

Jan. 29, 1957

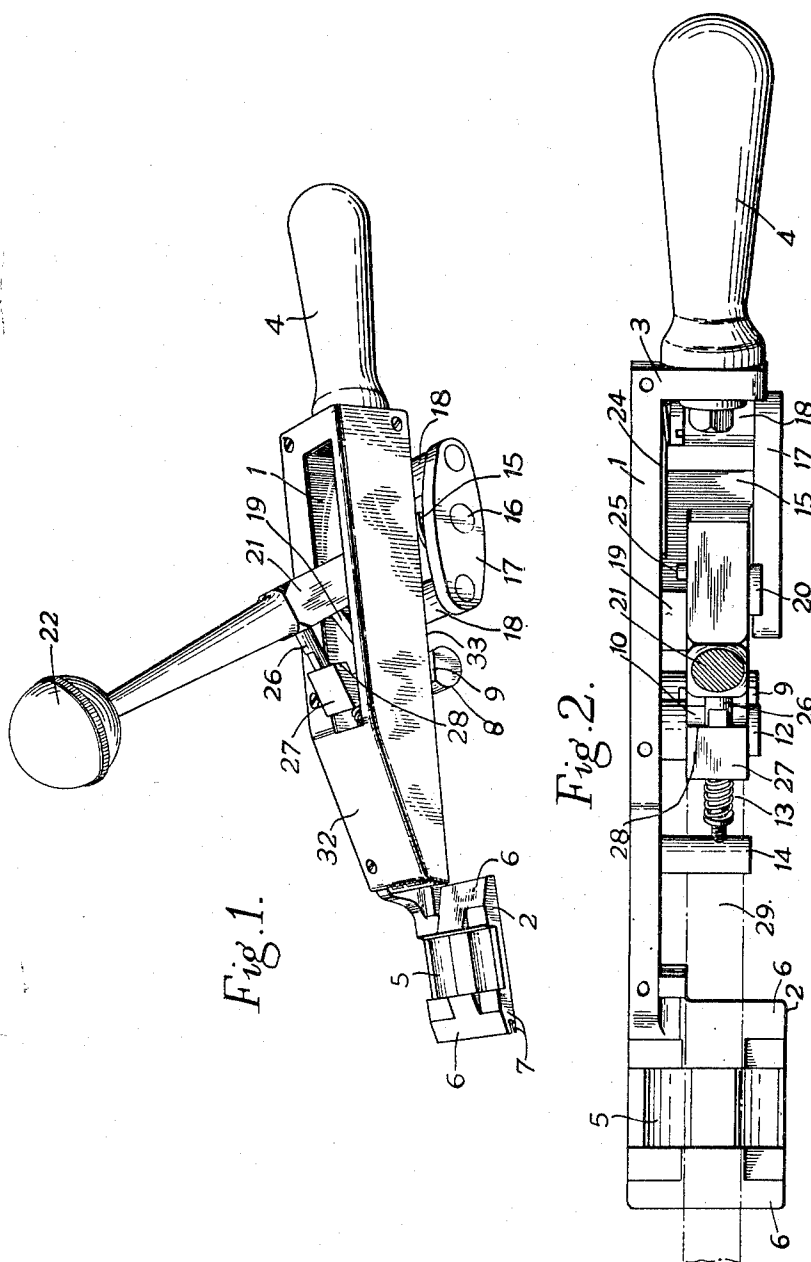
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2,779,566

APPARATUS FOR TENSIONING BINDING STRAPPING, WIRE
OR THE LIKE ABOUT A BODY

Filed Dec. 1, 1953

3 Sheets-Sheet 1



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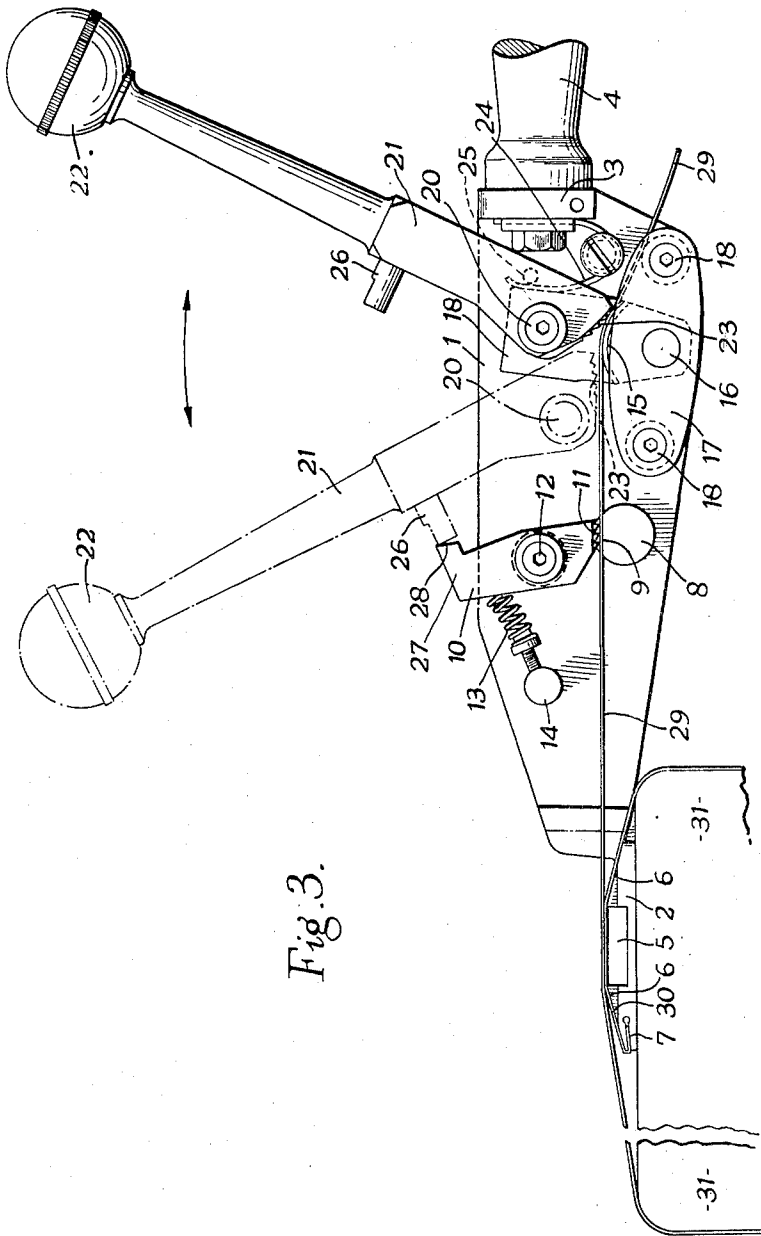


Fig. 3.

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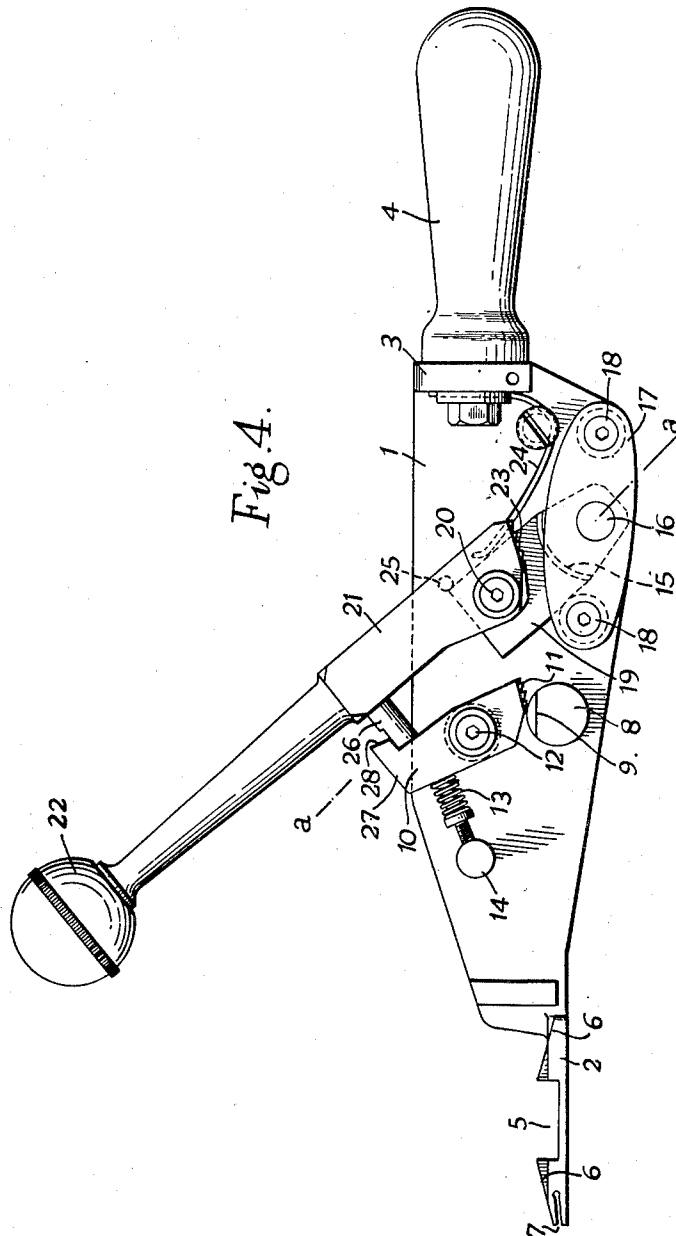
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APPARATUS FOR TENSIONING BINDING STRAPPING, WIRE OR THE LIKE ABOUT A BODY

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Application December 1, 1953, Serial No. 395,552

Claims priority, application Great Britain December 9, 1952

6 Claims. (Cl. 254—79)

The present invention relates to an apparatus for use in tensioning binding strapping, wire or the like about a body, and of the type comprising a support, tensioning means comprising a pair of movable gripping members adapted to grip the strapping or wire between them, the pair of gripping members being mounted on said support so as to be movable independently of one another and so that when a first of the said pair of gripping members is moved in one direction the gripping surfaces are brought into contact and the second gripping member thereafter moved by and with the first, and a one-way gripping device also mounted on the support and arranged to allow the strapping or wire to pass freely through it in the direction in which it is moved by the pair of movable gripping members to tension it but to hold the strapping or wire against movement in the reverse direction.

In accordance with the present invention an improved apparatus of the type indicated above is provided wherein the said second of the pair of movable gripping members is mounted for movement about a fixed axis on the support and the said first of the pair of movable gripping members is mounted for movement about an axis on the said second of the pair of movable gripping members, the said fixed axis on the support being on one side of the co-operating gripping surfaces of the two movable gripping members and the said axis on the said second of the pair of movable gripping members being on the other side of the co-operating gripping surfaces of the two movable gripping members.

Joining of the overlapped ends of a loop of strapping or wire after it has been tensioned by means of a tensioning apparatus of the type indicated above is effected as a subsequent operation and in known manner, sometimes by utilisation of a deformable sealing or connecting device applied to the overlapping portions of the strapping or wire and sometimes by deforming the overlapping portions of the strapping or wire themselves, and with the aid of an additional tool which may be separate from or form a part of the tensioning apparatus.

In known apparatus of the type referred to above the support is commonly an elongated body of angle section, one flange of the angle section forming a base upon which the apparatus rests when in use and the other flange of the angle section having the movable gripping members constituting the tensioning means, and also the one-way gripping device mounted thereon, and when the apparatus is in use the base-forming part of the support and parts of the tensioning means and of the one-way gripping device are contained within the loop of strapping or wire being tensioned, so that when the binding operation is completed and the apparatus is required to be removed, the base-forming part of the support and the said parts of the tensioning means and the one-way gripping device need to be removed from between the inside of the binding loop and the surface of the bound body, so that some consequent slackening of the tension in the loop cannot be avoided.

2

According to a further feature of the improved apparatus according to the present invention, a support is provided comprising a main body portion and a base-forming portion at or near to one end of the main body portion and extending over a part only of the length of the support, the tensioning means and the one-way gripping device being mounted on the main body portion of the support between the base-forming portion and the end of the support remote from the base-forming portion, with the fixed axis of movement of the second movable member of the tensioning means on the support and the axis of movement of the first movable member of the tensioning means, on opposite sides of a line extending from the upper surface of the base-forming portion of the support and between the co-operating gripping surfaces of the two movable members of the tensioning means.

With an apparatus of this construction the tensioning operation can be carried out with only the base-forming portion of the support of limited length between the inside of the tensioned loop of strapping or wire being formed and the surface of the body being bound, so that a minimum of slackening of the loop is involved as the tensioning apparatus is removed when the binding operation has been completed.

A fixed handle is provided on the support at or near the end thereof remote from the base-forming portion of limited length, suitable to be grasped by one hand of an operator, and a lever is provided for operation by the other hand of the operator to impart movement to the pair of movable gripping members constituting the tensioning means relative to the support.

The one-way gripping device is preferably mounted on the support in a position between the base-forming portion of limited length at one end of the support and the tensioning means at or near the other end of the support.

The improved apparatus enables the operation of tensioning a loop of strapping or wire about a body to be carried out in a succession of stages in which the pull on the strapping or wire is applied by a natural movement of the operator's hands towards one another and when tensioning is completed the entire loop, including the overlapping portions of the strapping or wire overlying the base portion of limited length, and upon which overlapping portions the connecting or sealing operation is to be carried out, is under tension so that again no slackening of the loop can occur due to the presence of an untensioned section in the loop, when the apparatus is removed from between the surface of the body being bound and the formed loop.

An embodiment of the invention suitable for use in binding bodies with flat mild steel strapping is illustrated in the accompanying drawings in which:

Fig. 1 is a view in perspective showing a complete tensioning apparatus according to the invention,

Fig. 2 is a view in plan, partly in section and on a larger scale of the complete apparatus according to Fig. 1 with the cover plate removed, and

Figs. 3 and 4 are views of the apparatus in front elevation and also on a larger scale, with operative parts thereof in different positions.

Referring to the drawings the improved apparatus shown comprises a support in the form of an elongated stiff metal bar 1 having an extension piece 2 of short length at one end lying for the main part at one side of the stiff metal bar 1 and in general plane at right angles to the plane containing the stiff metal bar, and at the other end with a lug 3 extending at right angles to the bar 1 and to which is rigidly fixed a longitudinally extending handle 4.

The bar 1 constitutes the main body portion of the support and the end extension piece 2 constitutes the base-forming portion of limited length corresponding to a part only of the total length of the support. The end extension piece 2 is formed flat on its underside and provided on its upper side with a transverse slot 5. The parts of the upper surface of the base-forming portion 2 on opposite sides of the slot 5 are chamfered as shown at 6 so that the base-forming portion 2 is of decreasing thickness towards its two opposite ends. In the edge of the base-forming portion 2 remote from the handle 4 there is formed a narrow transverse groove 7 of a width only slightly in excess of the thickness of the flat metal strapping to be used, the inner end of said groove 7 being enlarged by forming a boring of a diameter greater than the width of the major part of the groove.

On one face of the elongated bar portion 1 of the support is mounted a one-way gripping device comprising a stud or post 8 welded or otherwise fixedly connected to the bar 1 of the support so as to extend outwards from the bar 1 at the same side thereof as the greater part of the base-forming portion 2, the upper side of the stud or post 8 being provided with a flat surface as shown at 9, and a pivoted bar 10 having a serrated lower end 11 and pivoted on a transverse pivot pin 12 fixed to and extending from the support bar 1 and located over the stud or post 8.

A compression spring 13 is mounted between an anchorage 14 on the elongated bar 1 of the support and the pivoted bar 10 to urge the bar 10 in one direction i. e. the clockwise direction as shown in the drawings, about its pivot pin 12 to engage the serrated end 11 thereof with the upper surface 9 of the stud or post 8.

On the bar 1 of the support and between the one-way gripping device and the fixed handle 4, is mounted the tensioning means. The tensioning means comprise a gripping member having the form of a part of a roller 15 mounted for to and fro rotary movement about a fixed pivot pin 16 supported between the elongated bar portion 1 of the support and a short plate 17 parallel to the bar 1 and fixed to a pair of fixed spacing posts 18 extending from the bar 1. The part roller 15 is provided at its end adjacent the bar 1 with an upstanding arm 19 which carries a further pivot pin 20 fixed to the arm 19 and located above and extending parallel to the pivot pin 16 of the roller 15, said further pivot pin 20 serving as a pivot for an upstanding lever 21 having a handle or knob 22 at its upper end and a serrated surface 23 at its lower end for co-operation with the upper part of the surface of the roller 15. The lever 21 constitutes the first gripping member of the tensioning means and the roller 15 the second gripping member of the tensioning means as previously referred to. The arrangement is such that the serrated surface 23 at the lower end of the lever 21 is urged into engagement with the surface of the roller 15 by a movement of the handle 22 of the lever 21 towards the handle 4 on the lug 3 at the end of the bar 1 of the support.

A spring 24 is mounted on the bar 1 of the support in a position to engage the arm 19 of the roller 15 to urge the latter in one direction i. e. the counterclockwise direction in the drawings, about its pivot 16.

A pin 25 is fixed rigidly to the lever 21 in a position to extend rearwards thereof towards the bar 1 and to engage with one edge of the arm 19 of the roller 15 to impose a limit upon the permitted relative movement between the lever 21 and the arm 19 in the direction for disengaging the gripping members, constituted by the serrated end 23 of the lever 21 and the surface of the roller 15, from one another.

At the side of the lever 21 towards the one-way gripping device is fixed a projecting pin 26, and on the adjacent side of the upper end of the pivoted bar 10 of the one-way gripping device is formed a lug 27 having a profiled outer end 28 forming a cam for co-operation with

the end of the pin 26 when an extended movement is imparted to the lever 21 in the direction to disengage the serrated end 23 of the lever 21 from the roller 15, whereby the bar 10 of the one-way gripping device is moved about its transverse pivot pin 12 against the spring 13 to disengage the serrated end 11 of the bar 10 from the flat surface 9 of the fixed stud or post 8.

When the lever 21 is moved in the direction causing engagement of the pin 26 with the pivoted bar 10 of the one-way gripping device and the pin 26 first makes contact with the profiled end 28 of the pivoted bar 10, the lever 21 is caused to move about the point of contact as a fulcrum, so that the roller 15 moves in one direction i. e. the clockwise direction in the drawings about its fixed pivot pin 16 and the lever 21 moves in the other direction i. e. the counterclockwise direction in the drawings about its transverse pivot pin 20 on the arm 19 of the roller 15 until the fixed pin 25 at the rear of the lever 21 makes contact with one side edge of the arm 19. Thereafter the lever 21 and the roller 15 move in unison about the fixed pivot pin 16 of the roller 15, and the projecting pin 26 on the lever 21 finally engages beneath the lug 27 on the bar 10 in the manner shown in Fig. 4.

In this extreme position of the lever 21 the axis of the pivot pin 20 of the lever 21 on the arm 19 is above a line joining the axis of the pivot pin 16 of the roller 15, and the point of engagement of the pin 26 on the lever 21 with the end of the lug 28 on the bar 10 (see lines *a-a* in Fig. 4) but to an extent which is limited by the engagement of the pin 25 on the rear of the lever 21 with the side of the arm 19 of the roller 15, so that the lever 21 is held in that position relative to the arm 19 on the roller 15 in which the serrated end 23 of the lever is disengaged and spaced from the surface of the roller 15 and the pivoted bar 10 of the one-way gripping device is held in that position in which its serrated end 11 is disengaged and spaced from the surface 9 of the stud or post 8.

As can be seen in the drawings (see Fig. 3), the positions on the support bar 1 of the surface 9 of the stud or post 8 of the one-way gripping device and of the part of the surface of the roller 15 of the tensioning means intended to be engaged by the serrated end 23 of the lever 21 are selected so as to lie in a substantially straight line with the upper side of the base support 2, and the pivot pin 16 of the roller 15 lies below that line and the pivot pin 20 of the lever 21 on the arm 19 of the roller 15, above that line.

In the rest position the lever 21 takes the position shown in Fig. 1 and in dotted lines in Fig. 3, the roller 15 and its arm being urged in the counterclockwise direction about the pivot 16 by the spring 24 and the pin 26 on the lever 21 resting freely and lightly against the profiled end 28 of the lug 27 on the pivoted bar 10 of the one-way gripping device.

To use the apparatus, the handle 4 is grasped with one hand and the hand lever 21 moved with the other hand in the counterclockwise direction in the drawings from the position shown in Fig. 1 and in dotted lines in Fig. 3 into the position shown in Fig. 4 in which the end of the pin 26 on the lever 21 has moved into engagement beneath the lug 27 on the pivoted bar 10, so that the lever 21 and the pivoted bar 10 are thereafter mutually-retaining in the position shown in Fig. 4 in which the serrated ends 23 and 11 are spaced from the roller 15 and the surface 9 of the stud or post 8 respectively.

With the parts of the apparatus in the position shown in Fig. 4, the free end of the strapping 29 (Fig. 3) to be used is inserted in the groove 7 in the outer end of the base portion 2 and the strapping bent back to lie as shown at 30 in Fig. 3, over the base-forming portion 2 of the support so that a hook is formed at the end of the strapping as shown in Fig. 3 such as to anchor the end of the strapping 29 to the base-forming portion 2 of the support. It will be understood that the free end of the

5

6

strapping 29 to be inserted in the groove 7 will usually be a severed or broken-off end from a previously formed loop, so that the extremity will usually present some slight irregularity. The enlargement at the inner end of the groove 7 enables such irregular ends to be readily inserted edgewise into the groove 7 and such irregular ends offer the advantage of retention of the strip in the groove 7.

After insertion of the free end in the groove 7 the strapping is turned downwards between the one-way gripping device 9, 10, and the end of the base-forming portion 2 remote from the groove 7, and is looped about the body 31 (Fig. 3) to be bound and is thereafter passed again over the base-forming portion 2 of limited length so as to overlap the part 30 of the strapping already thereon; and is introduced by edgewise insertion between the serrated end 11 of the pivoted bar 10 and the surface 9 of the stud or post 8 and between the serrated end 23 of the lever 21 and the roller 15.

The apparatus is held by means of the handle 4 in a position with the base-forming portion 2 of limited length resting with its underside upon the body 31 looped by the strapping. The lever 21 is now moved by hand from the extreme end position shown in Fig. 4 in the clockwise direction in the drawings.

The first part of the movement of the lever 21 causes the pivot pin 20 to move towards the line *a-a* of Fig. 4 and the pin 25 to move away from engagement with the arm 19 and about the pivot pin 20 on the arm 19 of the roller 15, immediate follow-up movement by the arm 19 and roller 15 being prevented by the spring 24.

The pin 26 on the lever 21 is withdrawn from beneath the lug 27 on the pivoted bar 10 of the one-way gripping device and the pivoted bar 10 permitted to tilt under the thrust of spring 13 to engage its serrated lower end 11 with the strapping 29 located on the flat upper surface 9 of the stud or post 8. In this position the strapping 29 may be drawn in one direction i. e. towards the right in Fig. 3 between the parts 9 and 11 of the one-way gripping device but is held by said one-way gripping device against movement in the other direction.

Continued movement of the lever 21 about the pivot pin 20 on the arm 19 causes the serrated end 23 of the lever 21 to engage the strapping 29 on the roller 15 so that the strapping is gripped between the serrated end 23 of the lever 21 and the upper surface of the roller 15. During further clockwise movement of the lever 21 said lever and the roller 15 and the part of the strapping gripped between those parts move as a unitary whole about the pivot 16 of the roller 15 and against the spring 24, and the strapping is drawn through the one-way gripping device 9, 10 to contract the loop of strapping about the body 31.

Reversal of the direction of movement of the lever 21 brings about the release of the grip on the strapping 29 between the serrated end 23 of the lever 21 and the surface of the roller 15, return movement of the strapping, however, being prevented by the one-way gripping device comprising the serrated end 11 of the spring-loaded pivoted bar 10 and the flat surface 9 of the stud or post 8.

The lever 21 is moved in the counter-clockwise direction to a position approaching but short of that in which contact is made by the pin 26 on the lever 21 with the end 28 of the pivoted bar 10, and again the lever 21 is moved clockwise to first grip the strapping between the serrated end 23 of the lever 21 and the roller 15 and thereafter draw the strapping through the one-way gripping device in the direction to tension the loop, all as previously described.

It will thus be seen that by a to and fro movement of the lever 21 movement is imparted to the strapping each time the hands of the operator are drawn towards one another so that the loop of strapping around the body 31 is contracted step-by-step until the required degree of tension in the loop has been achieved.

Thereafter the overlapped portions of the strapping spanning the transverse slot 5 in the base-forming part 2 of the support are joined together in any convenient manner e. g. by the application of a sealing clip of well known kind in the slot 5 and around the overlapped parts of the strapping 29 and 30, and deforming the sealing clip and the overlapped parts of the strapping enveloped thereby all in well known manner and not forming part of the present invention.

The joining operation having been completed, the lever 21 is moved to the maximum extent in the counter-clockwise direction into the position previously described and as shown in Fig. 4, in which the serrated end 11 of the pivoted bar 10 of the one-way gripping device is spaced from the stud or post 8 and the serrated end 23 is spaced from the roller 15.

The apparatus may now be readily disengaged by a sideways movement from the portion of the strapping 29 extending from the closed loop through the one-way gripping device and the tensioning means, and the base-forming portion 2 of limited length withdrawn from between the joined ends of the loop and the body 31.

The portion of the strapping 29 extending from the joint of the loop may now be severed.

By the disposition of the upper side of the base-forming part 2 of the support, the platform 9 and the upper side of the roller 15 in substantially a straight line, the extending portion of the strapping adjacent the joint in the loop during tensioning and before severing, remains substantially unkninked so that it may be used as the starting portion of the next loop and no part of the strapping needs to be discarded.

The apparatus may be provided with a cover 32 as shown in Fig. 1 screwed to the support 1, the upper wall of the cover being slotted for the passage of the lever 21 and the upper end of the pivoted bar 10 of the one-way gripping device and the lower front edge 33 of the cover 32 being a straight edge spaced above the level of the platform 9 and the roller 15 and serving as a guide to assist the sideways insertion of the strapping into the apparatus.

I claim:

1. Apparatus for use in tensioning binding strapping, wire or the like, comprising a support, tensioning means including a hand-operable first pivoted gripping member and a second pivoted gripping member mounted on the said support and adapted to grip the strapping or wire between them and to move said strapping or wire in a substantially straight line lengthwise of the apparatus to tension it on movement of said first and second pivoted gripping members in one direction, a pivot for the said first gripping member carried by the second gripping member and located at one side of the co-operating gripping surfaces of said first and second gripping members and making oscillatory movement of limited extent on one side of said substantially straight line of movement of the wire or strapping during tensioning, a pivot for the second gripping member carried by the said support and located on the other side of said substantially straight line of movement of the wire or strapping during tensioning, the first and second gripping members being movable independently of one another and so that when the said hand-operable first gripping member is moved in one direction about its pivot on the said second gripping member the gripping surfaces are brought into contact and the said second gripping member moved by and with the said first gripping member, spring means biasing the said second pivoted gripping member about its fixed pivot on the support in opposition to the direction of movement of said second pivoted member for tensioning and a one-way gripping device also mounted on the said support and arranged to allow the strapping or wire to pass freely through it in the direction in which it is moved by the said tensioning means to tension it but

to hold the strapping or wire against movement in the reverse direction.

2. Apparatus for use in tensioning binding strapping, wire or the like comprising a support including a base-forming portion at one end only of the length of said support, tensioning means including a hand-operable first pivoted gripping member and a second pivoted gripping member mounted on the said support between the said base-forming portion and the end of the support remote from the base-forming portion and adapted to grip the strapping or wire between them, a pivot for the said first gripping member carried by the said second gripping member and a pivot for the said second gripping member carried by the said support, the said first and second gripping members being movable independently of one another and so that when the said hand-operable first gripping member is moved about its pivot on the said second gripping member in the direction away from the base-forming portion, the gripping surfaces are brought into contact and the said second gripping member moved by and with the said first gripping member, spring means biasing the said second pivoted member about its fixed pivot on the support in the direction towards the said base-forming portion of the support and a one-way gripping device also mounted on the said support between said base-forming portion and the end of the support remote from the base-forming portion and arranged to allow the strapping or wire to pass freely through it in the direction in which it is moved by the said tensioning means to tension it but to hold the strapping or wire against movement in the reverse direction.

3. Apparatus for use in tensioning binding strapping, wire or the like, comprising a support including a base-forming portion at one end only of the length of said support, tensioning means including a hand-operable first pivoted gripping member and a second pivoted gripping member mounted on the said support between the said base-forming portion and the end of the support remote from the base-forming portion and adapted to grip the strapping or wire between them and to move said strapping or wire in a substantially straight line lengthwise of the apparatus to tension it on movement of said first and second gripping members in one direction, a pivot for the said first gripping member carried by the second gripping member and located at one side of the co-operating gripping surfaces of said first and second gripping members and making oscillatory movement of limited extent on one side of said substantially straight line of movement of the wire or strapping during tensioning, a pivot for the second gripping member carried by the said support and located on the other side of said substantially straight line of movement of the wire or strapping during tensioning, the first and second gripping members being movable independently of one another and so that when the said hand-operable first gripping member is moved in one direction about its pivot on the said second gripping member the gripping surfaces are brought into contact and the said second gripping member moved by and with the said first gripping member, spring means biasing the said second pivoted member about its fixed pivot on the support in the direction towards the said base forming portion of the support and a one-way gripping device also mounted on the said support between said base-forming portion and the end of the support remote from said base-forming portion and arranged to allow the strapping or wire to pass freely through it in the direction in which it is moved by the said tensioning means to tension it but to hold the strapping or wire against movement in the reverse direction.

4. Apparatus for use in tensioning binding strapping, wire or the like comprising a support including a base-forming portion at one end only of the length of said support, tensioning means including first and second piv-

oted gripping members mounted on the said support between the said base-forming portion and the end of the support remote from the base-forming portion and adapted to grip the strapping or wire between them, a pivot for the said first gripping member carried by the said second gripping member and a pivot for the said second gripping member carried by the said support, the said first and second gripping members being movable independently of one another and so that when the said first gripping member is moved about its pivot on the said second gripping member in the direction away from the base-forming portion, the gripping surfaces are brought into contact and the said second gripping member moved by and with the said first gripping member, and a one-way gripping device also mounted on the said support between said base-forming portion and the end of the support remote from the base-forming portion and arranged to allow the strapping or wire to pass freely through it in the direction in which it is moved by the said tensioning means to tension it but to hold the strapping or wire against movement in the reverse direction, wherein the fixed pivot on the support for the second of the pivoted tensioning gripping members is below the line of movement of the wire or strapping through the apparatus during tensioning and the pivot for the first of the pivoted tensioning gripping members on the second pivoted tensioning gripping member is above said line and a spring is provided biasing the said second pivoted tensioning gripping member about its fixed pivot on the support in the direction towards the said base-forming portion of the apparatus.

5. Apparatus as claimed in claim 2 in which said support is in the form of a substantially flat vertical plate and said base-forming portion is located at one end of said support and extends from said end in a general horizontal plane, and a hand grip fixed to and extending longitudinally from the end of the support remote from the base-forming portion, the tensioning means and the one-way gripping device being mounted on the support between the base-forming portion and the hand grip with the one-way gripping device being mounted between the tensioning means and the base-forming member.

6. Apparatus as claimed in claim 1 and including means to limit the movement of the first pivoted gripping member in the direction opposite to that of its movement for tensioning and to retain said first pivoted member in the limiting position, said means including a spring-loaded member forming part of the one-way gripping device, a lug on said spring-loaded member, a stop limiting the relative movement between the first and second pivoted gripping members of the tensioning means in the direction for parting the co-operating gripping surfaces from one another and a projection on the first pivoted gripping member making retained engagement with the lug on the said spring-loaded member of the one-way gripping device, the arrangement being such that the co-operating gripping surfaces of the first and second pivoted gripping members, in such position of retained engagement, are maintained at the limit of their relative movement in the direction in which they are disengaged from one another.

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