

April 29, 1952

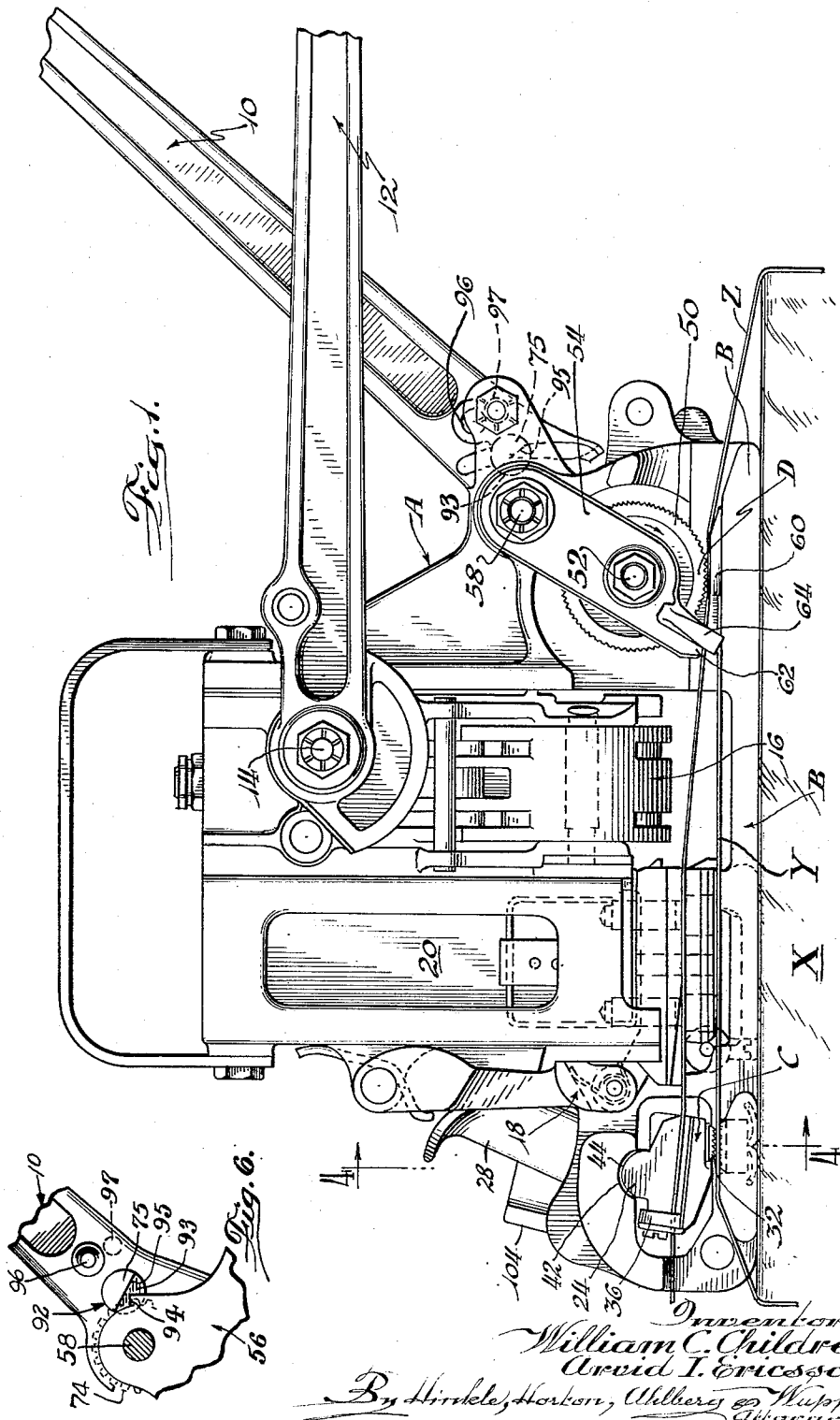
W. C. CHILDRESS ET AL

2,594,397

STRAPPING MACHINE

Filed July 21, 1950

4 Sheets-Sheet 1



April 29, 1952

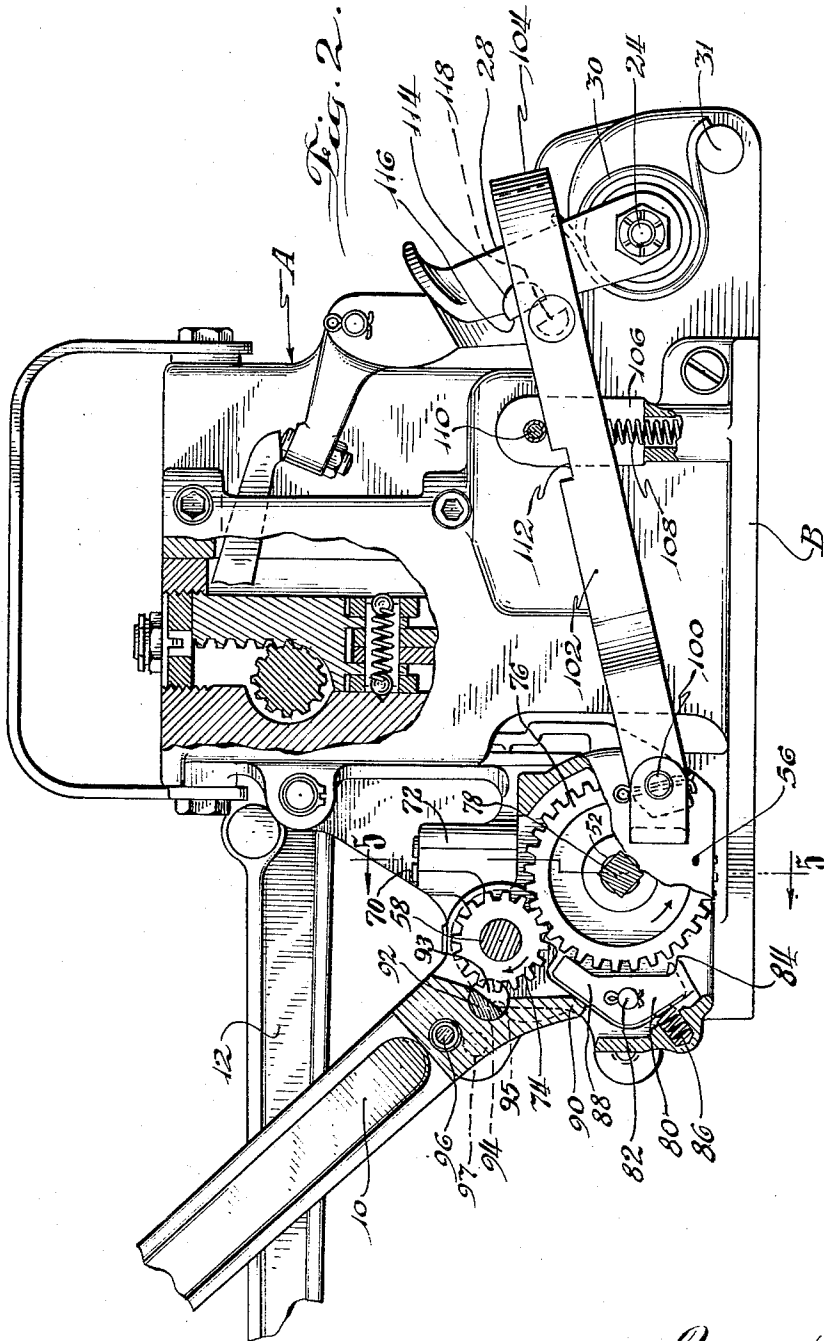
W. C. CHILDRESS ET AL

2,594,397

STRAPPING MACHINE

Filed July 21, 1950

4 Sheets-Sheet 2



Inventors:
William C. Childress
Arvid I. Ericsson

By Winkle, Horton, Aldberg & Mupper,
Attorneys.

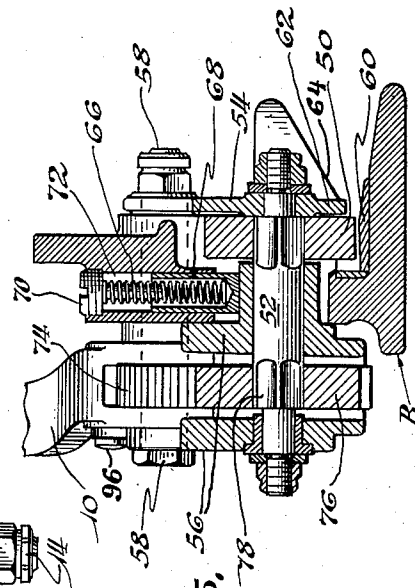
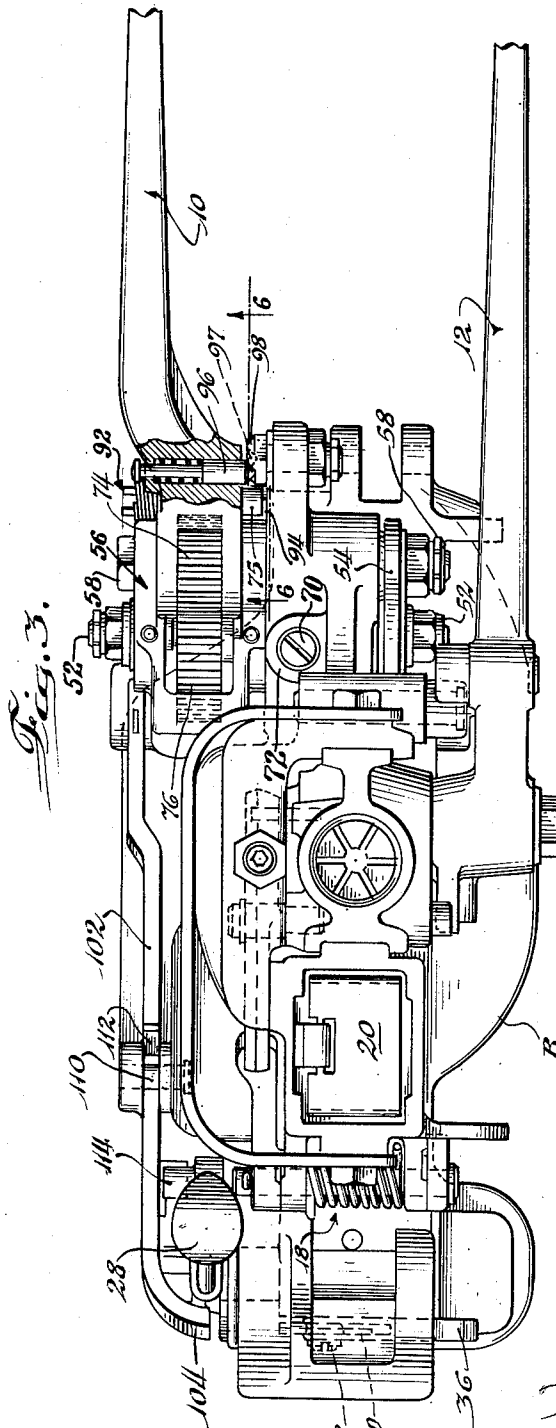
April 29, 1952

W. C. CHILDRESS ET AL
STRAPPING MACHINE

2,594,397

Filed July 21, 1950

4 Sheets-Sheet 3



Inventors:
William C. Childress
Arvid I. Ericsson
By Hinkle, Horton, Ahlberg & Wupper
Attorneys.

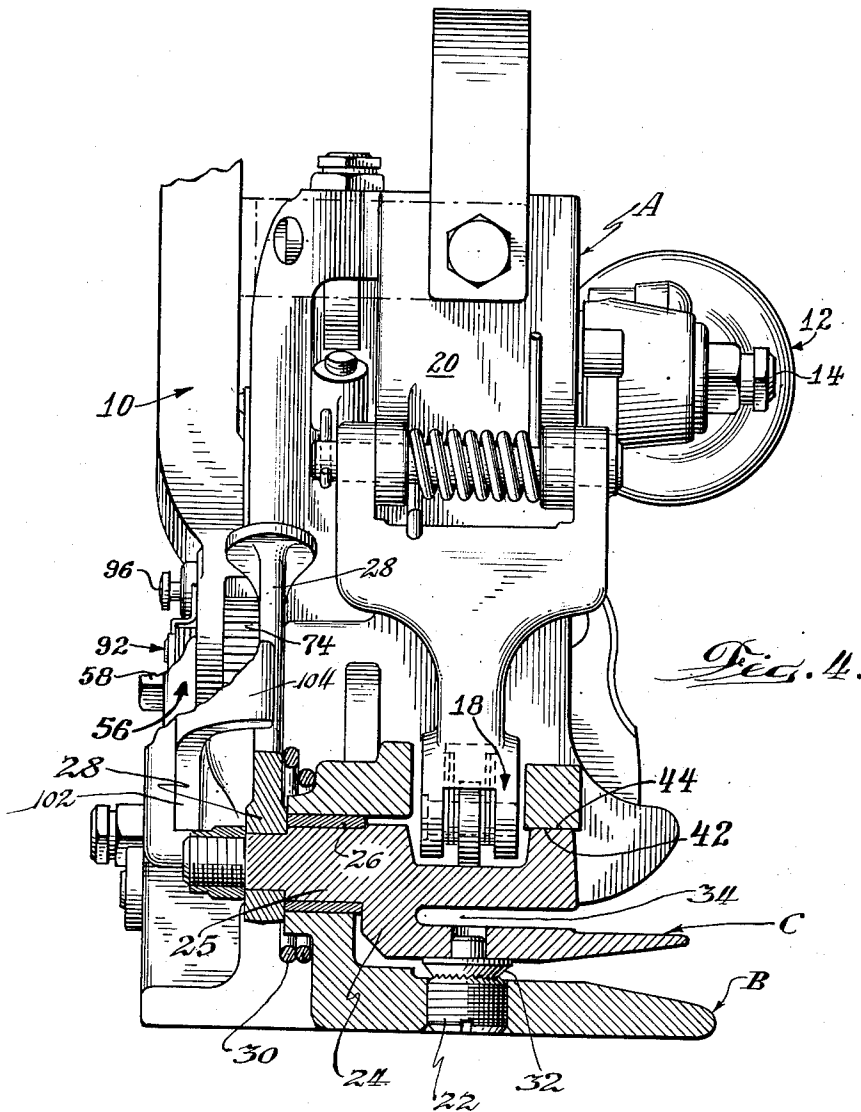
April 29, 1952

W. C. CHILDRESS ET AL
STRAPPING MACHINE

2,594,397

Filed July 21, 1950

4 Sheets-Sheet 4



Inventors:
William C. Childress
Arvid I. Ericsson
By Linkle, Horton, Ahlberg & Kupper
Attorneys

UNITED STATES PATENT OFFICE

2,594,397

STRAPPING MACHINE

William C. Childress, Oak Park, and Arvid I. Ericsson, Chicago, Ill., assignors to Signode Steel Strapping Company, Chicago, Ill., a corporation of Delaware

Application July 21, 1950, Serial No. 175,166

6 Claims. (Cl. 254—51)

1

The present invention relates generally to what are known as strapping machines. A machine of this type and in many respects similar to the present machine is well illustrated and described in Patent No. 2,497,313, issued February 14, 1950, to John H. Leslie II and entitled Package Binding Tool, but whereas the machine forming the subject matter of that patent is intended primarily for applying comparatively light weight strapping to packages, particularly in a production line application, the present invention has to do with a machine to be used for strapping larger objects or for bulk strapping and intended to be used with heavy strap such as, for instance, steel strap $\frac{3}{4}$ " wide by .020" thick or heavier. It will be appreciated, however, that the machine of the present invention may be used with smaller size strapping if desired.

A machine of this general character is intended to be placed upon or against the object to be strapped and to be connected to the two ends of steel strapping surrounding the object. The machine then, by the manipulation of two handles, will tension the strapping about the object, will sever the portion of strap to be used from a supply, will attach and crimp a seal to the overlapped ends of the strapping, and finally will release the overlapped portion of the strapping worked upon so that the tool may be removed. The machine also automatically feeds seals one at a time from a magazine to the crimping jaws as needed.

The particular type joint formed by the machine of the present invention is like that shown in our copending application, Serial No. 168,196 which was filed June 15, 1950. Other type joints may, of course, be substituted by modifying the folding and crimping mechanism although we prefer a joint of the type specified since it has good holding power and is comparatively flat, these advantages being explained in our above referred to copending application.

One of the objects of the present invention is to provide an improved strapping machine of the two handle type in which both the tensioning and sealing are accomplished by pull upon the handles rather than by a pushing operation, thereby facilitating use of the machine particularly with heavy strapping.

Yet another object is to provide a novel machine of the general character specified which is so arranged that the machine may be connected to both ends of the strapping with a minimum of effort.

Still another object is to provide a novel ma-

2

chine of this type which may be easily released from the strap being tensioned about an object at either end of the strap so as to shift the position of the tool if it is found not to have been properly located when the tensioning operation was started.

Still another object is to provide a novel strapping machine having gripping jaws for holding the free end of the strap and a feed wheel for pulling upon an intermediate portion of the strap and in which simple movement of the tensioning handle in the normal or reverse direction, with respect to the direction of tensioning movement, opens the tool for the reception of strapping at both the gripping jaws and the feed wheel.

Still another object is to provide a strapping machine having the above set out advantages and in which the gripping jaw is closed by the simple manual movement of a trigger and in which the feed wheel is brought against the strapping automatically by moving the tensioning handle into the tensioning range.

Yet another object is to provide a strapping machine having the above set out advantages and in which either the feed wheel or the gripper may easily be released from the strap independently of the other, but in which with normal operation of the tool both the feed wheel and gripper will be released from the strapping simultaneously and substantially automatically.

Other objects and advantages will become apparent from the following description of a preferred embodiment of our invention which is illustrated in the accompanying drawings.

In the drawings,

Fig. 1 is a side view of a tool which embodies the present invention as observed from the right;

Fig. 2 is a left hand side view of the tool with portions of the structure being broken away to reveal details of the mechanism in vertical longitudinal section;

Fig. 3 is a top view of the tool;

Fig. 4 is a front end view of the tool with portions thereof being broken away along the line 4—4 of Fig. 1 so as better to reveal the gripping mechanism in transverse vertical section;

Fig. 5 is a vertical transverse sectional view which may be considered as taken in the direction of the arrows substantially along the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary elevational view of the inner face of the gear housing and may be considered as being taken along the line 6—6 of Fig. 3.

In general the tool has a frame A with a flat

3

bottom base B which, when the tool is in use, rests upon a surface of the package or bundle X to be bound.

Frame A carries all of the operating mechanism which includes a gripper C for anchoring the lower or free end Y of the package encircling binder loop of strap and a loop tensioning gripper D which engages and bites into the upper end Z of the binder strap loop and upon rotation moves the upper end Z relative to the lower end Y to take up the slack in the loop and tension it tightly about the package.

As shown in Fig. 1 of the drawings the tensioning handle, indicated generally by the numeral 10, is within the tensioning range of movement but at about the extreme right hand end thereof. That is this lever is moved from the position shown in Fig. 1 toward the left by a pulling operation exerted by an operator standing to the left of the tool as shown and facing the tool. Under these conditions the feed wheel at D is normally closed against the strap and the gripper at C tightly engages the other strap end. Repeated rocking movement of the lever 10 from the position shown toward the left by means of a ratchet mechanism, to be explained presently, causes rotation of the feed wheel D in a clockwise direction as seen in Fig. 1 thereby tensioning the strap loop. When the handle 10 is pushed slightly to the right of the position shown in Fig. 1, the feed wheel D is raised away from the strapping and simultaneously the grippers at C are disconnected from the strap. The mechanism for accomplishing this will be described in greater detail presently.

The sealing lever is indicated at 12 and is shown in Fig. 1 in the position it assumes during the tensioning portion of the cycle. At the completion of the tensioning operation the handle 12 is pivoted about its shaft 14 upwardly and to the left thereby causing the sealing jaws, indicated at 16, to move downwardly so as to sever the top layer of strapping from the coil and to apply a seal to the overlapped strap ends. This sealing motion is completed when the lever 12 is in approximately a horizontal position pointing to the left. During this sealing portion of the cycle the reloading mechanism 18, operating in conjunction with the magazine 20, causes a reloading finger to be pulled toward the operator and from under the seals in the magazine thereby causing the lowermost seal to drop into alignment with a notch in the end of the finger so that at the completion of the sealing operation when the handle 12 is returned to the position shown in Fig. 1, thereby opening the jaws 16 and raising them to the level shown in Fig. 1, a new seal is projected into position between the sealing jaws in readiness for the next sealing operation.

The magazine arrangement and the sealing and strap cut off mechanism are essentially the same as those described in the above referred to patent and therefore need no additional description here beyond calling attention to the fact that the sealing lever is arranged so that it is pulled to the left rather than being pushed to the right, particularly since the invention to which the present application is directed is not concerned so much with the actual sealing and magazine feed arrangement, but more particularly with the tensioning and gripping mechanism and their relationship to the sealing mechanism.

The gripping mechanism, indicated generally at C, comprises a threaded plug 22 which extends upwardly through the base B, the upper end of

4

this threaded plug being provided with teeth for gripping the lower surface of the strap.

Just above the base B is a pivoted gripping member 24 formed preferably as a forging which has a shaft portion 25 journaled at 26 to the left of the strap position as seen in Fig. 4. The outer or left hand end of the shaft portion 25 is splined or keyed or otherwise suitably connected in non-rotatable fashion to an upwardly extending lever 28, this lever being urged toward the left as seen in Fig. 2 by means of a spring 30, one end of which engages the lever 28 above the center of rotation, the spring being coiled about the shaft 25 and having its opposite end hooked over a stationary pin 31 so as to rotate the shaft 25 in a counterclockwise direction as seen in Fig. 2, or in clockwise direction as seen in Fig. 1.

Referring to Fig. 4, particularly, it will be seen that to the right of the bearing 26 the gripping member 24 carries a button 32 secured so as to project downwardly therefrom in register with the upper end of the threaded plug 22. By reference to Fig. 1 it will be seen that this gripping button 32 is toward the right and below the axis of rotation of the member 24 so that the rotation of the latter in a clockwise direction as seen in Fig. 1 brings the gripping button 32 tightly against the upper end of the threaded plug 22, whereas movement of the lever 28 against the pressure exerted by the spring 30 lifts the button 32, thereby releasing the strap end engaged between this button and the upper end of the threaded plug 22. Furthermore, since the end of the strapping retained by the gripping mechanism C passes to the left of the machine as seen in Fig. 1, tension upon the strap toward the left causes the teeth of the gripping button 32 to bite more firmly into the strapping so as to prevent its slipping.

Above the gripping button 32 the gripping member 24 is formed to provide a horizontal slot 34 through which the upper layer of strap passes in a position parallel to the lower layer. In order to keep the strap in alignment with the feed wheel D it is preferable that this portion of the strap passing through the slot 34 be retained in place against sidewise outward movement of more than a limited extent by a snap latch, such as is shown at 36. A similar structure is shown in the previously referred to patent and comprises merely a lever best seen in Fig. 3 which is pivoted about a screw 38 and is pressed downwardly by a coil spring 40. The lower surface of the lever 36 is shaped so that when the strap is pushed into the slot 34 from the side, the end of the lever 36 is cammed upwardly against the pressure of the spring 40 until as the strap reaches a position parallel to the strap between the gripping elements 32 and 22, there is a reentrant portion in the lower surface of the lever 36 which permits the outer end of the lever to snap downwardly and retain the strapping within the slot 34. When the outer end of the lever 36 is manually raised, however, the strap may be slid out of the slot laterally.

Since the tension upon the button 32 may be considerable, it is preferable to supplement the bearing surface provided at 26 with a saddle 42 formed in the frame which engages a complementarily rounded upper surface 44 at the outer end of the rotatable member 24 in a position above the level of the two layers of strap.

At the end of the machine opposite the gripper C the tensioning device D comprises a toothed feed roll 50 which is mounted upon the squared

5

end of a driving shaft 52 so as to rotate therewith. This shaft is supported for rotation at the end of a pair of downwardly inclined arms 54 on the strap side of the tool and 56 on the opposite side, which are secured at their opposite ends to a cross shaft 58 which extends horizontally through the base A in a position above and behind the driving shaft 52. Thus with reference to Fig. 1, when the lower ends of the arms 54 and 56 are swung toward the center of the tool and upwardly the feed roll 50 is lifted above an opposing hard surfaced wear plate 60 against which the strap is pressed by the feed wheel 50. Conversely, movement in the opposite direction will bring the feed wheel 50 against the strap thereby pressing it against the wear plate 60 so that rotation of the wheel 50 in a clockwise direction will cause strap to move through the machine from right to left.

At its extreme lower end the arm 54 is formed to provide a finger 62 which prevents outward movement of the strap once it has been gripped beneath the feed wheel 50. This finger 62 is, of course, also raised when the feed wheel 50 is raised, thereby permitting strap material to be inserted laterally into a position beneath the feed wheel and this insertion is facilitated by providing the finger 62 with a wedge-shaped camming surface 64 which acts to cause the edge of the strap impinging there-against to be moved downwardly as it is pushed inwardly.

Referring to Fig. 2 of the drawings which shows the opposite side of the machine, it will be seen that the link 56 journalling the driving shaft 52 is actually a casting formed as an open housing which serves to contain a gear train and certain ratchet and pawl and other mechanisms. This housing 56 in which the shaft 52 is journaled is urged downwardly about its pivoting center at 58 by a vertical coil spring 66 which urges a following plunger 68 against a portion of the member 56 in a position approximately above the shaft 52. The other end of the spring is compressed by a plug 70 threaded into the upper end of the cylinder 72 in the base casting in which the spring is housed. The downward pressure of the spring 66 in a position approximately above the shaft 52 therefore urges the shaft 52 along with the linking members 56 and 54 downwardly so as to bring the feed wheel with considerable pressure against the strap between this feed wheel and the wear plate 60.

The handle 10 is forked at its lower end to straddle a gear 74 and the gear and handle are journaled to rotate upon the shaft 58 which passes therethrough, both the gear and the lower end of the handle being confined within the housing 56 which has a slot in the upper end thereof to receive the handle.

A second gear 76 is secured upon a squared portion 78 of the shaft 52 and is meshed with the gear 74 such that the two rotate together. Somewhat below the position of the handle a pair of side-by-side ratchets 80 are located within the case 56 and are pivoted about a pin 82 which is fixed to the side wall of the case. These ratchets have escapement teeth 84 adapted to engage the gear 76 so as to permit rotation of the gear in a counter-clockwise direction as seen in Fig. 2. The ratchet teeth are urged into engagement with the gear by springs 86. The reason for providing two side-by-side ratchets is that the teeth are spaced apart circumferentially a distance equal approximately to half

6

the spacing of the gear teeth so that they operate alternately as the gear rotates at twice the frequency of a single ratchet, thereby preventing reverse rotation of the gear at twice the number of positions as would a single ratchet.

In a position above the pivot pin 82 the ratchets have overhanging arms 88 which are engaged by a downward extension 90 of the handle 10 when the handle is pushed away from the operator almost to the limit of its travel thereby causing these extensions to be pressed against the gear 76 which limits further movement of the handle 10 relative to the housing 56.

The handle is provided with a spring loaded pawl 92 which engages the teeth of the gear 74 so as to cause rotation of this gear in a clockwise direction as seen in Fig. 2 when the handle 10 is pulled toward the operator in the tensioning range of movement. When the handle is pushed away from the operator the pawl escapes over the teeth of the gear 74 so as not to cause rotation of the gear in the reverse direction. The pawl 92, which extends through and is journaled for rotation on a pair of bearings 93 in a transversely drilled passage in the handle 10, has an extension 75 at the end toward the center line of the tool provided with a cam surface 95 which, during the tensioning range of movement of the lever 10, does not influence operation of the pawl 92. However, when the handle 10 is pushed away from the operator to the limit of its travel, this cam surface 95 rides upon an abutment 94 which is formed as a portion of the gear housing 56. This rotates the pawl 92 slightly in a clockwise direction as seen in Fig. 6 so as to raise the pawl out of engagement with the gear 74. The pawl is shown in this raised position in Fig. 2.

The above mechanism, it will be seen, will cause the feed wheel 50 to operate intermittently to tension metal strap about a bundle as the handle 10 is rocked backwardly and forwardly within the tensioning range, and that the tensioning effort will be applied to rotate the feed wheel 50 during the pulling portion of the cycle under which conditions the operator can apply a greater force than can conveniently be applied by pushing.

When the lever 10 is pushed away from the operator to the end of its travel within the tensioning range such that the downward extension 90 of the handle is brought against the ratchets 88 and the pawl 92 has been released from the gear 74, it will be seen that an additional push upon the handle 10 will cause the entire gear case 56 to pivot about the point established by the shaft 58, this additional pivoting motion being resisted by the spring 66. Thus whenever the handle 10 is pushed beyond the tensioning range, the result is to raise the feed wheel 50 away from the wear plate 60 so as to release the end of the strap being tensioned.

The handle whenever pushed into this position is retained therein by a spring loaded pin 96 extending transversely in the lower portion of the handle 10 in a position just above the pawl 92. This pin is urged toward the longitudinal center line of the machine and has a hardened tapered nose which snaps into a socket 97 formed in the end of a hardened bolt 98 fixed in the frame in the proper position. It is best shown in Fig. 3. Therefore when the handle 10 is pushed away from the operator beyond the tensioning range so as to raise the feed wheel against the pressure of the spring 66, the tapered pin and socket just described latches the handle in the extreme posi-

tion so that the feed wheel remains away from the wear plate 60 even though it is released by the operator. A slight pull upon the handle, however, will snap the pin 96 from the socket thereby returning the handle to the tensioning range and dropping the feed wheel 50 against the strapping.

In a position somewhat below and to the right as seen in Fig. 2 of the feed wheel shaft 52, the gear case 56 is connected by a horizontal pin 100 to a link 102 which extends toward the gripper handle 28. This link extends alongside and somewhat past the gripper handle and there is bent away from the gripper handle so as to serve as a manually operable trigger which is indicated at 104. At an intermediate portion of its length the link 102 passes through a vertical slot 106 formed in a portion of the frame A and is urged upwardly by a coil spring 108 located between the link and the bottom of the slot. This upward motion is resisted by a transverse pin 110 which extends across the slot in a position above the link.

A notch 112 is formed in the upper edge of the link 102 at a point to the left of the pin 110 as seen in Fig. 2 when the handle 10 is within the tensioning range. However, when the handle 10 is pushed beyond the tensioning range so as to rock the gear case 56, the link 102 is pushed toward the right as seen in Fig. 2 with the result that the notch 112 is brought into alignment with the pin 110 and the link 102 snaps upwardly under the influence of the spring 108. The notch 112 therefore, in conjunction with the pin 110, acts as a latch to prevent return movement of the link 102 toward the left until the trigger 104 is depressed.

The side of the gripper release handle 28 toward the link 102 is provided with a boss 114 having a flat face 116 which faces the gear case 56. This face is engaged by the flat face 118 of a similar boss formed upon the inside surface of the link 102 and spaced slightly to the left thereof when the handle 10 is within the tensioning range. Therefore when the handle 10 is pushed beyond the tensioning range and the link 102 is moved toward the right, as seen in Fig. 2, the two faces 116 and 118 will be brought into engagement thereby urging the upper portion of the handle 28 to the left. This raises the gripper button 32 away from the end of the strap held thereby in a manner previously described. Slightly thereafter when the notch 112 is brought into alignment with the pin 110 and the link 102 snaps upwardly, both the feed wheel and the gripper will be locked in open position even though the handle 10 is released.

Subsequently if the trigger 104 is depressed without moving the handle 10, the face 118 of the boss formed as a portion of the link 102 will be moved downwardly out of register with the face 116 of the boss 114 attached to the handle 28 thereby permitting the handle 28 to snap forwardly under the influence of the spring 30 so as to close the gripping jaws.

Thereafter if the handle 10 is grasped and pulled toward the operator into the tensioning range, the feed wheel 50 will be brought against the upper layer of the strapping thereby preparing the tool for tensioning. When subsequently the tensioning handle is pushed away from the operator out of the tensioning range and to the limit of its travel, both the feed wheel and the gripper jaws will be open simultaneously for removal of the tool.

If a tensioning operation has been started and

it is desired to release the feed wheel 50 from its end of the strapping without disturbing the gripper jaws at the opposite end of the strap, it is necessary merely to hold the trigger 104 down while rocking the handle 10 away from the operator beyond the tensioning range. Under these conditions the feed wheel 50 will be raised, but since the face 118 of the boss which is carried by the link 102 is below the boss 114, these two elements do not engage and thus the handle 28 is not moved toward the right as seen in Fig. 2. Once this operation has been performed, that is the handle has been moved so as to raise the feed wheel while the trigger 104 has been held down, both the trigger and the handle 10 may be released so that the operator may use both hands for shifting the position of the tool, since once the face 118 of the boss on the link 102 has passed the face 116 of the boss 114 in its movement toward the right, movement of the link 102 in an upwardly direction does not bring about releasing movement of the handle 28.

Also if desired the end of the strap retained by the gripper C may be released without disturbing the position of the feed wheel 50 against the strap simply by manual movement of the lever 28 toward the right as seen in Fig. 2.

The above construction, it will be seen, provides for automatic opening of the gripper jaws and the feed wheel for the reception of strap whenever the handle 10 is moved away from the operator to the end of its stroke. Further the tool is locked in this position until the free end of the strap can be properly located beneath the sealing mechanism and in position to be engaged by the gripping mechanism. Thereafter depressing the trigger 104 locks the gripper in place upon the strap end thereby permitting the operator to devote his full attention to properly positioning the other end portion of the strap which leads to the roll from which the strapping is being taken. After the main portion of the strapping has been pushed sideways into the strap track, which comprises the slot 34 in the upper portion of the gripper mechanism and the space between the feed wheel 50 and wear plate 60, the strap being retained in the slot 34 by the latch 36, movement of the lever 10 into the tensioning range lowers the feed wheel 50 and simultaneously brings the finger 62 into a position below the outer edges of the two layers of strap, thereby preventing their movement laterally from beneath the feed wheel 50. Thereafter by reciprocating the handle 10 the operator tensions the strap about the bundle with the excess strapping being passed off to the coil behind the operator.

If at any time it is desired to release either the feed wheel or the gripper individually, this can be accomplished in the first instance by moving the tensioning handle away from the operator out of the tensioning range while simultaneously depressing the trigger 104. Or in the other instance by simply moving the lever 28 toward the operator. In any event, after the bundle has been sufficiently tightly bound, the sealing lever is swung over and pulled toward the operator, thereby severing the portion of strapping to be used from the standing portion and applying a seal to the overlapped strap portions. Thereafter returning the sealing lever to its original position releases the seal and reloads the sealing jaws from the magazine automatically. When the tensioning lever is then moved away from the operator beyond the tensioning range, this locks open the gripping members and the feeding mecha-

nism so that the tool may be withdrawn from the bound package, the free end of the strap being retained in the slot 34 where it may be easily grasped by the operator in preparation for a subsequent tensioning and sealing cycle.

Although we have described one embodiment as illustrative of our invention, it will be appreciated that variations and substitutions may be made without departing from either the scope or spirit of the invention, and it is understood therefore that the invention is to be measured by the scope of the following claims.

We claim:

1. In a bundle-binding tool of the type having a fixed gripper for anchoring one end of a bundle encircling strap loop and a feed wheel for engaging and moving the other end of the loop to tension the loop, the combination of a frame having a base for resting against a bundle being bound and providing a pair of strap supporting seats, one in line with the fixed gripper and the other in line with the feed wheel, a pair of links rotatably carrying the feed wheel between them, a pivot attaching the feed wheel links to the frame so that the feed wheel may be bodily moved toward and retracted from the strap supporting seat in line therewith, a spring biasing the links to move the feed wheel toward the strap supporting seat in line therewith, a tensioning handle attached to the frame by the pivot attaching thereto the feed wheel carrying links, a pawl connection between the tensioning handle and the feed wheel whereby oscillation of the tensioning handle rotates the feed wheel in one direction only, an operative connection between the tensioning handle and one of the feed wheel carrying links which enables the handle to rock the links about their common pivot and thereby retract the feed wheel bodily away from the strap supporting seat in line therewith, a latch for holding the links in feed wheel retracted position, a shaft for pivotally attaching the fixed gripper to the frame so that it may be moved toward and retracted from the strap supporting seat in line therewith, a spring biasing the fixed gripper toward the seat in line therewith, an arm fixed to the shaft carrying the fixed gripper, a fixed gripper actuating and holding lever pivoted to one of the feed wheel carrying links, a pair of interlocking lugs, one carried by the actuating and holding lever and the other by the arm on the fixed gripper shaft, and a guide for causing the lug on the actuating and holding lever to engage the lug on the arm of the fixed gripper shaft when the tension handle is moved to retract the feed wheel so that the feed wheel and fixed gripper are simultaneously retracted to open the tool for reception of strap, the holding lever being manually movable to disengage the lugs to enable the fixed gripper to be closed by its biasing spring without releasing the feed wheel.

2. In a bundle-binding tool of the type having a fixed gripper for anchoring one end of a bundle encircling strap loop and a feed wheel for engaging and moving the other end of the loop to tension the loop, the combination of a frame having a base for resting against a bundle being bound and providing a pair of strap supporting seats, one in line with the fixed gripper and the other in line with the feed wheel, a pair of links rotatably carrying the feed wheel between them, a pivot attaching the feed wheel links to the frame so that the feed wheel may be bodily moved toward and retracted from the strap supporting seat in line therewith, a spring biasing the links

to move the feed wheel toward the seat in line therewith, a tensioning handle attached to the frame by the pivot attaching thereto the feed wheel carrying links, a pawl connection between the tensioning handle and the feed wheel whereby oscillation of the tensioning handle rotates the feed wheel in one direction only, an operative connection between the tensioning handle and one of the feed wheel carrying links which enables the handle to rock the links about their common pivot and thereby retract the feed wheel bodily away from the strap supporting seat in line therewith, a latch for holding the links in feed wheel retracted position, a shaft for pivotally attaching the fixed gripper to the frame so that it may be moved toward and retracted from the strap supporting seat in line therewith, a spring biasing the fixed gripper toward the seat in line therewith, an arm fixed to the shaft carrying the fixed gripper, a fixed gripper actuating and holding lever pivoted to one of the feed wheel carrying links, a pair of interlocking members, one carried by the actuating and holding lever and the other by the arm on the fixed gripper shaft, a guide for causing said member on the actuating and holding lever to engage the member on the arm of the fixed gripper shaft when the tension handle is moved to retract the feed wheel so that the feed wheel and fixed gripper are simultaneously retracted to open the tool for reception of strap, and a releasable latch cooperating with the actuating and holding lever to retain the fixed gripper retracted until said latch is released.

3. In a bundle-binding tool of the type having a fixed gripper for anchoring one end of a bundle encircling loop of metallic strap and a feed wheel for engaging and moving the other end of the strap loop to tension the loop, the combination of a frame having a base for resting against the bundle being bound and providing a pair of spaced strap supporting seats, one in line with the fixed gripper and the other in line with the feed wheel, a pair of links carrying the feed wheel between them and pivotally attached to the frame so that the feed wheel can be moved bodily toward and retracted from the strap seat in line therewith, a pivot attaching the fixed gripper to the frame so that the fixed gripper can be moved toward and retracted from the strap seat in line therewith, a tensioning handle pivotally attached to the frame, a one way drive connection between the tensioning handle and the feed wheel for rotating the feed wheel in one direction only, an operative connection between the tensioning handle and the feed wheel carrying links which becomes effective as the tensioning handle approaches the limit of its stroke in feed wheel nonrotating direction to rotate the feed wheel carrying links to retract the feed wheel, a lever interposed between one of the feed wheel carrying links and the fixed gripper to retract the fixed gripper simultaneously with the retraction of the feed wheel, and a latch cooperating with said lever to retain both the feed wheel and the fixed gripper in retracted position.

4. In a bundle-binding tool of the type having a fixed gripper for anchoring one end of a bundle encircling loop of metallic strap and a feed wheel for engaging and moving the other end of the strap loop to tension the loop, the combination of a frame having a base for resting against the bundle being bound and providing a pair of spaced strap supporting seats, one in line with the fixed gripper and the other in line with the

11

feed wheel, a pair of links carrying the feed wheel between them and pivotally attached to the frame so that the feed wheel can be moved bodily toward and retracted from the strap seat in line therewith, a pivot attaching the fixed gripper to the frame so that the fixed gripper can be moved toward and retracted from the strap seat in line therewith, a tensioning handle pivotally attached to the frame, a one way drive connection between the tensioning handle and the feed wheel for rotating the feed wheel in one direction only, an operative connection between the tensioning handle and the feed wheel carrying links which becomes effective as the tensioning handle approaches the limit of its stroke in feed wheel non-rotating direction to rotate the feed wheel carrying links to retract the feed wheel, a lever interposed between one of the feed wheel carrying links and the fixed gripper to retract the fixed gripper simultaneously with the retraction of the feed wheel, a latch cooperating with said lever to retain both the feed wheel and the fixed gripper in retracted position, said latch being operable to release the fixed gripper, and a spring for moving the fixed gripper toward the seat in line therewith when thus released.

5. In a bundle-binding tool of the type having a fixed gripper for anchoring one end of a bundle encircling strap loop and a feed wheel for engaging and moving the other end of the loop to tension the loop, the combination of a frame having a base for resting against a bundle being bound and providing a pair of strap supporting seats, one for the fixed gripper and the other for the feed wheel, a wheel support rotatably carrying the feed wheel, a pivot attaching the wheel support to the frame so that the feed wheel may be bodily moved toward and retracted from its strap supporting seat, means biasing the wheel support to move the feed wheel toward its strap supporting seat, a pivotally mounted tensioning handle, a one way driving connection between the tensioning handle and the feed wheel whereby oscillation of the tensioning handle rotates the feed wheel in one direction only, an operative connection between the tensioning handle and the wheel support to pivot said support and feed wheel away from its seat when said handle is moved to the limit of its range in one direction, means pivotally attaching the fixed gripper to the frame so that it may be moved toward and retracted from its strap supporting seat, means biasing the fixed gripper toward its seat, an arm

12

for pivoting the fixed gripper, a fixed gripper actuating and holding member connected to said wheel support, a pair of opposing members on said holding member and arm and adapted to engage when the tension handle is moved to retract the feed wheel so that the feed wheel and fixed gripper are simultaneously retracted to open the tool for reception of strap, and means for independently latching both said feed wheel and said fixed gripper in retracted position.

6. In a bundle-binding tool of the type having a fixed gripper for anchoring one end of a bundle encircling loop of metallic strap and a feed wheel for engaging and moving the other end of the strap loop to tension the loop, the combination of a frame having a base for resting against the bundle being bound, retractable feed wheel supporting means attached to the frame so that the feed wheel can be moved bodily toward and away from a strap feeding position, retractable gripper supporting means attaching the gripper to the frame so that the gripper can be moved toward and retracted from a strap gripping position, a tensioning handle mounted for pivoting movement, a one way drive connection between the tensioning handle and the feed wheel for rotating the feed wheel in one direction only, an operative connection between the tensioning handle and the feed wheel supporting means effective as the tensioning handle approaches the limit of its stroke in one direction to retract the feed wheel, linkage means interposed between the feed wheel supporting means and the gripper to retract the gripper simultaneously with retraction of the feed wheel, and latching means to retain both the feed wheel and the gripper in retracted position, said latching means being adapted to permit independent release of said gripper and subsequent release of said feed wheel.

WILLIAM C. CHILDRESS.
ARVID I. ERICSSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,503,237	Guenther	July 29, 1924
1,939,746	Whitman	Dec. 19, 1933
2,368,969	Cleveland	Feb. 6, 1945
2,497,313	Leslie	Feb. 14, 1950