Jan. 5, 1960 D. L. HEPLER 2,919,894

STRAP STRETCHING TOOL CONSTRUCTION

Filed Oct. 19, 1955 4 Sheets-Sheet 1

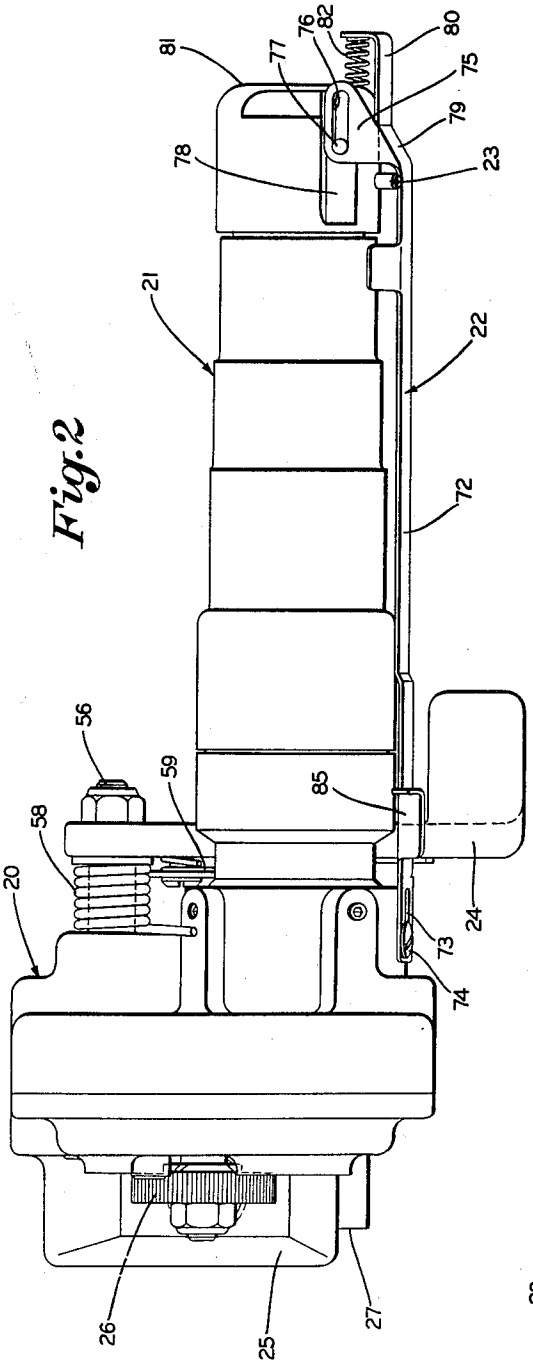


Fig. 2

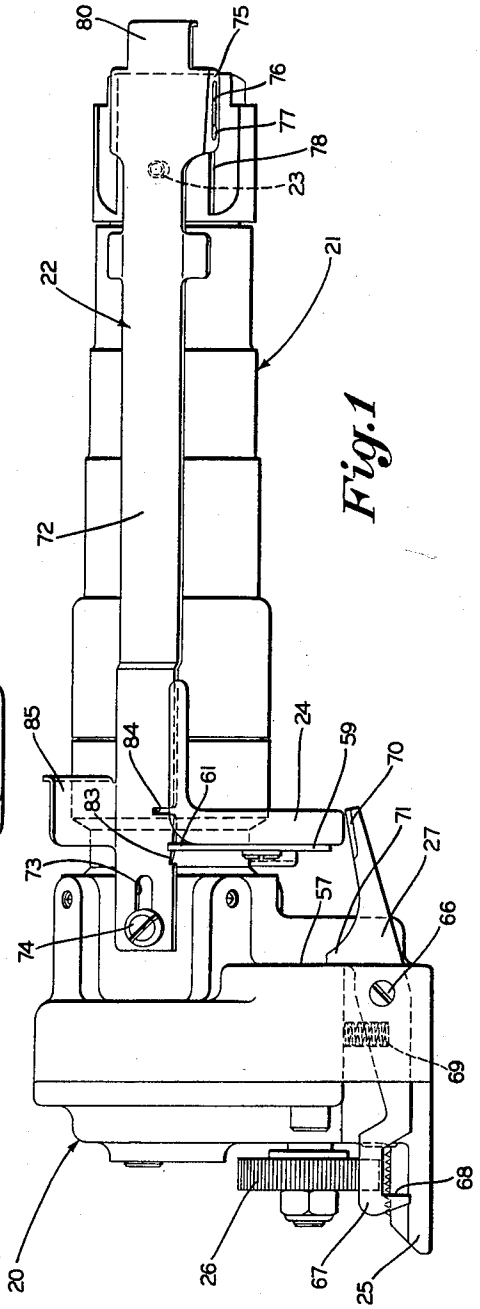


Fig. 1

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STRAP STRETCHING TOOL CONSTRUCTION

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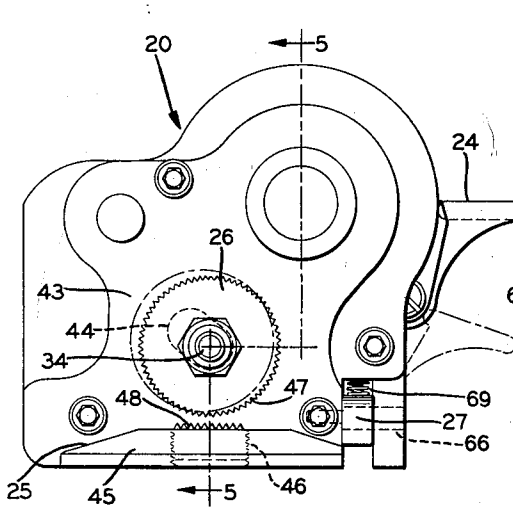


Fig. 3

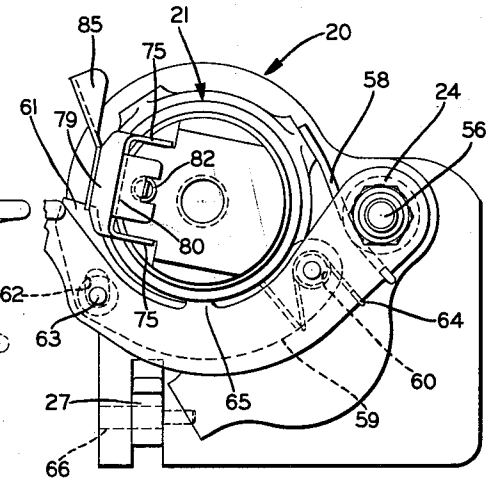


Fig. 4

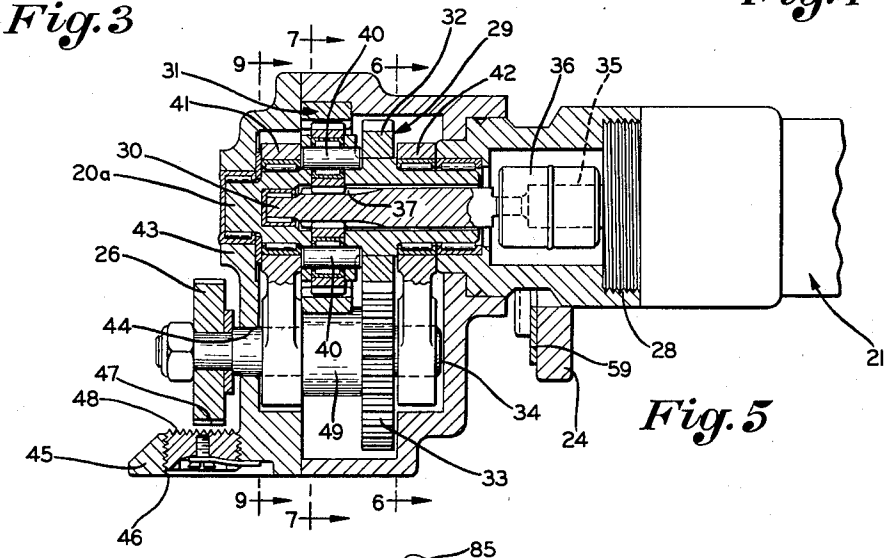


Fig. 5

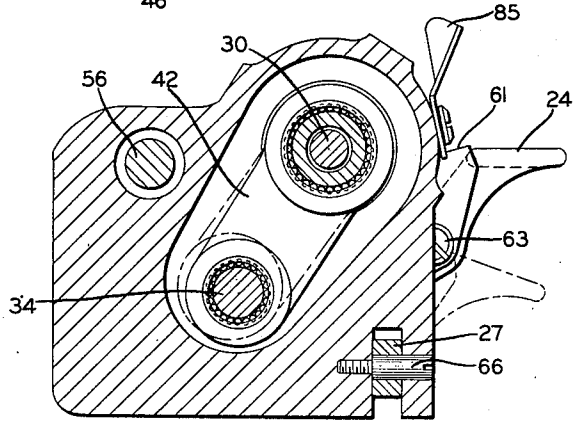


Fig. 6

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STRAP STRETCHING TOOL CONSTRUCTION

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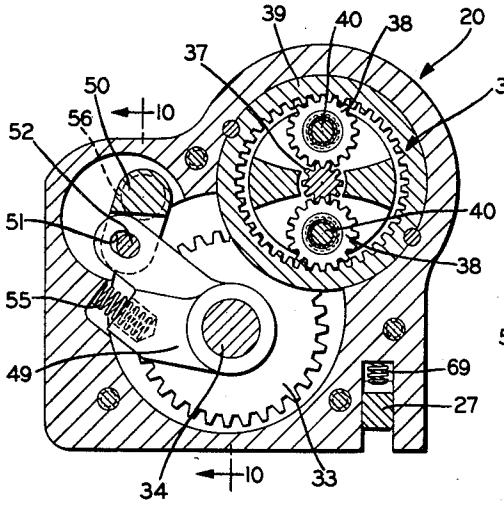


Fig. 7

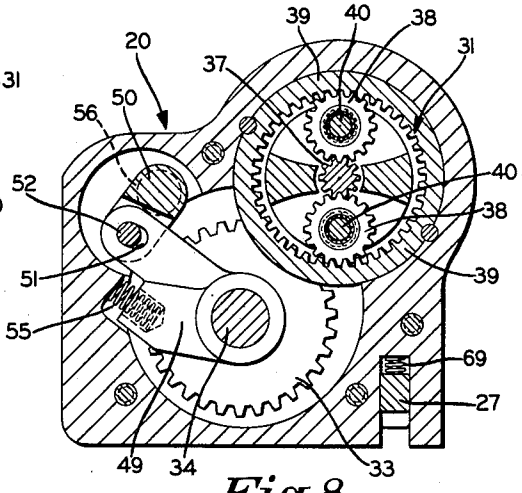
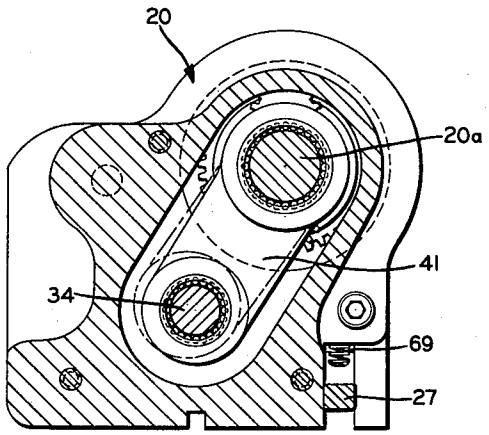


Fig. 8

Fig. 9



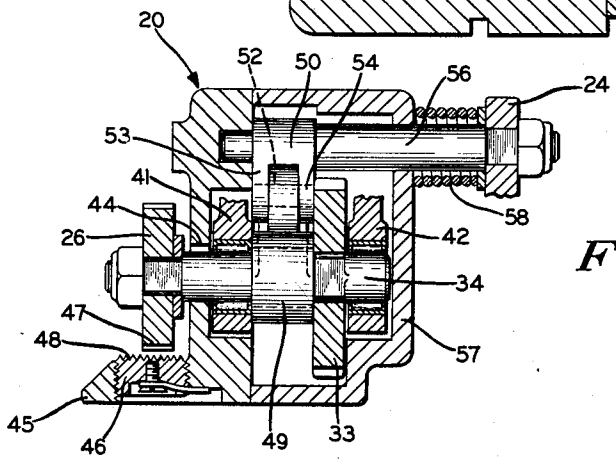


Fig. 10

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STRAP STRETCHING TOOL CONSTRUCTION

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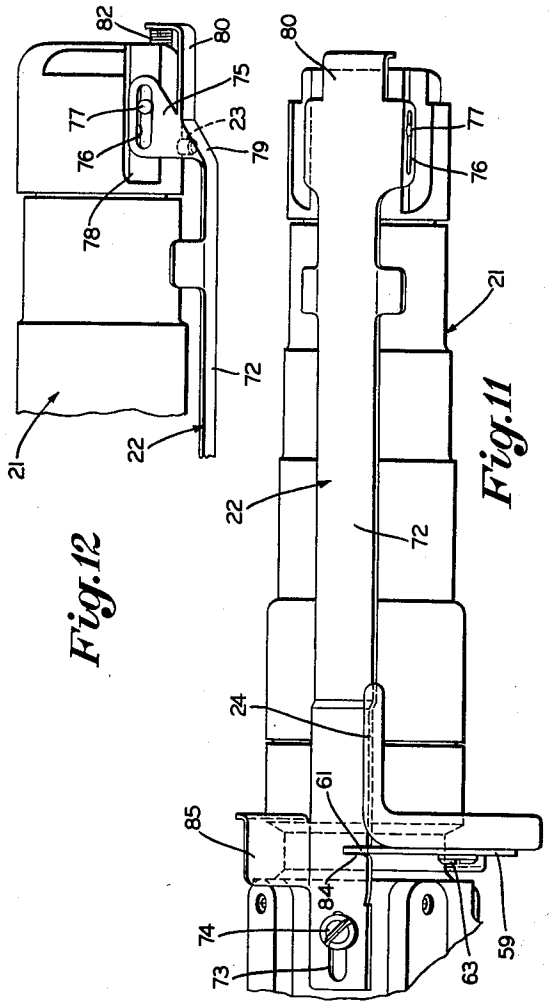


Fig. 12

Fig. 11

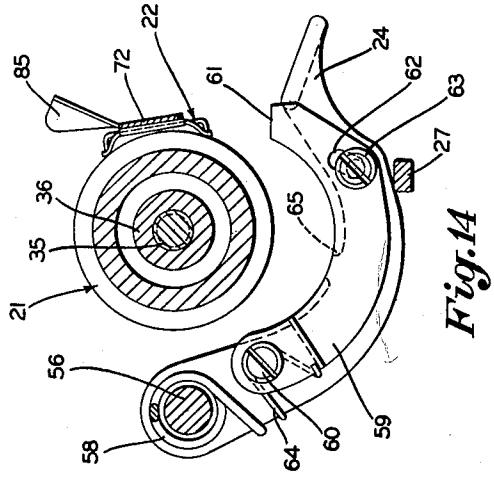


Fig. 14

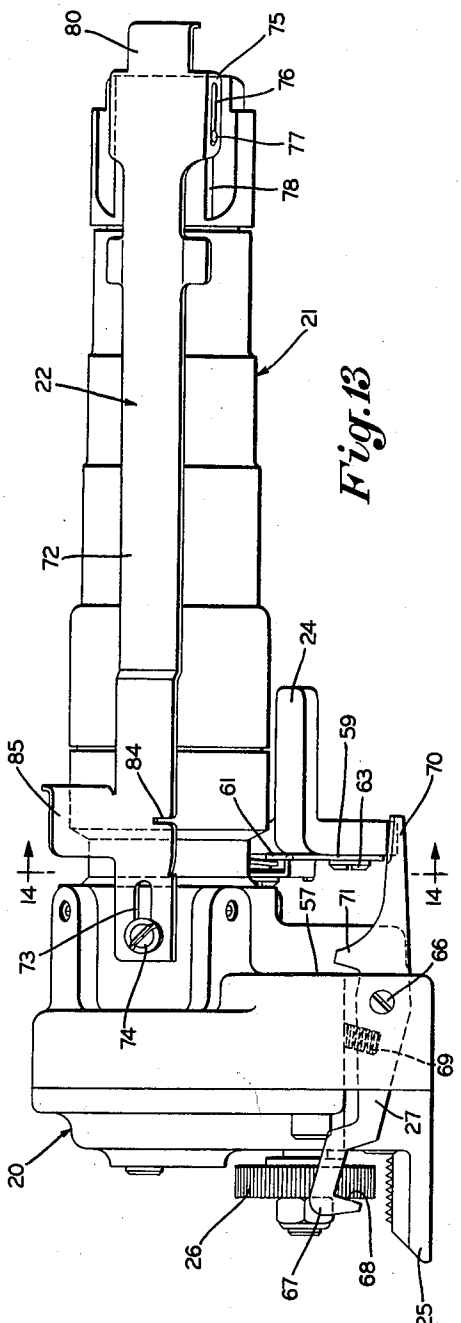


Fig. 13

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2,919,894

STRAP STRETCHING TOOL CONSTRUCTION

Donald L. Hepler, New Bedford, Pa., assignor to Sharon Steel Corporation, Sharon, Pa., a corporation of Pennsylvania

Application October 19, 1955, Serial No. 541,430

22 Claims. (Cl. 254—51)

My invention relates generally to improvements in strap stretching tool construction of the general type shown in my copending application, Serial No. 538,394. More specifically my invention relates to a powered wheel type strap stretching tool.

Certain prior constructions of powered strap stretching tools have been provided, most of which have been of the drum type and powered by electric motors transmitting torque through a clutch mechanism. In drum type strap stretching tools, one end of a length of strapping being tensioned is fed through one of several axially extending slots formed in a rotatable drum. In the powered tools, the rotatable drum is driven by the electric motor through the clutch means.

The other end of the length of strapping is engaged under a gripping member which usually must be hand actuated to permit the end of the length of strapping to be engaged therewith. The slotted drum is then rotated winding the strapping therearound and tensioning the same until a predetermined torque is developed through the clutch mechanism, after which the electric motors continue to rotate, but the clutch mechanism no longer transmits rotational motion therethrough, but merely retains the tension on the strapping until the tensioned strapping can be properly sealed.

One of the major difficulties with these prior drum type strap stretching tools is that the electric motors and clutch mechanism are expensive and add greatly to the cost of the tool. Further, since the clutch mechanism must slip after the predetermined torque has been developed and the proper tension placed in the strapping, certain portions of the clutch must be replaced after the tool has been used for a length of time because of these portions becoming worn, and thus, the maintenance costs of such a tool are high.

A still further difficulty is that the electric motor and clutch mechanism assemblies are necessarily bulky and heavy, adding greatly to the size and weight of the tool. This is particularly important if the strap stretching tool is for hand use rather than forming the part of a large strapping machine. Finally, the ends of the strapping must each be threaded into the tool separately, one end through a slot in the rotatable drum and the other end beneath the hand actuated gripper, so that a considerable amount of time is consumed for this threading operation during each strap tensioning cycle.

Certain prior constructions of wheel type strap stretching tools have been provided which have been hand lever actuated. In the wheel type strap stretching tool, a rotatable knurled wheel is mounted overlying a foot member with said foot member having a knurled surface either formed directly thereon, or provided by a screw projecting therefrom and having the knurled surface formed on the end thereof.

Additionally, the rotatable wheel is mounted for movement toward and away from the knurled foot member and spring means is usually provided urging the rotatable wheel against the foot member. Thus, the ends of a length of strapping to be tensioned are placed overlapped between the rotatable wheel and the foot member, after which the wheel is rotated by reciprocal movement of the hand lever. This hand lever movement drives the wheel through a driving pawl engaging either a cogged wheel connected to the knurled wheel, or directly engaging the knurled wheel.

Rotation of the knurled wheel causes the upper layer of strapping to slide over the lower layer of strapping, while the lower layer of strapping is held stationary by the knurled foot member. The knurled wheel is rotated by actuation of the hand lever until the strapping is tensioned, after which the strapping is sealed and the strap stretching tool removed therefrom by raising the knurled wheel from the foot member.

One of the difficulties with this type of strap stretching tool is that it is hand operated and thus, the tensioning operation is slow and relatively expensive. A further difficulty is that since the tool is hand operated, the strapping can be over or under tensioned. If the strapping is over tensioned it may either damage the object being strapped or may break and injure the workmen operating the tensioning tool, and if the strapping is under tension, the object being strapped will not be properly bound.

It is desirable, therefore, to have a wheel type strap stretching tool which is powered by a motor or a mechanism driven by a motor arranged so that a preset stall torque will develop a preset tension in the strapping. Such a tool is desirable for certain uses, that is, where an extremely high strap tension is not desired or needed, for the reason that the wheel type stretching tool may be used to accomplish the tensioning operation much more rapidly than the drum type tool, since both ends of the strapping are threaded in a wheel type tool at one time, whereas they are separately threaded in the drum type tool.

It is difficult, however, to adapt a motor whether electric, air or otherwise, for driving the knurled wheel of a wheel type strap stretching tool, since in order to engage the ends of the strapping with the tool, it is necessary to raise the knurled wheel from the foot member of the tool. Thus, it is necessary to provide a driving connection between the motor and the knurled wheel, which permits the axis about which the knurled wheel rotates to be moved, while at the same time transmits torque to drive the knurled wheel.

It is therefore a general object of the present invention to provide a wheel type strap stretching tool construction which overcomes the difficulties of the prior constructions enumerated and discussed above.

It is a primary object of the present invention to provide a wheel type strap stretching tool construction which is automatically actuated by a drive motor rather than being hand actuated by a reciprocal operating lever.

It is another object of the present invention to provide a wheel type strap stretching tool construction which is automatically actuated by a drive motor, but yet the tensioning wheel included therein is still movable toward and away from the knurled foot member of the tool, so that the ends of a length of strapping to be tensioned may be threaded therebetween.

It is still another object of the present invention to provide a wheel type strap stretching tool construction in which the tensioning wheel is mounted movable toward and away from the foot member thereof in such a manner that increased tension on the strapping causes the tensioning wheel to grip the strapping more tightly while the tensioning wheel is being driven by the drive motor.

It is a further object of the present invention to provide

a wheel type strap stretching tool construction in which the tensioning wheel is mounted so that once the drive motor actuating the tensioning wheel is shut off, the gripping power of the tensioning wheel is decreased, making it easier to disengage the tensioning wheel from the strapping.

It is still a further object of the present invention to provide a wheel type strap stretching tool construction in which the means driving the tensioning wheel may be set to place a predetermined tension in the strapping.

It is an additional object of the present invention to provide a wheel type strap stretching tool construction in which control means is provided associated with the drive motor, so that once the drive motor is placed in "on" position, it will remain on until the length of strapping is sealed securing said strapping around the particular object being strapped.

It is another object of the present invention to provide a powered strap stretching tool construction in which release means is associated with the tensioning wheel, for moving the tensioning wheel away from the strapping that has been tensioned and sealed to disengage the tension wheel from the strapping.

It is still another object of the present invention to provide a power strap stretching tool construction in which the release means disengages the tensioning wheel from the tensioned and sealed strapping, and at the same time releases the drive motor control means so that the control means places the drive motor in "off" position.

Additionally, it is an object of the present invention to provide a powered strap stretching tool construction in which the release means disengages the tensioning wheel from the tensioned and sealed strapping, while at the same time releasing the drive motor control means, and also simultaneously disengages a strap guide from the tensioned and sealed strapping so that the strap stretching tool may be removed from said sealed strapping.

Finally, it is an object of the present invention to provide a strap stretching tool construction which accomplishes all of the above objects with a maximum of efficiency but yet is relatively simple in construction and may be manufactured at a minimum of cost.

These and other objects are accomplished by the parts, constructions, arrangements, combinations and subcombinations comprising the present invention, the nature of which is set forth in the following general statement, a preferred embodiment of which—illustrative of the best mode of which applicant has contemplated applying the principles—is set forth in the following description and illustrated in the accompanying drawings, and which is particularly and distinctly pointed out and set forth in the appended claims forming a part hereof.

In general terms, the strap stretching tool construction comprising the present invention may be stated as including a main frame member having a drive motor mounted thereon. The drive motor is preferably an air motor, but may be an hydraulic motor or one of the type equipped with a clutch set to transmit a predetermined maximum torque. The drive motor is provided with an actuating button movable between positions actuating and not actuating the drive motor, and the drive motor also preferably includes control means for moving the actuating button between its positions.

The strap stretching tool construction also includes a knurled foot portion mounted on the main frame member, with a knurled driving or tensioning wheel rotatably mounted on the main frame member overlying and movable toward and away from the said knurled foot member. A strap guide member is pivotally mounted on the main frame member, with a preferably U-shaped guide portion of the guide member movable toward and away from a position engaged over strapping positioned between the tensioning wheel and main frame foot portion upon pivotal movement of the guide member. Both the tensioning wheel and the guide member are preferably resiliently urged by preferably spring means toward engagement with the strapping.

The tensioning wheel is rotatably driven by the drive motor upon actuation of the drive motor by the actuating button, with transmission means providing the driving connection between said drive motor and tensioning wheel. The transmission means preferably includes a drive motor shaft operably connected at one end thereof to the drive motor, with the drive motor shaft being journalled in the main frame and having a planetary gear train mounted surrounding and operably connected to the other end thereof. The planetary gear train is in turn operably connected to a first driving gear mounted journalled in the main frame and preferably surrounding the drive motor shaft.

A second driving gear is mounted on a tensioning wheel drive shaft, with said second driving gear being operably engaged with the first driving gear. The tensioning wheel drive shaft is journalled in a set of spaced pivot frames, with said pivot frames being journalled for pivotal movement in the main frame. The tensioning wheel is mounted on the tensioning wheel drive shaft for rotation and pivotal movement with said drive shaft.

Thus, actuation of the drive motor by the actuating button causes the drive motor to rotate the motor drive shaft, which motor drive shaft in turn rotates the planetary gear train. The planetary gear train rotates the first driving gear, which first driving gear rotates the second driving gear and the second driving gear rotates the tensioning wheel drive shaft and thus, the tensioning wheel. This driving connection between the drive motor and the tensioning wheel is maintained regardless of the position of the tensioning wheel in reference to the main frame knurled foot portion.

The strap tensioning tool construction further includes an operating lever pivotally mounted on the main frame member by means of an operating shaft journalled in the main frame member. The operating shaft is preferably connected to an operating link journalled on the tensioning wheel drive shaft by means of an offset preferably lost motion link. Thus, pivotal movement of the operating lever causes the tensioning wheel drive shaft to pivot by means of the pivot frames in reference to the main frame knurled foot member, thereby moving the tensioning wheel toward and away from said foot member, while the operating lever is preferably spring urged toward a position in which the tensioning wheel is engaged with the knurled foot member.

The drive motor actuating means preferably includes a slide member slidably connected to the drive motor and having an angled portion formed thereon. The slide member angled portion preferably engages the drive motor actuating button upon slidable movement of the slide member, so that the actuating button is pressed inwardly of the drive motor to drive motor actuating position. The slide member is preferably resiliently urged by spring means to a position in which the angled portion thereof permits the actuating button to remain in non-actuating position.

The main frame operating lever has a spring urged stop plate mounted thereon engageable in a slot formed in the actuating means slide member upon slidable movement of the slide member to a position in which the slide member angled surface causes the drive motor actuating button to move inwardly to actuate the drive motor. The main frame operating lever is also mounted overlying an end portion of the main frame guide member, and engageable with said guide member end portion upon pivotal movement of the operating lever to move the tensioning wheel away from the main frame knurled foot member, while at the same time moving the stop plate to a position disengaged from the actuating means slide member slot. Continuing pivotal movement of the operating lever after engagement with the guide member end portion causes the guide member to pivot and move the

guide portion thereof away from strapping engaging position.

Thus, when the actuating means slide member is moved to a position causing the actuating button to actuate the drive motor, the operating lever stop member will engage the slot formed in said slide member, retaining the drive motor in "on" position, driving or rotating the tensioning wheel. Upon pivotal movement of the operating lever, however, due to the lost motion link, the stop plate will first be disengaged from the slide member slot, causing the sliding member to permit the actuating button to return the drive motor to "off" position. Thereafter, continued pivotal movement of the operating lever will move the tensioning wheel away from the knurled foot member, while at the same time moving the guide portion of the guide member away from strapping engaging position.

By way of example, an embodiment of the strap stretching tool construction of the present invention is illustrated in the accompanying drawings forming a part hereof, wherein like numerals indicate similar parts throughout the several views, and in which:

Fig. 1 is a side elevation of the strap stretching tool in "off" position, with the operating lever in raised or "at rest" position;

Fig. 2 is a top plan view of the strap stretching tool in the position illustrated in Fig. 1;

Fig. 3, an end view of the strap stretching tool in the position illustrated in Fig. 1, looking at the tensioning wheel end thereof;

Fig. 4, a fragmentary end view of the strap stretching tool in the position illustrated in Fig. 1, looking at the drive motor end thereof;

Fig. 5, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 5—5 in Fig. 3;

Fig. 6, a sectional view, part in elevation, looking in the direction of the arrows 6—6 in Fig. 5;

Fig. 7, a sectional view, part in elevation, looking in the direction of the arrows 7—7 in Fig. 5;

Fig. 8, a view similar to Fig. 7, but showing the tensioning wheel drive shaft, the second driving gear, the pivot link and the operating lever offset link in positions in which the tensioning wheel is pivoted away from the knurled foot member;

Fig. 9, a sectional view, part in elevation, looking in the direction of the arrows 9—9 in Fig. 5;

Fig. 10, a sectional view, part in elevation, looking in the direction of the arrows 10—10 in Fig. 7;

Fig. 11, a fragmentary side elevation of a strap stretching tool with the drive motor actuating means maintaining the drive motor in "on" position and with the operating lever stop plate engaged in the slide member slot;

Fig. 12, a fragmentary top plan view of the strap stretching tool in the position illustrated in Fig. 11;

Fig. 13, a side elevation of the strap stretching tool in "off" position, with the operating lever in depressed position maintaining the tensioning wheel raised from the knurled foot portion and maintaining the guide member guide portion raised from strapping engaging position;

Fig. 14, a fragmentary view, part in elevation, looking in the direction of the arrows 14—14 in Fig. 13.

The strap tensioning tool construction includes a main frame member generally indicated at **20**, a drive motor generally indicated at **21** having actuating means generally indicated at **22**. The drive motor **21** further includes an actuating button **23**. The main frame member **20** further includes an operating lever **24**, a foot member **25**, an operating or tensioning wheel **26** and a strap guide member **27**.

The drive motor **21** may be of any type which will develop a present maximum torque, which maximum torque may be adjusted for the particular application in which the strap stretching tool is to be used. For instance, the drive motor **21** may be an air or hydraulic motor, or an electric motor provided with clutch means thereon, which clutch means will only transmit a predetermined and preset torque. The required feature is that the motor must develop a predetermined and preset torque, and when such torque is reached, the motor will either stall maintaining the maximum torque or the clutch means will slip maintaining the maximum torque.

It is preferred, however, that the drive motor **21** be air actuated so that upon reaching a predetermined and preset torque the motor will stall maintaining the torque. The drive motor **21** is mounted on the main frame member **20** preferably by the threaded connection **28** shown in Fig. 5.

Further, drive motor **21** is operably connected to transmission means, generally indicated at **29**, mounted in the main frame member **20**, which transmission means has the tensioning wheel **26** operably mounted thereon. The transmission means **29** preferably includes a motor drive shaft **30**, a planetary gear train **31**, a first driving gear **32**, a second driving gear **33** and a tensioning wheel drive shaft **34**.

The motor shaft **35** is connected to the motor drive shaft **30** by a coupling member **36**, with the motor drive shaft **30** being preferably journalled in a gear carrier **20***a*, which gear carrier is in turn journalled in the main frame member **20**. Gear teeth **37** are formed on the outer periphery of the motor drive shaft **30**, as best seen in Figs. 7 and 8, spaced from the motor shaft **35** and forming the center driving gear of the planetary gear train **31**.

Diametrically oppositely disposed driven gears are mounted engaged with the gear teeth **37** of the motor drive shaft **30**, with said driven gears **38** being positioned between the motor drive shaft **30** and the stationary outer ring gear **39**, and also operably engaged with ring gear **39**. Ring gear **39** is secured stationary in main frame member **20** and driven gears **38** are each journalled on a stub shaft **40**, which stub shafts are secured on gear carrier **20***a* at diametrically opposite points on the gear carrier.

First driving gear **32** is journalled in the main frame member **20** through gear carrier **20***a*, being mounted secured on the gear carrier, and this gear is operably engaged with the second driving gear **33**. Second driving gear **33** is mounted on the tensioning wheel drive shaft **34**, which drive shaft is journalled in the spaced pivot frames **41** and **42** and thereby suspended in the main frame member **20**, as best seen in Fig. 5.

Also as seen in Fig. 5, pivot frames **41** and **42** extend upwardly from tensioning wheel drive shaft **34** and are journalled in main frame member **20** preferably by being journalled on gear carrier **20***a*, as shown. Thus, pivot frames **41** and **42** are mounted spaced outwardly from and surrounding the motor drive shaft **30**, thereby pivoting tensioning wheel drive shaft **34** and the second driving gear **33** in reference to the remainder of the transmission means **29**, while still maintaining the center axes of the first and second driving gears **32** and **33** spaced a constant distance so that these gears are at all times engaged with each other. The tensioning wheel **26** is mounted on the end of tensioning wheel drive shaft **34** outwardly of the end wall **43** of main frame member **20**, with the opening **44** in end wall **43** being formed oblong, as best seen in Fig. 3, to permit limited pivoting of the tensioning wheel drive shaft **34** in reference to the main frame member **20**, as before described.

Foot member **25** is preferably formed integral with the main frame member **20** in the form of a foot portion **45** extending outwardly from end wall **43** beneath tensioning wheel **26**. Foot portion **45** is formed with a roughened portion preferably in the form of a knurled screw **46**, directly underlying tensioning wheel **26**, with the tensioning wheel also being provided with an outer peripheral knurled surface **47**. Thus, tensioning wheel **26** is mounted for pivotal movement toward and away from foot portion **45** of main frame member **20**, and the

knurled surface 47 of tensioning wheel 26 is movable toward and away from the knurled surface 48 on the screw 46.

Thus, upon actuation of the drive motor 21, the motor shaft 35 will rotate the motor drive shaft 30, which motor drive shaft rotates the driven gears 38, around said motor drive shaft and within the stationary ring gear 39. Rotation of the driven gears 38 around motor drive shaft 30 rotates the first driving gear 32 which in turn rotates the second driving gear 33, the tensioning wheel drive shaft 34 and ultimately the tensioning wheel 26. The driving connection between the tensioning wheel 26 and the drive motor 21 will be maintained at all times, despite the pivoting of tensioning wheel 26 toward or away from the foot portion 45, since the pivot frames 41 and 42 maintain the axes of the first and second driving gears 32 and 33 in a constantly uniformly spaced relationship and in driving contact. That is to say, the axis of second driving gear 33 moves in a constant radius arcuate path in reference to first driving gear 32, as tensioning wheel 26 is moved toward and away from foot portion 45, as illustrated in Figs. 7 and 8.

The axis of the second driving gear 33 is movable on a constant radius in reference to the first driving gear 32 since pivot frames 41 and 42 pivot around the same axis about which the first driving gear 32 rotates, that is, the longitudinal axis of motor drive shaft 30, as seen in Fig. 5. Thus, since second driving gear 33 is journalled in pivot frames 41 and 42 through tensioning wheel drive shaft 34, second driving gear 33 must pivot around the first driving gear 32 with pivot frames 41 and 42 and at a constant radius to first driving gear 32.

As best seen in Fig. 7 and 8, a pivot link 49 is journalled on the tensioning wheel drive shaft 34 and is connected through a lost motion connection to a generally U-shaped offset link 50. The lost motion connection comprises preferably an oblong slot 51 formed in the pivot link 49, and a pin 52 received through said slot and mounted through and between the leg portions 53 and 54 of offset link 50, as best seen in Fig. 10, so that the end portion of pivot link 49 is received between legs 53 and 54. Pivot link 49 is resiliently urged in a direction urging the tensioning wheel 26 toward the foot portion 45 preferably by means of a spring 55.

Offset link 50 is mounted on the operating lever shaft 56, which shaft is journalled in the main frame member 20 and extends outwardly from the end wall 57 thereof, that is the same end wall upon which the drive motor 21 is mounted. The operating lever 24 is mounted on the outer end of operating shaft 56 outwardly of the main frame end wall 57, so that the operating lever 24 underlies the drive motor 21, as best seen in Figs. 1 and 4.

Spring member 58 is mounted surrounding operating shaft 56 outwardly of end wall 57 and between end wall 57 and operating lever 24, with spring 58 urging operating shaft 56 and consequently operating lever 24 to rotate in a clockwise direction, as seen in Fig. 4 or toward the drive motor 21. Thus, as seen in Figs. 3 and 7, spring 55 urges the pivot link 49 to move the tensioning wheel 26 toward the foot portion 45, which movement is limited by the length of slot 44 formed in the main frame member 20, and at the same time, spring 58 shown in Fig. 10, urges the operating shaft 56 to rotate the offset link 50 so that pin 52 is normally at the lower end of slot 51. With this arrangement, downward movement of the operating lever 24, as seen in Fig. 4, will rotate the operating shaft 56, and as seen in Fig. 7, will move the offset link 50 in a clockwise direction, moving pin 52 lengthwise of slot 51, without moving the pivot link 49 in the initial motion of offset link 50 until pin 52 engages the upper end of slot 51, after which offset link 50 will cause pivot link 49 to move the tensioning wheel 26 away from the foot member 45.

Operating lever 24 is provided with a stop plate 59 pivotally mounted thereon for limited pivotal movement

in reference thereto. One end of stop plate 59 is pivotally connected to operating lever 24 at a point on operating lever 24 spaced from operating shaft 56, as best seen in Figs. 4 and 14, by means of a pivot screw 60.

Plate 59 is provided at the other end thereof with an actuating means engagement portion 61 and a slotted hole 62 spaced from said engagement portion. A stop screw 63 is received through the slotted hole 62 and is threadably secured in the actuating lever 24. Thus, stop screw 63 limits the pivotal movement of stop plate 59 around pivot screw 60 in reference to operating lever 24 and within the confines of the slotted hole 62 in plate 59.

A spring 64 is mounted surrounding pivot screw 60 with one end of said spring engaged with stop plate 59 and the other end thereof engaged with operating lever 24, so that spring 64 urges stop plate 59 to pivot upwardly in reference to operating lever 24, that is, so that stop plate 59 pivots clockwise in reference to operating lever 24, as seen in Fig. 4, or counter clockwise, as seen in Fig. 14. Further, spring 64 urges stop plate 59 to pivot in a direction urging the actuating means engagement portion 61 toward the actuating means 22, with said upward pivotal movement of stop plate 59 in reference to operating lever 24 being limited by the slotted hole 62 in stop plate 59 and stop screw 63 extending through said slotted hole and engaged with operating lever 24.

Thus, in normal position, as seen in Fig. 4, operating lever 24 is urged to rotate around operating shaft 56 in a clockwise direction toward drive motor 21 by spring 58, and at the same time, stop plate 59 is urged to pivot in a clockwise direction in reference to operating lever 24 by spring 64, so that engagement portion 61 of stop plate 59 engages actuating means 22. As shown in Fig. 4, in this normal position, stop screw 63 is in the lower portion of slotted hole 62 of the stop plate 59 so that stop plate 59 may pivot a limited amount in a counter clockwise direction or downwardly in reference to operating lever 24 against the pressure of spring 64, and further the clockwise rotation of operating lever 24 in reference to operating shaft 56 is limited by an engagement portion 65 on operating lever 24 abutting the lower surface of drive motor 21. The purpose of stop plate 59 will be hereinafter described.

As best seen in Figs. 1 and 2, the guide member 27 is pivotally mounted in main frame member 20 spaced from tensioning wheel 26 and adjacent foot member 25 by means of a pivot screw 66. As shown, guide member 27 is provided with a downwardly opening generally U-shaped end portion 67 at the end thereof adjacent foot member 25, with the U-shaped opening 68 in said portion 67 being positioned in alignment with the outer periphery of tensioning wheel 26.

Spring 69 is mounted engaged with guide member 27 and main frame member 20 at a point on guide member 27 intermediate the pivot screw 66 and the U-shaped end portion 67. Further, the end of guide member 27 opposite from the U-shaped portion 67 extends away from main frame member 20 to a position underlying operating lever 24, with said end having an operating lever engagement portion 70, as shown. Finally, guide member 27 is provided with a main frame member engagement portion 71 intermediate the operating lever engagement portion 70 and the pivot screw 66, with said portion 71 engageable with the end wall 57 of main frame member 20.

Thus, as shown in Fig. 1, guide member 27 is normally urged in a counterclockwise direction by spring 69, so that U-shaped portion 67 is generally in alignment with the knurled surface 48 on foot member 25 with said U-shaped portion extending downwardly adjacent foot member 25 and with main frame member engagement portion 71 abutting the end wall 57 of main frame member 20, limiting said counterclockwise movement of guide member 27. As best seen in Fig. 13, when operating lever 24 is moved downwardly, as before described, around operating shaft 56, the lower

portion of this operating lever will engage the operating lever engagement portion 70 of guide member 27, rotating the guide member in a clockwise direction, and moving the U-shaped portion 67 of the guide member upwardly away from foot member 25 against the pressure of spring 69.

As best seen in Figs. 1 and 2, actuating means 22 includes a slide member 72 slidably mounted adjacent one side of and extending the length of drive motor 21, overlying the actuating means engagement portion 61 of stop plate 59. Slide member 72 is slidably attached at one end thereof to the main frame member 20 by means of a slotted hole 73 formed in the end of slide member 72 and a screw 74 received through said slotted hole and threadably engaged in main frame member 20.

The other end of slide member 72 is slidably attached to the outer end of drive motor 21 by means of spaced inwardly extending tabs 75 having slotted holes 76 formed therein, with pins 77 being mounted in spaced tabs 78 on drive motor 21 and engaged in said slotted holes 76. Thus, slide member 72 is slidable in relation to drive motor 21 and main frame member 20, within the limits of slotted hole 73 and slotted holes 76.

Slide member 72 is mounted overlying actuating button 23, as shown, and is further provided with an inwardly angled portion 79 normally spaced from actuating button 23 and outwardly thereof. A generally L-shaped spring tab portion 80 extends outwardly from inwardly angled portion 79 to a point spaced from the outer end 81 of drive motor 21, and spring 82 is mounted between spring tab 80 and the outer end 81 of drive motor 21, urging the slide member 72 to slide outwardly in reference to drive motor 21, within the confines of the slotted holes 73 and 76 of slide member 72.

Still further, slide member 72 is provided with an angled surface 83 spaced outwardly from the main frame member 20 and generally overlying stop plate 59 on operating lever 24. Angled surface 83 terminates in an upwardly extending slot 84 outwardly of angled surface 83 and of a width greater than the width of stop plate 59, so that stop plate 59 may be received in said slot 84, upon inward sliding movement of slide member 72. Finally, slide member 72 is provided with an upwardly extending finger portion 85 for engagement by the fingers of an operator, for sliding the slide member 72 in a direction toward the main frame member 20.

Thus, slide member 72 may be moved in reference to drive motor 21 toward main frame member 20 against the pressure of spring 82, and during such sliding movement, stop plate 59 will slide along angled surface 83 and finally engage in slot 84, since stop plate 59, as before described, is urged upwardly in reference to operating lever 24 by spring 64. Also, during this sliding movement of slide member 72, actuating button 23 will be engaged by the inwardly angled portion 79 of slide member 72, and continued inward sliding movement of slide member 72 will cause angled portion 79 to force the actuating button 23 inwardly to ultimately place the drive motor 21 in "on" position.

In operation of the strap stretching tool construction comprising the present invention, prior to use, the strap stretching tool is in its normal position, as illustrated in full lines in Figs. 1 through 7, 9 and 10. As before described, the slide member 72 is in its outermost position, that is, with slide member 72 in a position so that screw 74 and pin 77 are at the innermost ends of their respective slots 73 and 76, spring tab portion 80 is at its outermost extended position extending its maximum distance outwardly of outer end 81 on drive motor 21, spring 82 is extended, and inwardly angled portion 79 is spaced outwardly from actuating button 23, so that said angled portion does not engage the actuating button, thereby maintaining the drive motor 21 in "off" position.

Further, operating lever 24 is in its maximum upward position, with engagement portion 65 abutting the under side of drive motor 21, said lever being urged to such position by spring 58. In this position, operating lever 24 is disengaged from operating lever engagement portion 70 on guide member 27 and stop plate 59 on operating lever 24 is in a position in which the actuating means engagement portion 61 thereof is engaged with the angled surface 83 on slide member 72 inwardly of slot 84 formed in said slide member. Also, in this position, stop screw 63 is in the lower portion of the stop member slotted hole 62, with stop plate 59 being urged to such position by spring 64.

Still further, with operating lever 24 in its uppermost position, the operating shaft 56 maintains offset link 50 in a position so that pin 52 thereof is in the lower end of the oblong slot 51 formed in the pivot link 49, as shown in Fig. 7. Also, spring 55 urges the pivot link 49 to force the tensioning wheel drive shaft 34 and consequently the tensioning wheel 26 to their lowermost position in which the tensioning wheel knurled surface 47 is closely adjacent the foot portion and is spaced only a slight distance from the foot portion knurled surface 48.

Finally, since the operating lever 24 is disengaged from the guide member 27, the spring 69 has urged the U-shaped portion 67 of the guide member to its lowermost position, and the main frame member engagement portion 71 has engaged the end wall 57 of main frame member 20. When the guide member 27 is in this position, the opening portion of the U-shaped opening 68 thereof extends to a level below the knurled surface 48 of foot member 25, as shown.

After a length of metal strapping (not shown) has been placed around an object to be strapped (not shown) and the ends of said strapping brought into overlapping relationship, this overlapped portion of the strapping is engaged over the knurled surface 48 of foot portion 45 beneath the knurled surface 47 of tensioning wheel 26, and within the U-shaped opening of guide member 27. Positioning of the strap stretching tool for such engagement is illustrated in Figs. 8, 13 and 14.

The operating lever 24 is pressed downwardly, that is, rotated in a clockwise direction about operating shaft 56, as seen in Fig. 14. This downward movement of operating lever 24 rotates the operating shaft 56 in a clockwise direction, as seen in Fig. 8, thereby also rotating offset link 50 in a clockwise direction, causing pin 52 to move to the upper end of slot 51 and thereafter, move pivot link 49 upwardly against the pressure of spring 55. This causes the second driving gear 33 to rotate a distance around the first driving gear 32, while still remaining engaged therewith, and moves tensioning wheel drive shaft 34 and consequently tensioning wheel 26 at an angle upwardly away from the knurled surface 48 on the foot portion 45, as shown in full lines in Figs. 8 and 13, and in dot-dash lines in Fig. 3.

Further, this downward movement of operating lever 24 disengages the actuating means engagement portion 61 of stop plate 59 from slide member 72, so that spring 64 urges stop plate 59 to pivot around pivot screw 60 until the stop screw 63 is positioned in the lower portion of the stop plate slotted hole 62. Finally, as the operating lever 24 moves downwardly, it engages the operating lever engagement portion 70 of the guide member 27, forcing the guide member to pivot in a clockwise direction, as seen in Fig. 13, around the pivot screw 66, against the pressure of spring 69, so that the U-shaped portion 67 is moved upwardly away from the foot portion 45 and the opening portion of the U-shaped opening 68 is positioned in a plane spaced above the knurled surface 48 of foot portion 45.

The overlapped portion of the strapping is then placed between the knurled surface 48 on the foot portion 45 and the knurled surface 47 on the tensioning wheel 26,

and also beneath the U-shaped portion 67 of guide member 27. The operating lever 24 is then released and is again urged to assume its normal position, as illustrated in Figs. 1 and 4, wherein the engagement portion 65 thereof again abuts the lower portion of the drive motor 21, and the stop plate 59 again engages the angled surface 83 of slide member 72.

This upward movement of operating lever 24 permits the spring 55 to urge the pivot link 49, tensioning wheel drive shaft 34 and consequently, tensioning wheel 26 downwardly, moving the tensioning wheel toward and again to a position closely adjacent foot portion 45, and causing the overlapped portion of the strapping to be gripped between the knurled surface 47 of tensioning wheel 26 and the knurled surface 48 of foot portion 45. Also, the upward movement of operating lever 24 permits the guide member 27 to rotate in a counter clockwise direction, as seen in Fig. 1, and as urged by spring 69, until the U-shaped portion 67 of said guide member engages over the overlapped portion of the strapping so that the two layers of strapping extend within U-shaped opening 68. The strap stretching tool is then in position for the tensioning operation.

The tensioning operation is begun by moving the slide member 72 toward the main frame member 20 by means of the finger portion 85, and against the pressure of spring 82 engaged with spring tab portion 80. This causes the inwardly angled portion 79 of slide member 72 to engage the actuating button 23, and continued inward movement of slide member 72 causes the actuating button 23 to be moved inwardly to start the drive motor 21, as seen in Fig. 12.

Also, as the slide member 72 moves inwardly toward main frame member 20, the actuating means engagement portion 61 of stop plate 59 slides along angled surface 83 on the slide member, which angled surface is formed such that it moves the stop plate 59 downwardly in reference to the operating lever 24. Ultimately, the engagement portion 61 of stop plate 59 reaches the end of angled surface 83, adjacent slot 84, and spring 64, which has permitted stop plate 59 to move downwardly in reference to operating lever 24 and along the angled surface 83, forces the stop plate engagement portion 61 into slot 84, as seen in Fig. 11.

Thus, the drive motor 21 is retained "on" rotating the tensioning wheel 26 through the transmission means 29, as before described. This causes the top layer of strapping to be moved in reference to the lower layer of strapping by the tensioning wheel 26 in a direction shortening the length of strapping around the object being strapped, while the lower layer of the strapping is retained stationary by the knurled surface 48 on foot portion 45.

The drive motor 21 will continue to tension the strapping until the predetermined and preset stall torque of the drive motor is reached, at which time the drive motor will stall and maintain a preset tension in the strapping. Thereafter, the overlapped end portions of the strapping may be sealed by a usual U-shaped seal (not shown) or by other means, so that the tension is retained on the strapping and the object to be strapped is properly bound.

Thereafter, the operating lever 24 is again pressed downwardly and in the initial downward motion of operating lever 24, stop plate 59 is withdrawn from the slide member slot 84, but due to the lost motion connection between the operating lever 24 and the tensioning wheel 26, that is, the pin 52 in the offset link 50, and the slot 51 in the pivot link 49, during this initial downward motion of operating lever 24 and while stop plate 59 is withdrawn from slot 84, the tensioning wheel 26 is not moved. As stop plate 59 moves out of slot 84, spring 82 urges slide member 72 outwardly away from main frame member 20, causing the inwardly angled portion 79 of slide member 72 to disengage the actuating button 23, permitting the actuating button 23 to move outwardly and turn the drive motor 21 "off."

After the drive motor 21 is "off" and thereby no longer driving or rotating tensioning wheel 26, the continued downward movement of operating lever 24 again raises tensioning wheel 26 away from foot portion 45 and pivots the guide member 27 such that the U-shaped portion 67 thereof disengages the strapping, as before described. Thus, the strapping may be slid outwardly from between tensioning wheel 26 and foot portion 45, and from beneath guide member 27, so that the strap tensioning tool may be completely disengaged from the strapping.

One of the important features of the strap stretching tool construction comprising the present invention is the particular positioning of the pivot link 49 supporting the tensioning wheel drive shaft 34 and tensioning wheel 26, and thereby supporting the second driving gear 33 in driving relation to the first driving gear 32. The drive motor 21 is arranged to drive the tensioning wheel 26 in a clockwise direction, as shown in Fig. 3, and the end portions of the length of strapping are always positioned therebeneath, with the top layer of the strapping extending from the tensioning wheel toward the guide member 27, and thereafter around the object being strapped.

As tension is created in the strapping by this clockwise rotation of the tensioning wheel 26, this tension creates a force on this top layer of strapping toward the guide member 27, and thus tends to urge the tensioning wheel 26 in a direction toward the guide member. Since the pivot link 49 angles upwardly and in a direction substantially opposite to the tension force created in the strapping, that is, at an angle more than 90° or at an obtuse angle to the tension force in the strapping, this tension force urges the tensioning wheel 26 downwardly toward foot portion 45, so that the tensioning wheel more tightly grips the strapping against foot portion 45. Thus, as the tension in the strapping increases, the tensioning wheel 26 tends to grip the strapping more tightly, and is thereby able to place a greater tension in the strapping.

Another important feature of the invention is that since the tensioning wheel is rotating in a clockwise direction, as seen in Fig. 3, the second driving gear 33 is also turned in a clockwise direction, as seen in Fig. 7, so that the first driving gear 32 turns in a counter clockwise direction. This counter clockwise movement of gear 32 tends to urge gear 33 to rotate in a counter clockwise direction around gear 32, thereby, similar to the tension in the strapping, creating a downward force on gear 33, tensioning wheel drive shaft 34 and tensioning wheel 26, causing tensioning wheel 26 to more tightly engage the strapping against the foot portion 45, while the drive motor 21 is driving this tensioning wheel. Thus, the gripping force caused by the tension in the strapping is further supplemented by an additional gripping force caused by the driving forces through and between gears 32 and 33.

However, after drive motor 21 has been turned off and is no longer driving or rotating tensioning wheel 26, that is, after the length of strapping has been tensioned and sealed, this added gripping force caused by the drive through gears 32 and 33 is released since these gears are no longer driven. Thus, at the time that it is desired to disengage tensioning wheel 26 from the strapping, the gripping force of tensioning wheel 26 against the strapping is decreased, making it much easier to disengage the knurled surface 47 of the tensioning wheel from the strapping.

Still another important feature of the invention is the particular arrangement of the stop plate 59 in relation to the operating lever 24, and the lost motion connection between operating lever 24 and tensioning wheel 26. After the strap tensioning operation has been completed and the strapping sealed, because of the lost motion connection between offset link 50 and pivot link 49, upon initial downward movement of the operating lever 24,

the stop plate 59 is first disengaged from the slide member slot 84, so that the drive motor 21 is first shut off before tensioning wheel 26 is raised and disengaged from the strapping.

If drive motor 21 remained "on" while tensioning wheel 26 was raised from engagement from the strapping, as the downward pressure of tensioning wheel 26 was released, the drive motor 21 would begin to rotate the tensioning wheel, since the force between the tensioning wheel and the strapping would not be as great. This could cause the knurled surface 47 of the tensioning wheel to seriously damage the strapping and also might cause the seal around the strapping to be broken, thereby releasing the strapping. However, with the particular arrangement shown, this danger is eliminated.

A further important feature of the present invention, which feature has been described in the operation of the strap stretching tool, is the arrangement of the stop plate 59, slide member 72, actuating button 23 and slot 84 in the slide member. With the arrangement described, the drive motor 21 may be placed in driving position and will remain "on" until stop plate 59 is disengaged from the slide member slot 84.

Thus, the motor may be placed "on" and will tension the strapping until sufficient tension is created in the strapping to stall the drive motor, after which the drive motor will still retain this tension in the strapping until the strapping can be sealed. Thereafter, the stop plate 59 is disengaged from the slide member slot 84, and the slide member 72 moves outwardly releasing the actuating button 23 and causing the motor to be turned "off." All of this automatic operation is merely controlled by moving the slide member 72 inwardly to start the drive motor 21 and moving the operating lever 24 slightly downwardly to stop the drive motor 21.

Finally, a feature of the present invention is that the guide member 27 is disengaged from the strapping automatically upon the actuation of operating lever 24 to raise the tensioning wheel 26 from the strapping. Thus, as before described, in the one motion of moving the operating lever 24 downwardly, the drive motor 21 is turned "off," the tensioning wheel 26 is disengaged from the strapping, and the guide member 27 is also disengaged from the strapping.

Thus, the present invention provides a wheel type strap stretching tool construction which overcomes the difficulties of the prior constructions hereinbefore discussed; which is automatically actuated by a drive motor rather than being hand actuated by a reciprocal operating lever; which is automatically actuated by a drive motor, but yet the tensioning wheel included therein is still movable toward and away from the knurled foot member of the tool, so that the ends of a length of strapping to be tensioned may be threaded therebetween; in which the tensioning wheel is mounted movable toward and away from the foot member thereof in such a manner that increased tension on the strapping causes the tensioning wheel to grip the strapping more tightly, while the tensioning wheel is being driven by the drive motor; in which the tensioning wheel is mounted so that once the drive motor actuating the tensioning wheel is shut off, the gripping power of the tensioning wheel is decreased, making it easier to disengage the tensioning wheel from the strapping; in which the means driving the tensioning wheel may be set to place a predetermined tension in the strapping; in which control means is provided associated with the drive motor, so that once the drive motor is placed in "on" position, it will remain on until the length of strapping is sealed securing said strapping around the particular object being strapped; in which release means is associated with the tensioning wheel for moving the tensioning wheel away from the strapping that has been tensioned and sealed to disengage the tensioning wheel from the strapping; in which the release means disengages the tensioning wheel from the tensioned and sealed strapping, and at the same time, releases the drive motor control means so that the control means places the drive motor in "off" position; in which the release means disengages the tensioning wheel from the tensioned and sealed strapping, while at the same time releasing the drive motor control means, and also simultaneously disengages a strap guide from the tensioned and sealed strapping so that the strap stretching tool may be removed from said sealed strapping; and which provides all of the above advantageous features with a maximum of efficiency but yet is relatively simple in construction and may be manufactured at a minimum of cost.

In the foregoing description, certain terms have been used for brevity, clearness and understanding but no unnecessary limitations are to be implied therefrom, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example and the scope of the present invention is not limited to the exact details of construction shown.

Having now described the invention, the construction, operation and use of a preferred embodiment thereof, the advantageous new and useful construction and reasonable mechanical equivalents thereof obvious to those skilled in the art are set forth in the appended claims.

I claim:

1. A strap stretching tool construction including a main frame member, drive motor means mounted on the main frame member, a first driving gear rotatably mounted on the main frame member and operably connected to the drive motor means, a tensioning wheel shaft rotatably mounted on the main frame member, a second driving gear mounted on the tensioning wheel shaft in operable engagement with said first driving gear, a strap tensioning wheel mounted on the tensioning wheel shaft adjacent a portion of the main frame member, and said tensioning wheel and tensioning wheel shaft mounted for movement toward and away from said main frame portion and the operable connection between the first and second driving gears being maintained during said tensioning wheel and tensioning wheel shaft movement; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor to move one end of the strapping in reference to the other end of the strapping and thereby tension the strapping around an object.

2. A strap stretching tool construction including a main frame member, drive motor means mounted on the main frame member, a first driving gear rotatably mounted on the main frame member and operably connected to the drive motor means, a tensioning wheel shaft rotatably mounted on the main frame member, a second driving gear mounted on the tensioning wheel shaft in operable engagement with said first driving gear, a strap tensioning wheel mounted on the tensioning wheel shaft adjacent a portion of the main frame member, said tensioning wheel and tensioning wheel shaft mounted for movement toward and away from said main frame portion, a control handle pivotally mounted on the main frame member and operably connected to the tensioning wheel shaft, said control handle operable to move the tensioning wheel and tensioning wheel shaft toward and away from said main frame portion, resilient means operably connected with the tensioning wheel and normally urging the tensioning wheel toward said main frame portion, and the operable connection between the first and second driving gears being maintained during said tensioning wheel and tensioning wheel shaft movement; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor to move one end of the strapping in reference

to the other end of the strapping and thereby tensioning the strapping around an object.

3. A strap stretching tool construction as defined in claim 2 in which a guide member is mounted on the main frame member spaced from the tensioning wheel and engageable with strapping positioned between the tensioning wheel and the main frame portion, and in which the guide member is operably connected with the control handle and movable by the control handle away from the strapping upon operation of the control handle to move the tensioning wheel away from the main frame portion.

4. A strap stretching tool construction including a main frame member, drive motor means mounted on the main frame member, a first driving gear rotatably mounted on the main frame member and operably connected to the drive motor means for receiving torque from said motor means, a tensioning wheel shaft rotatably mounted on the main frame member, a second driving gear mounted on the tensioning wheel shaft in operable engagement with said first driving gear for receiving torque from said first driving gear, a strap tensioning wheel mounted on the tensioning wheel shaft adjacent a portion of the main frame member, said tensioning wheel and tensioning wheel shaft mounted for movement toward and away from said main frame portion while the second driving gear moves around the first driving gear maintaining the operable connection between said first and second driving gears, and the first driving gear transmitting torque to the second driving gear in a direction of rotation urging the tensioning wheel and tensioning wheel shaft toward the main frame portion; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object, while the direction of rotation of the driving gear urges the tensioning wheel to more tightly engage said one end of the strapping.

5. A strap stretching tool construction including a main frame member, drive motor means mounted on the main frame member, a first driving gear rotatably mounted on the main frame member and operably connected to the drive motor means for receiving torque from said motor means, a tensioning wheel shaft rotatably mounted on the main frame member, a second driving gear mounted on the tensioning wheel shaft in operable engagement with said first driving gear for receiving torque from said first driving gear, a strap tensioning wheel mounted on the tensioning wheel shaft adjacent a portion of the main frame member, said tensioning wheel and tensioning wheel shaft mounted for movement toward and away from said main frame portion while the second driving gear moves around the first driving gear maintaining the operable connection between said first and second driving gears so that overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object, and the first driving gear transmitting torque to the second driving gear in a direction of rotation to cause the tensioning wheel to move said one end of the strapping in a direction so that the tension developed in the strapping urges the tensioning wheel and tensioning wheel shaft toward the main frame portion.

6. The strap stretching tool construction as defined in claim 5 in which the first driving gear transmits torque to the second driving gear in a direction of rotation urging the tensioning wheel and tensioning wheel shaft toward the main frame portion.

7. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, power transmission means operably connecting the drive motor means to the tensioning wheel at least when the tensioning wheel is closely adjacent the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel when the drive motor means is actuated, motor control means on the drive motor means movable between positions actuating and not actuating said motor means, actuating means operably connected with the motor control means and movable between positions placing said motor control means in motor-actuating and non-actuating positions, resilient means operably connected with the actuating means and normally urging the actuating means toward non-motor-actuating position, and stop means operably connected with the actuating means and movable between a position maintaining the actuating means in motor-actuating position and a position releasing the actuating means to move to non-motor-actuating position; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, the actuating means may be moved to a position placing the motor control means in motor-actuating position so that the motor means drives the tensioning wheel, and the tensioning wheel will move one end of the strapping in reference to the other end of the strapping and whereby tension the strapping around an object, and the stop means may be moved to a position maintaining the actuating means in motor-actuating position to maintain the motor means rotating the tensioning wheel.

8. A strap stretching tool construction as defined in claim 7 in which the actuating means includes a slide member mounted for slidable movement in relation to the drive motor means; in which the motor control means includes a control button; and in which an angled surface is formed on the actuating means slide member for engagement with the motor control means button upon movement of the slide member to one position and disengaged from the button upon movement of the slide member to a second position, the angled surface placing the control button in motor-actuating position when engaged therewith, and the angled surface releasing the control button to return to non-motor-actuating position when disengaged therefrom.

9. A strap stretching tool construction as defined in claim 7 in which the actuating means includes a slide member having a slot formed therein; and in which the stop means includes a plate movable between positions engaged and disengaged from said slide member slot.

10. A strap stretching tool construction as defined in claim 7 in which the actuating means includes a slide member mounted for slidable movement in relation to the drive motor means, and the slide member has a slot formed therein; in which the motor control means includes a control button; in which an angled surface is formed on the actuating means slide member for engagement with the motor control means button upon movement of the slide member to one position and disengaged from the button upon movement of the slide member to a second position, the angled surface placing the control button in motor-actuating position when engaged therewith, and the angled surface releasing the control button to return to non-motor-actuating position when disengaged therefrom; and in which the stop means includes a pivotally mounted plate movable between positions engaged and disengaged from said slide member slot.

11. A strap stretching tool construction as defined in claim 7 in which tensioning wheel control means is mounted on the main frame member operably connected

with the tension wheel to move the tensioning wheel toward and away from the main frame portion and normally resiliently urging the tensioning wheel toward said portion; and in which the stop means is also operably connected with the tensioning wheel control means and is movable by said control means to a position releasing the actuating means to move to non-motor-actuating position upon operation of said control means to move the tensioning wheel away from the main frame portion.

12. A strap stretching tool construction as defined in claim 7 in which a tensioning wheel control handle is pivotally mounted on the main frame member and operably connected to the tensioning wheel, and said control handle being operable to move the tensioning wheel toward and away from the main frame portion and normally resiliently urging the tensioning wheel toward said portion; in which the operable connection between the tensioning wheel control handle and the tensioning wheel includes a lost motion connection; and in which the stop means is also operably connected with the tensioning wheel control handle and is movable by said control handle to a position releasing the actuating means to move to non-motor-actuating position upon operation of said control handle to move the tensioning wheel away from the main frame portion, and the control handle through the lost motion connection moving the stop means to a position releasing the actuating means to move to non-motor-actuating position before the operating handle starts to move the tensioning wheel away from the main frame portion.

13. A strap stretching tool construction as defined in claim 7 in which the actuating means includes a slide member having a slot formed therein; in which the stop means includes a plate movable between positions engaged and disengaged from said slide member slot; in which a tensioning wheel control handle is pivotally mounted on the main frame member and operably connected to the tensioning wheel, and said control handle being operable to move the tensioning wheel toward and away from the main frame portion and normally resiliently urging the tensioning wheel toward said portion; in which the operable connection between the tensioning wheel control handle and the tensioning wheel includes a lost motion connection; and in which the stop means plate is also operably connected with the tensioning wheel control handle and is movable by said control handle to a position disengaged from said slide member slot upon operation of said control handle to move the tensioning wheel away from the main frame portion, and the control handle through the lost motion connection moving the stop plate to a position disengaged from said slide member slot before the operating handle starts to move the tensioning wheel away from the main frame portion.

14. A strap stretching tool construction as defined in claim 7 in which tensioning wheel control means is mounted on the main frame member operably connected with the tension wheel to move the tensioning wheel toward and away from the main frame portion and normally resiliently urging the tensioning wheel toward said portion; in which the stop means is also operably connected with the tensioning wheel control means and is movable by said control means to a position releasing the actuating means to move to non-motor-actuating position upon operation of said control means to move the tensioning wheen away from the main frame portion; in which a guide member is mounted on the main frame member spaced from the tensioning wheel and engageable with strapping positioned between the tensioning wheel and the main frame portion, and the guide member is operably connected with the tensioning wheel control means and movable by said control means away from the strapping upon operation of said control means to move the tensioning wheel away from the main frame portion.

15. A strap stretching tool construction as defined in claim 7 in which a tensioning wheel control handle is pivotally mounted on the main frame member and operably connected to the tensioning wheel, and said control handle being operable to move the tensioning wheel toward and away from the main frame portion and normally resiliently urging the tensioning wheel toward said portion; in which the operable connection between the tensioning wheel control handle and the tensioning wheel includes a lost motion connection; in which the actuation means includes a slide member having a slot formed therein; in which the stop means includes a plate movable between positions engaged and disengaged from said slide member slot; in which the stop means plate is also operably connected with the tensioning wheel control handle and is movable by said control handle to a position disengaged from said slide member slot upon operation of said control handle to move the tensioning wheel away from the main frame portion, and the control handle through the lost motion connection moving the stop plate to a position disengaged from said slide member slot before the operating handle starts to move the tensioning wheel away from the main frame portion; and in which a guide member is pivotally mounted on the main frame member spaced from the tensioning wheel and engageable with strapping positioned between the tensioning wheel and the main frame portion, and the guide member is operably connected with the tensioning wheel control handle and movable by said control handle away from the strapping upon operation of said control handle to move the tensioning wheel away from the main frame portion.

16. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, and power transmission means operably connecting the drive motor means to the tensioning wheel at least at positions of the tensioning wheel closely adjacent the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

17. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, control means mounted on the main frame member operably connected with the tensioning wheel to move the tensioning wheel toward and away from said main frame portion and normally resiliently urging the tensioning wheel toward said portion, and power transmission means operably connecting the drive motor means to the tensioning wheel at least at positions of the tensioning wheel closely adjacent the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

18. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning

wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, and power transmission means operably connecting the drive motor means to the tensioning wheel in all positions of the tensioning wheel with respect to the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel in any of said tensioning wheel positions; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

19. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, control means mounted on the main frame member operably connected with the tensioning wheel to move the tensioning wheel toward and away from said main frame portion and normally resiliently urging the tensioning wheel toward said portion, and power transmission means operably connecting the drive motor means to the tensioning wheel in all positions of the tensioning wheel with respect to the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel in any of said tensioning wheel positions; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

20. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, power transmission means operably connecting the drive motor means to the tensioning wheel at least at positions of the tensioning wheel closely adjacent the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel, and a guide member pivotally mounted on the main frame member spaced from the tensioning wheel and said main frame portion and selectively engageable with strapping positioned between the tensioning wheel and the main frame portion at a point spaced from said tensioning wheel and main frame portion; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

21. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, control means mounted on the main frame member operably connected with the tensioning wheel for moving the tensioning wheel toward and away from said main frame portion and normally resiliently urging the tensioning wheel toward said portion, power transmission means operably connecting the drive motor means to the tensioning wheel at least at positions of the tensioning wheel closely adjacent the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel, a guide member pivotally mounted on the main frame member spaced from the tensioning wheel and said main frame portion and selectively engageable with strapping positioned between the tensioning wheel and the main frame portion at a point spaced from said tensioning wheel and main frame portion, and the guide member being operably connected with the control means and movable by the control means away from the strapping upon operation of the control means to move the tensioning wheel away from the main frame portion; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

22. A strap stretching tool construction including a main frame member, drive motor means mounted stationary on the main frame member, a strap tensioning wheel rotatably mounted on the main frame member adjacent a portion of the main frame member and mounted for movement toward and away from said portion and thereby for movement with respect to the drive motor means, control means mounted on the main frame member operably connected with the tensioning wheel to move the tensioning wheel toward and away from said main frame portion and normally resiliently urging the tensioning wheel toward said portion, power transmission means operably connecting the drive motor means to the tensioning wheel in all positions of the tensioning wheel with respect to the main frame portion for transmitting power from the drive motor means to rotate the tensioning wheel in any of said tensioning wheel positions, a guide member pivotally mounted on the main frame member spaced from the tensioning wheel and said main frame portion and selectively engageable with strapping positioned between the tensioning wheel and the main frame portion at a point spaced from said tensioning wheel and main frame portion, and the guide member being operably connected with the control means and movable by the control means away from the strapping upon operation of the control means to move the tensioning wheel away from the main frame portion; whereby overlapped ends of a length of strapping may be positioned between the tensioning wheel and the main frame portion, and the tensioning wheel rotated by the drive motor means to move one end of the strapping in reference to the other end and thereby tension the strapping around an object.

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