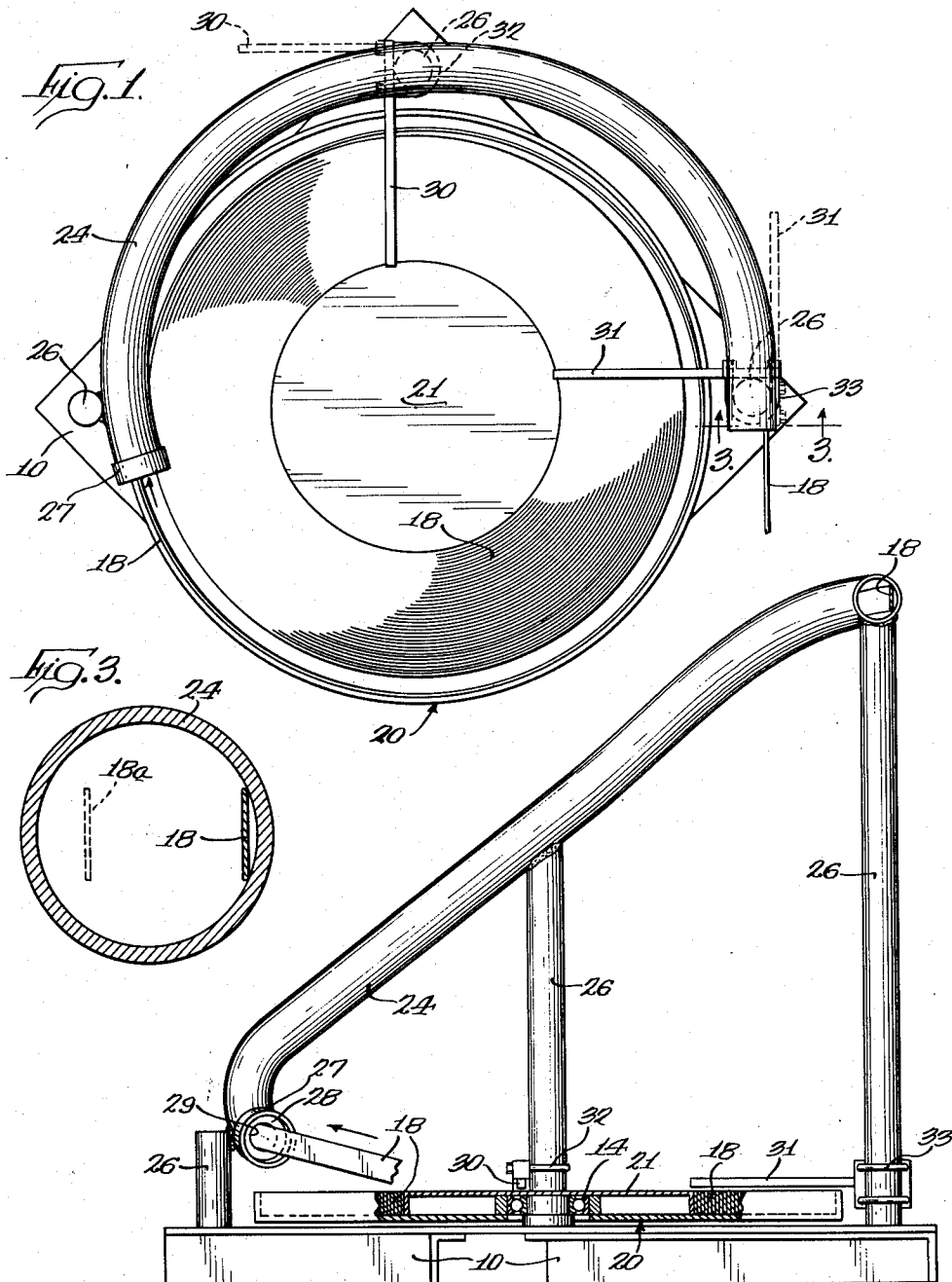


Fig. 1.

Fig. 2.

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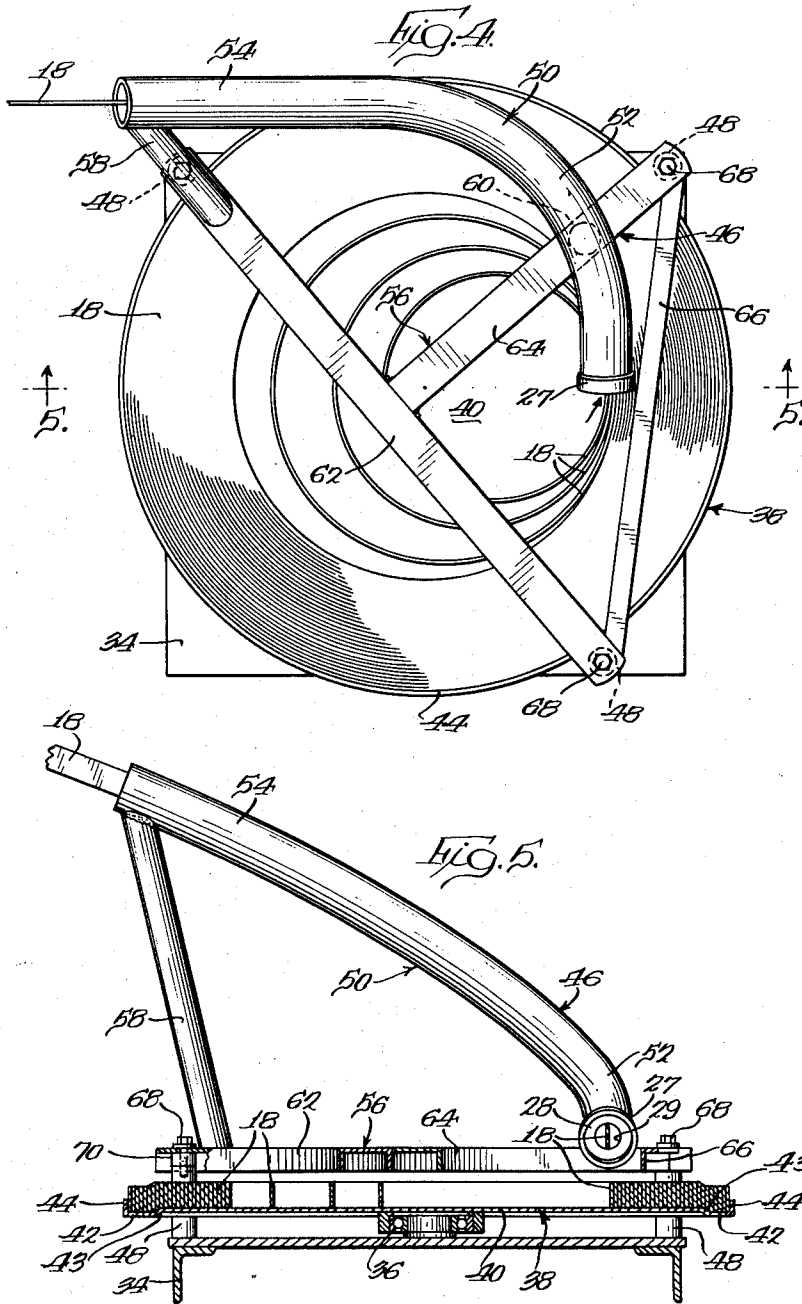
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2 Sheets-Sheet 2



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STEEL STRAPPING DISPENSER

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Filed Sept. 24, 1959, Ser. No. 842,006

4 Claims. (Cl. 242—128)

This invention relates generally to means for dispensing steel strapping for use in conjunction with manual or pneumatically operated tools which tension the strap about one or a number of cartons or bundles, joining the strap ends, and cut the strap about the bundle from that in the dispenser. More particularly, the invention relates to such strap dispensing apparatus by which strapping may easily be withdrawn from a coil thereof manually or otherwise, in which the dispensing means provides a frictional braking means on the strap to prevent overtravel and backlash, and in which the possibility of snarling of the strap is avoided.

This application is a continuation in part of application Serial No. 718,637, filed March 3, 1958, entitled "Steel Strapping Dispenser," now abandoned.

In the dispensing of steel strap of, for example, three-fourths inch or one and one-quarter inch width, there is occasionally a tendency, due to the presence of stresses in the strap, to camber or curl, which makes it difficult to feed the strap through guides, pairs of rollers, or the like, without encountering the trouble of having the strap fan out and jam between guide flanges, rollers, and the like, utilized in conventional strap dispensing apparatus. Likewise, in conventional steel strap dispensing devices, there is frequently considerable friction between the strap and the dispensing device, making it onerous to dispense the required length of strap, especially if this is done by manually pulling the strap from the reel. There is present the possibility that the strap may continue to unwind from the reel, resulting in buckling of the strap and snarling of its feed when the force pulling the strap from the dispenser is relieved. This condition is frequently encountered in strap of the lighter weights and narrower widths.

It is thus one of the objects of the invention to provide an improved steel strap dispensing apparatus in which the frictional forces opposing withdrawal of a length of strap from the reel are relatively small, and in which such friction is greatly increased when the required length of strap has been withdrawn and the pull thereon released.

A further object is to provide an improved steel strap dispenser which may readily be adjusted for the dispensing of steel strapping of different widths.

A further object is to provide a steel strap dispenser in which the strap is withdrawn from the center of the coil or from the outer turn of the coil, and in which several turns of the coil may unwind inwardly or outwardly to provide some slack to decrease the initial pulling force required to withdraw a substantial length of the strap before the coil is accelerated in the direction of strap dispensing in response to the pulling force.

A further object is to provide a steel strap dispenser in which the strap is withdrawn from the outer turn of the coil, and in which several outer turns of the coil of the strap may spread outwardly in the manner of an unwinding clock coil spring, so as to provide some slack to decrease the initial pulling force required to withdraw a substantial length of the strap before the coil itself is accelerated in the coil unwinding direction in response to the pulling force.

More specifically, a further object is to provide a dispenser having a generally helical tubular guide through which the strap travels, and which, due to the inherent resilient stresses in the strap, will cause the latter frictionally to engage the radially outward inner surface of the

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tube so as to provide a substantial braking effect. However, when the strap is pulled, it will be drawn away from the radially outward internal surface of the helical tube so that the frictional forces resisting withdrawal of the strap will be substantially reduced, thus facilitating the withdrawal of a length of strap by the operator.

A further object is to provide a steel strap dispenser wherein the braking action referred to in the preceding paragraph is used smoothly to decelerate the rotating coil when the dispensing pull has been stopped and which unwinds strapping from the outer coil turns or recoils the strapping at the center of the coil, depending on whether strapping is being withdrawn from the outer turns or the center of the coil as the case might be.

A further object is to provide an improved steel strapping dispenser which may conveniently rest upon a floor, and from which the strap may be drawn at a height above the floor level which is convenient for the operator.

A further object is to provide a steel strap dispenser in which all of the functional parts are conveniently visible to the operator, so that any possible malfunction is easily detected and easily corrected.

A further object is to provide a steel strap dispenser in which the strap is fed from the outer turn of the coil, and in which the inherent resiliency of the coil, which is mounted for rotation in a rotatable tray having antifriction bearing means, is utilized to cause rotation of the reel and its tray support after the strap has been released, to cause a number of the outer turns of the reel of strap to be loosened so that the force required subsequently to pull a length of strap from the reel is slight.

Other objects will become apparent from the following description, reference being had to the accompanying drawings, in which

FIG. 1 is a plan view of a first form of strap dispensing apparatus;

FIG. 2 is a side elevation thereof, shown partly in diametral cross section;

FIG. 3 is a sectional view, taken on the line 3—3 of FIG. 1;

FIG. 4 is a plan view of a second form of strap dispensing apparatus; and

FIG. 5 is a diametral cross sectional view thereof, taken along the line 5—5 of FIG. 4, looking in the direction of the arrows.

In the withdrawal of steel strapping from a ribbon wound coil (or possibly also from a mill wound coil) for use in securing packages and other articles, using manual or pneumatically operated tools for tensioning, severing, and securing a length of steel strap about a carton, etc., difficulty has at times been experienced in preventing the coil of the steel strap from rotation beyond that required for a particular operation. The apparatus of the present invention provides frictional means for retarding the movement of the steel strap after a length has been withdrawn from the coil, so that the possibility of undesirably extensive overtravel of the reel of strap is prevented; and further, that the strap may be withdrawn from the apparatus against a very slight and more or less constant frictional retarding force. If such, or similar, means are not provided it is possible that the steel strap may become snarled due to the fact that the forces of momentum will cause the reel to overtravel and thus produce a slack which is not readily controllable. The presence of excessive slack may require the operator to rewind the reel to take up the possibly snarled length of steel strapping resultant from excessive overtravel of the reel beyond that required for dispensing the length of strapping withdrawn from the reel. When the snarling is excessive, the strapping may be kinked, thus creating a condition where a substantial length of strapping would have to be discarded and wasted.

The dispenser of FIGS. 1 to 3 comprises a suitably fabricated base 10 supporting an antifriction bearing structure 14 for a tray 20 and a bobbin or reel structure 21 for relatively free rotation. A steel strap 18 in a hollow coil surrounds the bobbin 21, preferably as a ribbon wound spiral, but may, with slight modification of the dispensing apparatus, be in the form of a mill wound spiral coil. It will be understood that in a mill wound coil of strapping the strapping is oscillated back and forth laterally as it is being wound (somewhat in the manner that a fishline is wound upon its reel by a level wind mechanism) so that the aggregate width of the coil may be several times the width of the strap itself. The dispenser herein disclosed, however, is particularly adapted for ribbon wound coils of strapping in which each turn directly overlies the underlying turn, so that the aggregate width of the coil is approximately the same as the width of the strap.

The steel strapping 18 is fed from the outer turn of the coil into the lower end of a helically conformed guide tube 24 which is supported by suitable tubular posts 26 welded respectively to the tube 24 and the base structure 10.

A fitting 27 is suitably secured to the lower end of the guide tube 24 and has a transverse wall 28 provided with an opening 29 which is of slightly greater diameter than the width of the strap 18. For example, the opening 29 may be $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter, assuming that the strap is three-fourths inch in width. When the dispensing apparatus is used for a strap of, for example, one and one-fourth inch width, the fitting 27 is removed and may be attached to a suitable part of the dispenser so as to be available for reattachment in the event the dispenser is required for serving strap of three-quarter inch width.

Retainer arms 30 and 31 are mounted by clamps 32 and 33, respectively, to two of the columns 26, and project radially inward so as to overlie the coil of steel strapping (with slight clearance), thereby to maintain it in regular coiled form. These clamps 32 and 33 are adjustable to permit adjustment of the arms 30 and 31 vertically, for different widths of strap, and allow the arms to be swung outwardly to permit insertion of a replacement coil of strapping 18.

In the use of the apparatus, the operator grasps the end of the strapping 18 which protrudes from the upper, generally horizontally directed, open end of the helical tubular guide 24, and withdraws the desired length of strapping for the particular packaging operation being performed. Due to the inherent resiliency of the steel strapping, it will tend normally to engage the radially outward portion of the internal surface of the guide tube 24, with the result that a substantial frictional retarding force will be applied to the strapping. However, when the operator pulls upon the protruding end of the strap 18, the strap within the tube will tend to move radially away from the radially outward inner surface of the guide tube, and thus the frictional resistance against withdrawal of the strap is substantially reduced. This condition is indicated in the sectional view of FIG. 3, wherein the strap 18 is shown as normally engaging the inner wall of the guide tube 24 and is shown in dotted lines at 18a in the position which it may assume relative to the tubular guide 24 as the strap is being pulled from the coil. Of course, the strap shown in dotted lines at 18a is representative of any of a number of positions it may assume relative to the guide tube 24, depending upon many factors, such as the speed of the withdrawal of the strap, the inertia of the coil resting in the tray 20, and other frictional forces involved, but in general, the major portion of the length of the strap 18 within the guide tube 24 will be but slightly retarded by friction resulting from engagement of the strap with the wall of the guide tube 24.

However, as soon as the application of the pulling force is discontinued, the resiliency of the strap will cause it almost immediately to assume the position relative to the guide tube 24 as shown in full lines in FIG. 3, so that a

substantial frictional braking force will almost instantly be applied to the strap. As previously indicated, this resistance to travel of the strap through the guide tube will usually hold the strap from further travel, but due to the rotary moment of inertia of the coil of strap and the tray 20 will, due to overtravel of the coil and tray, result in loosening or partially unwinding a number of turns of the coil of strap so that upon a succeeding dispensing operation the force required to pull the strap from the dispenser will not be great.

This overtravel of the coiled strap and its supporting tray 20 may increase somewhat as the diameter of the coil of strapping is reduced, but by the same token there will be provided additional space between the outer winding of the coil of strapping and the outer vertical wall of the tray 20, so that such increased overtravel of the coil of strap and reel is readily accommodated.

This braking action of the strapping 18 in the tubular guide 24 and the unwinding of the outer turns of the coil have the further function of bringing the coil and tray 20 to a smooth stop with no snarling or kinking of the strapping.

The second form of dispenser is shown in FIGS. 4 and 5, and comprises a base 34 adapted to be set on the floor and which mounts a bearing structure 36 fitted to the underside of a circular tray or coil holder 38. The tray has a substantially flat or plate-like bottom 40 on which a coil of strapping 18, preferably a ribbon wound coil, may be supported. The tray has a slightly depressed portion 42 surrounding the flat bottom 40 and connected thereto by a gentle rise 43, and is bounded by a low up-turned flange 44 to center and retain the coil on the tray.

A strap guide or chute assembly 46 overlies the tray 38 and the coil of strapping 18, and is mounted on three posts 48 upstanding from the base 34. The assembly 46 includes a tubular strap guide or chute 50 having a lower helical or curved section 52 merging into a gently curved and laterally substantially straight section 54 terminating in an upper end, having its opening facing generally horizontally. The tubular guide 50 is provided with the previously described removable fitting 27 to accommodate the dispenser to steel strap 18 of various widths.

The tubular guide 50 is supported on a horizontal frame 56 forming part of the assembly 46, by a pair of posts 58 and 60, the first being appreciably longer than the second. The frame 56 comprises three downwardly opening channel or angle shaped structural members 62, 64, and 66. The member 62 extends diagonally across the base 34 and almost diametrically across the tray 38. The member 64 is welded to the member 62 at approximately its midpoint, to extend away therefrom at right angles to a supporting post 48 in another corner of the base 34. The longer post 58 for the tubular guide 50 has its lower end welded to the long member 62 adjacent one of its ends, and the post 60 upstands from the frame member 64 near its outer end. The frame member 66 connects the outer end of the member 64 with that end of the longest structural member 62 remote from the post 58, thus giving substantial rigidity to the strap guide assembly 46.

The guide and chute assembly 46 is secured to the posts 48 by bolts 68 which pass through suitable openings in the ends of the frame members 62, 64, and 66, and into tapped openings in the posts 48. To accommodate the dispenser to strapping of varying widths, spacers 70 are used and are positioned between the horizontal frame 56 and the tops of the posts 48 when the dispenser is to be used for strapping of the wider width, such as one and one-quarter inch, for which the dispenser is designed. However, when the dispenser is used with strapping of a narrower width, such as three-fourth inch strap, the spacers 70 are placed on top of the horizontal frame 56 and used as washers between the heads of the bolts 68 and the tops of the respective frame members. In the drawings, the guide assembly 46 is shown arranged for

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the wider strapping, that is, with the spacers 70 interposed between the tops of the posts and the undersides of the frame members 62, 64, and 66. However, in order to illustrate the use of the adapter 27, it is shown on the lower end of the tubular guide 50. It should be understood, however, that when the washers or spacers 70 underlie the frame 56, the adapter 27 would not be used. When the adapter 27 is used and a narrower width strapping is being dispensed, the spacers 70 are used as washers between the heads of the bolts 68 and the top of the horizontal frame 56.

When this dispenser is used, the strapping is loaded into the tray from the open side of the dispenser, that is, the side which has no corner post and is at the lower left of the plan view of FIG. 4. The coil of strapping is slid beneath the horizontal frame member 62 until it is accommodated within the tray 38. The ties binding the coil of strapping are cut and if the coil has any tendency to expand, the peripheral flange 44 will limit this expansion. The end of the coil at the center of the tray is grasped and inserted into the lower end of the tube 50, and if the fitting 27 is being used, through the opening 29 in this fitting. The tray is rotated to force the strap 18 through the tubular guide 50 until it appears at the upper end as shown in the drawing. The dispenser is then ready for operation.

The strapping is pulled from the upper open end of the tubular guide 50 and during the initial movement the strapping will uncoil at the center, forming offset spirals of strap, as indicated in FIG. 4, until enough strap has been withdrawn to accelerate the coil and tray 38 to strap dispensing speed. When an adequate amount of strapping has been withdrawn, the pull is stopped and the friction of the strapping 18 against the inner surface of the tubular guide 50 acts as a brake and further movement of the strapping through the tubular guide stops. However, the weight of the coil and the tray will cause some slight further movement of the tray. This is accommodated by recoiling of the strapping onto the center of the coil, and the speed of the tray and coil and the amount of strap which had been unwound will determine how much is recoiled before the rotation of the coil and tray stops. It may be that all of it will be recoiled before the tray and coil are brought to a smooth stop. Subsequent withdrawal of the strapping causes the coil to unwind at the center, and the amount of initial unwinding required is dependent upon the weight of the coil and how much strapping is in it before the rotational speed of the coil and tray approximately matches that of the withdrawal rate of the strap through the tubular guide 50.

As the coil is nearly exhausted, those convolutions or turns of the coil which are in the depressed portion 42 of the tray 38 will be used. It should be noted, however, that these will be very easily pulled up the slight incline 43 between this depressed portion and the main flat bottom of the tray 40, and no interference with normal strap removal is encountered. The depressed portion 42 and the low flange 44 are provided so that a full coil may be slid horizontally over the edge of the tray and under the frame member 62 without in any way having to loosen the mounting bolts 68 or to remove the guide assembly 46. The height of the spacers 70 is such as to accommodate the position of the horizontal frame 56 to the wide and narrower strap widths, as previously indicated, so that the proper space will be provided below the frame 56 for the insertion of the coil. The space between the tray 38 and the frame 56 is such that the latter normally prevents the strapping convolutions from crossing each other on the tray and in general retains the coil on the tray. These spacers also insure that the lower open end of the tubular guide 50 will be properly spaced above the surface of the tray so that the strapping 18 will enter the lower end of the tube at the proper angle and will not bind against the inlet to the tube 50, which would interfere with the orderly withdrawal of the strapping from the coil.

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From the foregoing, it will appear that the strap dispenser described provides an extremely simple, low cost apparatus or device for dispensing steel strapping of one of several commercially used widths, that the strapping is easily pulled therefrom, that it provides automatic means for braking the travel of the strap when the pulling force is discontinued, that it inhibits overtravel after the pulling force has been removed, that it is constructed for easy insertion of a coil of strapping, that it is relatively free from the possibility of snarling the strapping, that due to the avoidance of the use of pairs of guide rollers and other similar guiding restrictions, it is capable of dispensing, without undue friction, strap which may have a certain amount of camber or curl.

While there have been shown and described preferred embodiments of this invention, it will be apparent that numerous variations and modifications thereof may be made without departing from the underlying principles of the invention. Therefore, it is desired, by the following claims, to include within the scope of this invention all such variations and modifications by which substantially the results of this invention may be obtained through the use of substantially the same or equivalent means.

What is claimed as new and desired to be secured by United States Letters Patent is:

1. In an apparatus for dispensing steel strapping, the combination of a base, an annular tray rotatably mounted on the base for the reception of a coil of strapping, a curved tube having a generally helical portion positioned about a generally vertical axis and supported by said base, the lower end of the tube being adjacent the tray and the upper end thereof having its opening directed generally horizontally for conveniently grasping the end of the length of strapping fed through the tube, a fitting having an opening for the passage of strapping secured to the end of the tube into which the strapping is fed, the opening being smaller than the maximum cross sectional internal dimension of the tube, and means overlying the tray to retain the coil of strapping in the tray.

2. In an apparatus for dispensing steel strapping, the combination comprising, a base, a circular tray for the reception of a coil of strapping, bearing means forming a rotatable mounting for the tray upon said base, a curved guide tube having at least a portion thereof in the form of a helix, a frame overlying said base and said tray and mounting said guide tube so that one end thereof is close to the surface of said tray and appreciably inward from the periphery of said tray to receive strapping from the center of the coil and so that its opposite open end is substantially above the surface of said tray for conveniently grasping the end of the length of strapping fed through said tube, and a plurality of posts upstanding from said base and to which said frame and said guide tube are secured, and a plurality of spacers are interposed between said posts and said frame properly to space said frame and the lower end of said guide tube above the surface of said tray.

3. The combination set forth in claim 2, in which said guide tube is of circular cross section so that overtravel of the strapping and the coil thereof after the desired length has been withdrawn is braked by the frictional engagement of the edges of the strapping with radially outward portions of the internal surface of said guide tube.

4. In an apparatus for dispensing transversely flat steel strapping from a coil thereof, having a base, and a circular tray mounted on the base for rotation about a vertical axis and adapted to support a coil of strapping, the combination including, a tubular strap guide open at both ends and having at least a portion thereof in the form of a helix with a vertical axis, means supporting said tubular guide on the base with its lower end adjacent the tray and its opposite upper end substantially above the tray with the opening thereof directed generally hori-

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zontally for conveniently grasping the end of the length of strapping fed through said tubular guide, said guide supporting means comprising a frame supported at three points on the base at loci beyond the periphery of the tray, said tubular guide being circular in cross section and overtravel of the strapping coil and excess feeding of the strapping after the desired length thereof has been withdrawn are braked by the frictional engagement of the edges of the strapping within said tubular guide with radially outward portions of the internal surface of said guide, said braking being relieved by a withdrawing pull

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on the strapping, and means forming a part of said guide supporting frame overlying the tray to retain the coil of strapping thereon and to prevent humping of the coil or convolutions thereof during braking of the coil.

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