Sept. 21, 1926. 1,600,833

J. S. McCHESNEY

PACKAGE BANDING MACHINE

Original Filed Dec. 30, 1918 4 Sheets-Sheet 1

Fig. 1.

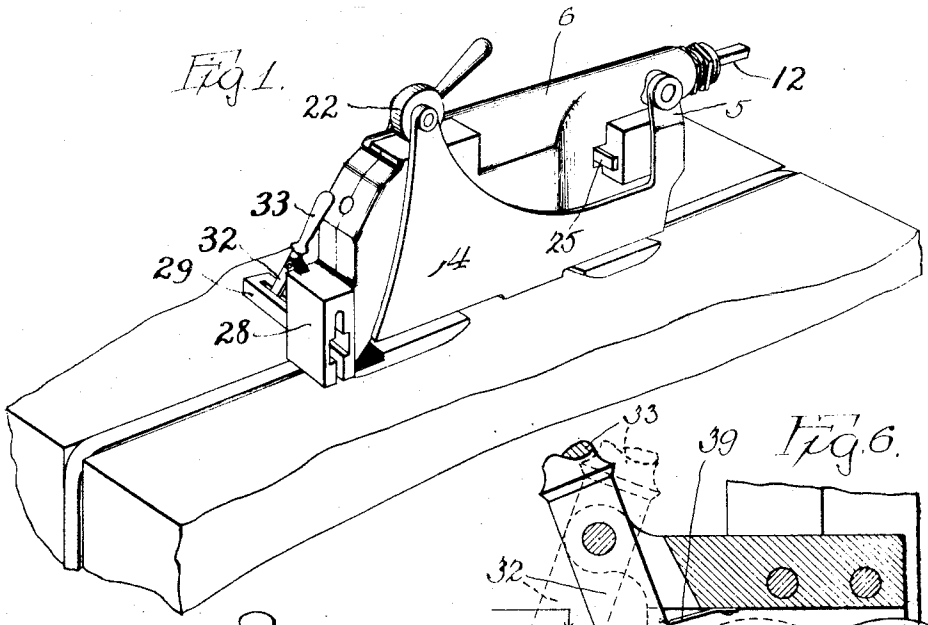


Fig. 6.

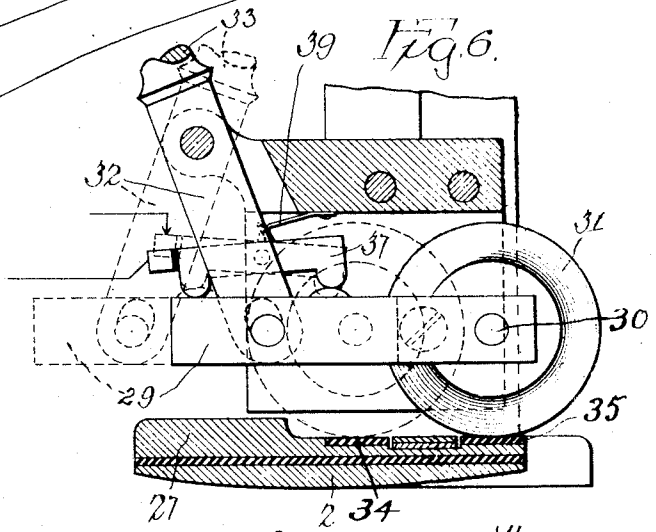


Fig. 5.

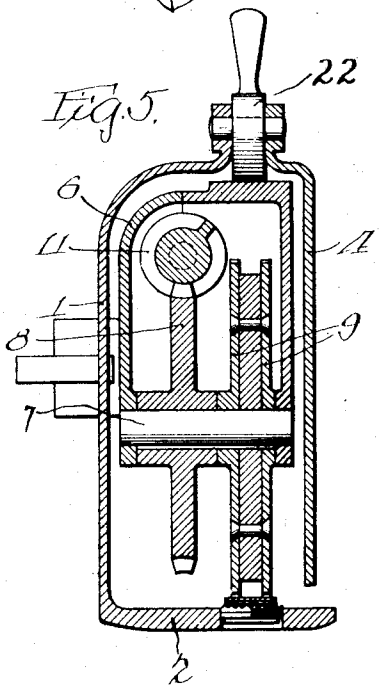
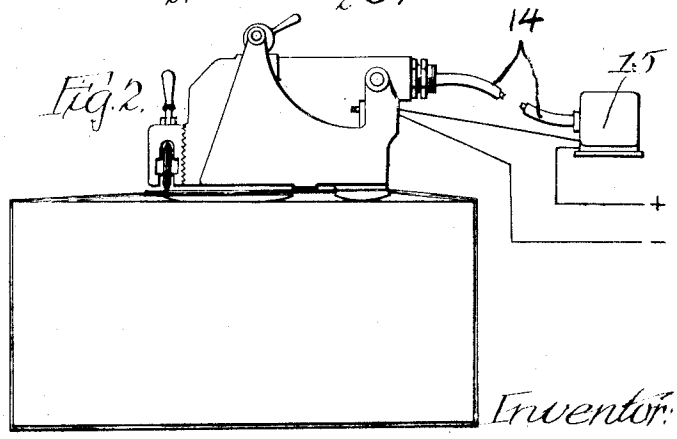


Fig. 2.



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PACKAGE BANDING MACHINE

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Fig 3.

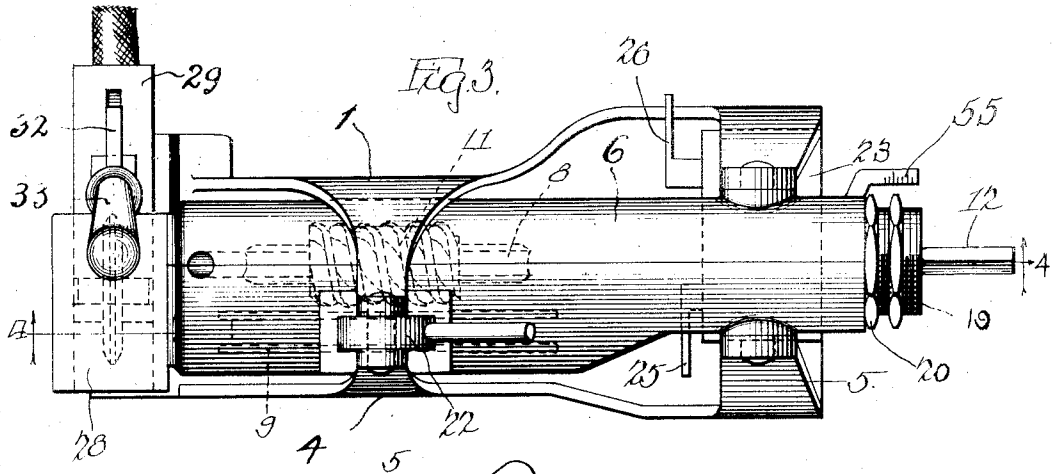


Fig 4.

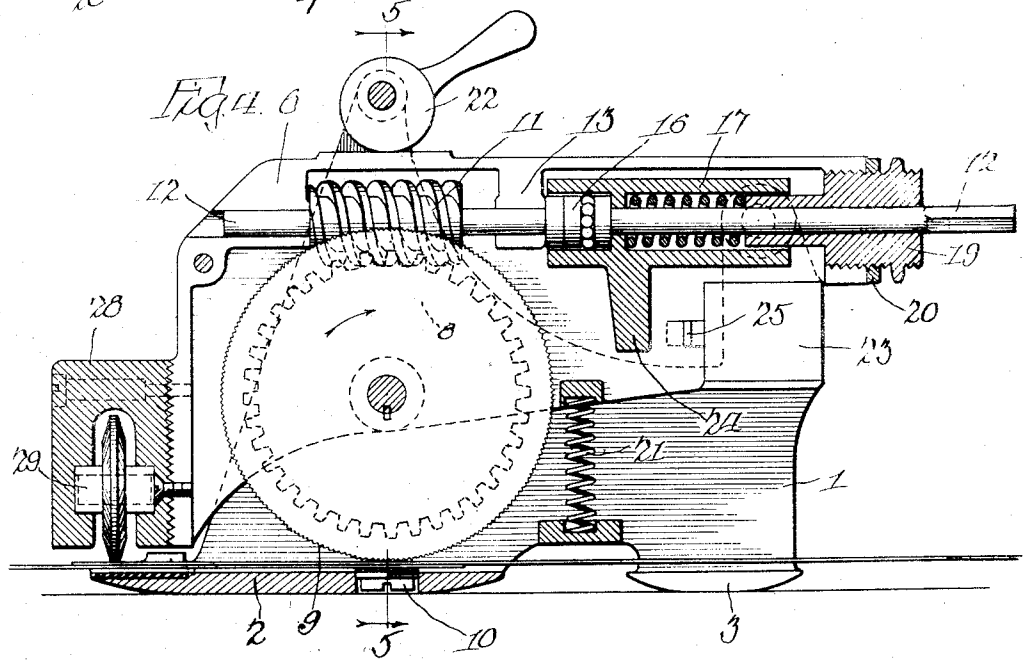
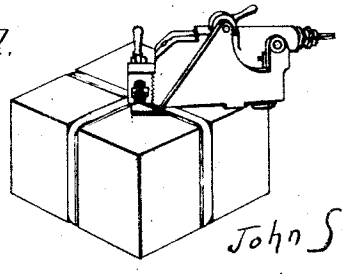


Fig 1a.



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Sept. 21, 1926. 1,600,833

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PACKAGE BANDING MACHINE

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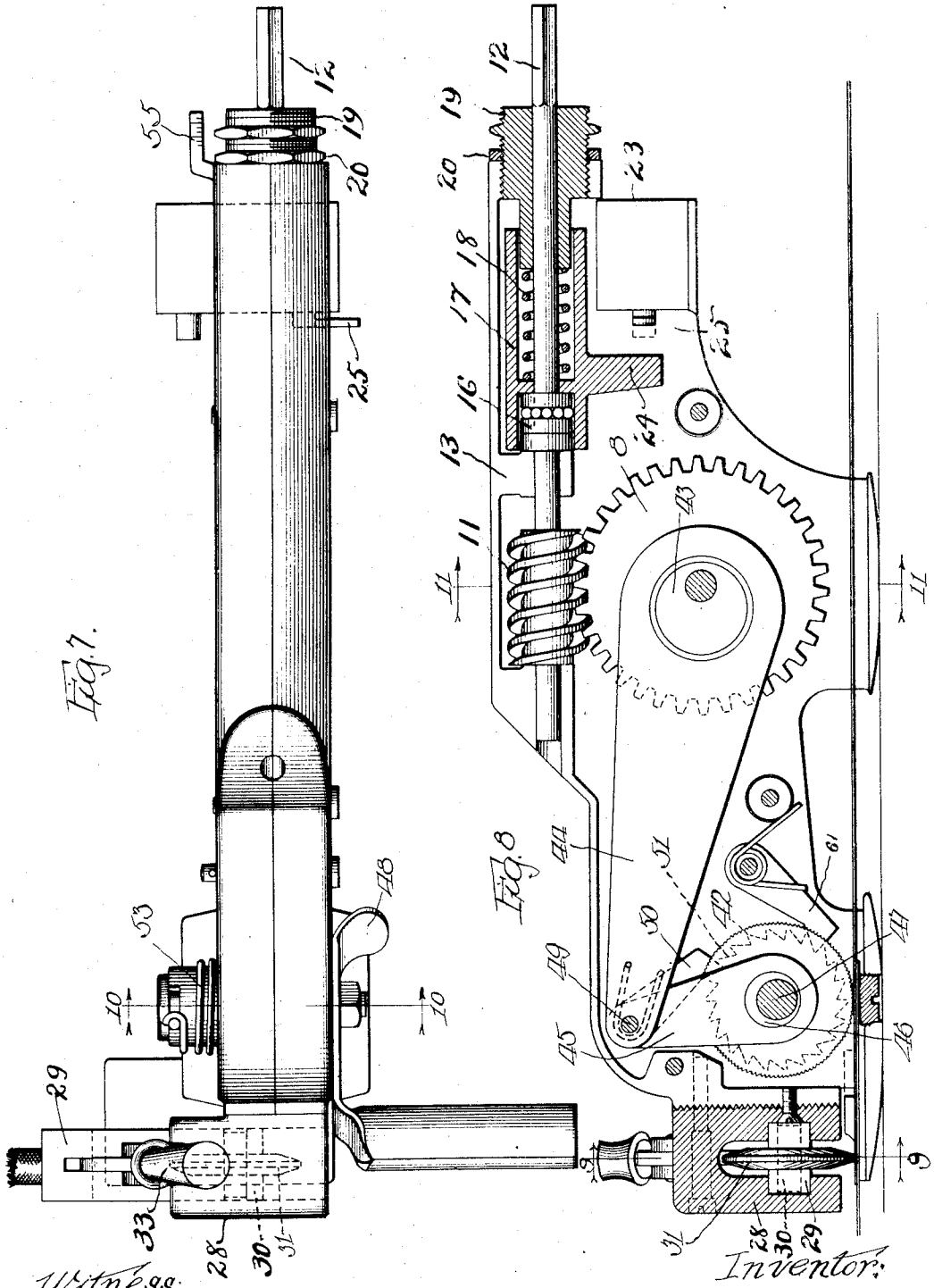


Fig. 7.

Fig. 8

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Sept. 21, 1926. 1,600,833

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PACKAGE BANDING MACHINE

Original Filed Dec. 30, 1918 4 Sheets-Sheet 4

Fig. 9.

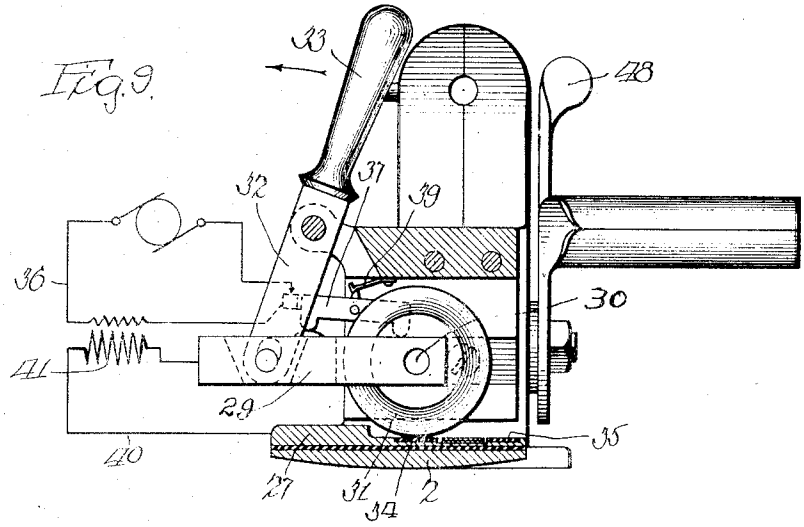


Fig. 10.

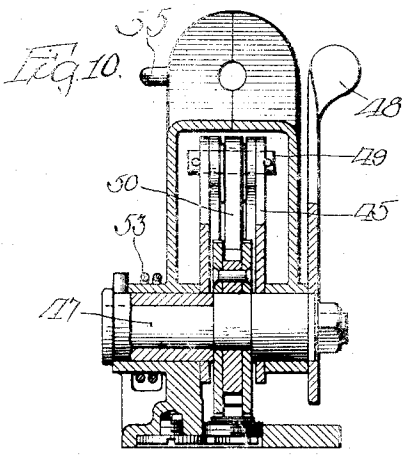


Fig. 11.

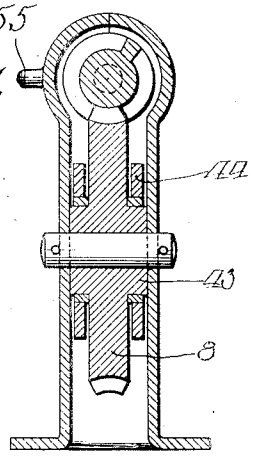
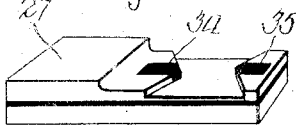


Fig. 13.



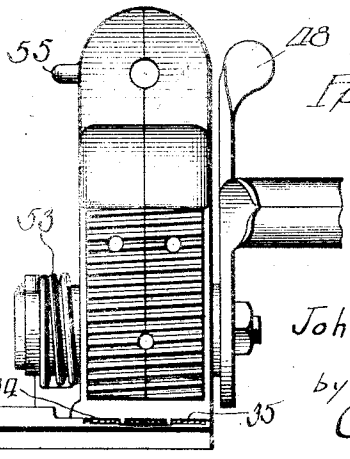


Fig. 12.

Witness:
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Inventor:
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Patented Sept. 21, 1926. 1,600,833

UNITED STATES PATENT OFFICE.

JOHN SHERMAN McCHESNEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CARY MANUFACTURING CO., OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

PACKAGE-BANDING MACHINE.

Application filed December 30, 1918, Serial No. 268,873. Renewed November 3, 1922. Serial No. 598,759½.

In some of its general aspects, my invention relates to appliances for securing metal wire or strip ends to each other while the wires or strips are under tension, and for effectively uniting the ends of a metal loop while the same is banding a package or other object or group of objects, the term wire being used by me in the broad sense in which it includes flat metal strips of various cross-sections. In one aspect, my invention aims to provide an appliance for this general purpose which will effectively tighten a banding loop about the object encircled by the latter; which will automatically adjust itself in position during the tensioning, so as to distribute the tensioning effect equally in opposite directions from the appliance; which may be easily and speedily manipulated by any ordinary workman, which will automatically discontinue the tensioning when the band has been tightened to a predetermined degree; which can readily be adjusted as to the extent to which the band is tightened by the appliance; which will hold the tightened band under tension while overlapped portions thereof are being secured to each other, and which will speedily permit the securing of such overlapped portions to each other at various points or lines including the extreme tip portions of each end of the wire or strip from which the band is formed.

In another aspect, my invention aims to provide an easily and speedily operated appliance, and desirably a power-driven appliance, for tightening an encircling band about a box or other object to a tension having a predetermined relation to the resistance offered to such tensioning, as for example, to the extent to which a banded box resists the tendency to draw the band tightly against sides of the box and to form relatively sharp angles in the band at the edges of the box. In another aspect, my invention aims to provide an appliance which may easily and speedily be used for welding overlapping wire portions to each other along lines extending at any desired angles to the edges of the wires, and which may be used for this purpose both with wires overlapped in longitudinally parallel relation and with wires overlapped while extending transversely of each other, and in which adjustments may easily be made to vary the pressure under which the parts are welded to each other and to adjust the appliance to varying thicknesses of the strips or other wires. For this same general purpose, my invention also aims to provide simple means for supplying an electric welding current to such an appliance and for automatically breaking this current after the welding has been effected along a line of band transverse of the overlapped wire portions, so that the movable electrode will be disconnected from the circuit during its return movement but will still exert a pressure during the said return movement and will automatically be reconnected to the circuit after the completion of its travel, and hence ready for another welding operation.

Furthermore, my invention aims to provide an appliance of the class described which will not require the operator to guide the same in any way after it has been placed in proper position, but which may be left free to adjust itself to the strains on the different band portions; which may easily be set in operation by the simple pressing of a button; which ordinarily will automatically cease its operation of tensioning the band when this tensioning has been carried to a certain desired extent, but which can readily be stopped in operation at some earlier point by the simple pressing of another button. Moreover, my invention aims to provide an appliance of the class described which will readily be portable and therefore adapted for convenient use with boxes, packages or the like of widely varying sizes, and in which the tensioning mechanism may either be arranged for step-by-step operation or for continuous or non-stepping operation. Still other objects will appear from the following specification and from the accompanying drawings, in which—

Fig. 1 is a perspective view of an appliance embodying my invention and showing the same in position for tensioning and joining the ends of a flat wire band encircling a box or package in one direction.

Fig. 2 is a side view of the same box and

appliance, together with a somewhat diagrammatic view showing the power and circuit connections.

Fig. 3 is an enlarged plan view of the appliance of Fig. 1 with the flexible shaft detached from the same.

Fig. 4 is a transverse vertical section taken through Fig. 3 along the zigzag line 4—4.

Fig. 5 is a vertical section taken through Fig. 4 along the line 5—5.

Fig. 6 is an enlarged and fragmentary view showing the mechanism for controlling the supply of current to the roller which forms one electrode of the electric welding portion of my appliance.

Fig. 7 is a plan view of another embodiment of my invention, namely one in which the tensioning of the wire band is effected by a step-by-step movement.

Fig. 8 is a central and vertical longitudinal section through the appliance of Fig. 7.

Fig. 9 is a transverse vertical section through Fig. 8 along the line 9—9, together with a diagrammatic view showing the circuit connections to the electric welding mechanism forming part of my appliance.

Fig. 10 is a transverse vertical section taken along the line 10—10 of Fig. 7.

Fig. 11 is a transverse vertical section taken along the line 11—11 of Fig. 8.

Fig. 12 is a front view of the appliance of Figs. 7 and 8 with the electric welding mechanism removed.

Fig. 13 is a perspective view of the toe plate at the forward end of either of illustrated embodiments, showing the mounting of the electrode on the same and the method of insulating the electrodes from each other.

Fig. 14 is a perspective view showing an appliance embodying my invention as it appears in position for weld-joining two transversely overlapped bands encircling a package.

In accomplishing the purposes of my invention according to the illustrated embodiments, I provide a casing having a main portion 1 carrying a pair of shoes 2 and 3, which shoes are desirably convexed so that they will readily ride over irregularities in the surface of the box or other object on which my appliance is used. The casing portion 1 and an opposed front portion 4 are connected by a stirrup 5 forming a bearing for a trunnion for an inner casing 6 which carries both the tensioning mechanism, the switching mechanisms, and the movable parts of the electric welding mechanism. Mounted transversely of the inner casing 6 at a point considerably forward of the trunnion shaft is a shaft 7 which has keyed to it a worm wheel 8 and a pair of tensioning wheels 9, these wheels desirably having serrated peripheries and being spaced from each other longitudinally of the shaft 7. Mounted in the shoe 2 directly under the shaft 7 is a gripper screw 10 having a knurled or otherwise roughened upper end which projects slightly above the top of the shoe 2. The worm wheel 8 is continuously engaged by a worm 11 fast upon a worm shaft 12 which is mounted longitudinally of the upper portion of the inner casing 6. This shaft extends slidably through a bearing 13 as shown in Fig. 4 and is rotated by a flexible shaft 14 driven by an electrically controlled source of power, such as the electric motor 15 of Fig. 2. Fast upon the shaft 12 is a collar 16 which is connected through a ball-bearing thrust arrangement with a corresponding collar on a sleeve 17 housing a portion of the shaft 12. This sleeve is normally pressed towards the bearing 13 by a spring 18 which bears at its other end against a bushing 19 threaded into one end of the casing 6 and which bushing is locked in position by a nut 20.

The inner casing is continuously urged in an upward direction about the trunnion shaft 5 by a spring 21 interposed between lugs carried respectively by this inner casing 6 and by the outer casing 1, as shown in Fig. 4. However, these two casings can be adjusted as to their relative position by a cam 22 engaging the top of the inner casing 6 and pivoted between the outer casing portions 1 and 4, as shown in Figs. 4 and 5. On releasing the cam 22 by means of a handle fastened to it, the spring 21 will force the inner casing to swing upwardly, thereby increasing the distance between the rollers 9 and the knurled top of the nut 10, so that the two end portions of a banding strip can readily be inserted from one side of the appliance between the roller and the said screw.

In operation, the banding strip, cut to a suitable length, is first looped around the package and partly drawn up by hand, after which the ends of the strip are overlapped flatwise with their tips extending in opposite directions, whereupon the appliance is placed on the package with the shoes 2 and 3 slid between the loop and the package into the position shown in Fig. 4; that is to say, in a position in which the overlapped strip portions extend between the gripper screw 10 and the wheels 9 and in which the tip of the lower strip portion projects slightly beyond the screw 10 towards the rear of the appliance. Then the wheels 9 are brought into engagement with the upper strip portion by moving the cam 22 and thus swinging the carrier which supports the tensioning mechanism, the cam being moved to a position in which it causes the wheels 9 to grip the upper strip end while still permitting this strip portion to slide upon the lower one. Power is then applied

to the worm 11 through the shaft 12 and the flexible shaft 14, thus causing the wheels 9 to rotate in the direction shown by the arrow in Fig. 4. In thus rotating, the toothed edges of the wheels 9 will engage the upper strip portion so as to move this forwardly of the appliance, which is done by sliding it over the surface of the lower strip portion, since the latter is locked in position by the serrated tip of the screw 10. The result will be a tensioning of the band about the package and a consequent increase in the torque on the worm wheel 8, thereby likewise increasing the back-thrust upon the worm 11 and the shaft 12. As soon as this back thrust is sufficient to overcome the resistance of the spring 18, the collar 16 on the shaft 12 will cause the sleeve 17 to compress the spring while permitting the shaft 12 to slide rearwardly of the machine. That is to say, the worm will rotate to some extent without correspondingly propelling the worm wheel and the tensioning rollers.

In its desirable embodiments, I employ this longitudinal movement of the shaft 12 and consequently of the sleeve 17 for automatically discontinuing the tensioning of the band when the latter has been tightened to a predetermined degree. For example, I may mount an ordinary double-push-button switch 23 on the inner end of the casing 6 and may provide the sleeve 17 with an arm 24 adapted to engage one button 25 of the switch. Then I may arrange the companion button 26 to that it can readily be reached by the hand of the operator for starting the operation, the switch as described being in the circuit of the motor as shown in Fig. 2. Thus arranged, a pressing of the button 26 will start the motor and consequently the tensioning mechanism and the motor will continue in operation until the gradually increasing back-thrust on the worm shaft causes the arm 24 of the sleeve 17 to engage the "off" button 25 of the switch and thereby to disconnect the motor from the circuit. I thus automatically cause my appliance to discontinue the tensioning when the desired tightness is reached, which may be by a variable point even with a given size of package, owing to the differences in resistance offered by different pieces of wire towards lapping against the sides of the box and towards forming relatively sharp bends at the edges of the box, and owing also to the resistance offered by different boxes to the indenting of the edges of the wire.

When the current is thus shut off, the band will be left tightened around the package, with only the relatively thin shoes 2 and 3 between the surface of the package and portions of the banding loop. By using a worm of a relatively low pitch, I readily cause this to resist any tendency towards its being rotated backwardly by a reverse rotation of the worm wheel 8, and hence enable the worm to hold the rollers 9 at the extreme position which they have reached during the tension. I then secure overlapped portions of the metal strip to each other while the band is held under this tension, after which I release the clamping cam 22 and thus permit the shoes of the appliance to be slid sideways out of the banding loop so as to remove the appliance from the package.

To secure the overlapped strip portions to each other, I desirably employ an electric welding mechanism mounted at the forward end of my appliance. For this purpose, the forward shoe 2 may carry an electrode 27, suitably insulated from the shoe as shown in Fig. 13, this electrode having a groove corresponding substantially in depth to the thickness of the thinnest pair of overlapped strips with which the appliance is to be used. Mounted on the forward end of the inner casing 6 is a carrier 28 which is transversely grooved to afford guidways for a slide 29 carrying the shaft 30 of a roller 31 which roller forms the movable welding electrode. This slide 29 is adapted to be reciprocated transversely of the appliance by a lever 32 operated through a conveniently disposed handle 33. The fastening of the carrier 28 to the front of the casing of my appliance is desirably adjustable, so that the carrier can be mounted in any one of a number of different positions, thereby adjusting the distance between the periphery of the welding roller 31 and the companion electrode 27, so as to allow both for variations in the thickness of the metal strips and for the gradual wear of the roller 31. For example, the rear face of the carrier 28 and the forward face of the adjacent casing portion may both be corrugated, so that the carrier may be adjusted as to height by loosening the fastening screws and shifting the carrier in position.

While the band is being tensioned, the roller 31 is desirably in the position of Fig. 9, with its lower edge resting on an insulating block 34 which keeps it out of contact with the lower electrode 27. As soon as the band has been properly tensioned, the handle 33 is moved towards the left, causing the roller 31 to pass over the upper of the two strips with such pressure as is determined by the said vertical adjusting of the carrier 28. When the roller has passed clear across the upper strip, it again engages another insulating block 35 which likewise maintains it out of contact with the stationary electrode 27.

In practice, I desirably apply current to the electrodes while the movable one is moved in one direction across the overlapped strips, but leave the current off while the roller 31 is being retracted, so as to

merely secure the added pressure effect of this roller during its return movement. To accomplish this, I desirably provide a switching mechanism associated with the movement of the slide 29, as shown for example in Fig. 9. In this illustration, the primary circuit 36 of the welding mechanism is controlled by a switch having a rocking switch lever 37 pivoted on the carrier 28 and held in either of two positions by a snapover spring 39 as shown in Fig. 9. At the beginning of the movement of the roller 31, the rocking lever 37 is tilted to the position of Fig. 9 by the engagement of a lug on the slide 29 with a lug at the left hand end of this rocking lever, thus causing the switch lever to close the circuit 36 and enabling the current to energize the welding circuit 40 through the transformer 41. Since the rocking switch lever 37 is maintained in either extreme position by the spring 39, this lever will then maintain the supply of welding current connected to the electrodes 27 and 31 while the roller is being moved over the overlapped wire portions to weld the latter to each other along a transverse band corresponding substantially in width to that of the edge of the roller electrode 31. Then as the slide 29 is moved further by the lever 32, so as to carry the roller electrode beyond the overlapped strips, the lug on the slide encounters the lug on the other end of the rocking lever 37, thereby tilting this switch lever to its "off" position as shown in Fig. 6 and rupturing the welding circuit. The welding electrodes are therefore dead during the return movement of the roller across the metal strips, so that this return movement simply exerts pressure on the overlapped strip portions to make the weld-joining all the more effective. However, as the slide 29 approaches the extreme end of this return travel, it again moves the rocking switch lever to its circuit-closing position of Fig. 9, so as to be ready for another welding operation.

The welding part of my appliance as thus described can be used both quickly and effectively for welding the overlapped portions to each other along a number of other transverse lines, preferably including bands at the extreme tips of the overlapped strips. To shift the position of the appliance for this purpose, it is only necessary to release the clamping cam 22, thus permitting the spring 21 to raise the main portion of my appliance and to bring the rollers 9 out of engagement with the upper strip portion, whereupon the appliance may readily be slipped backwards or forwards along the strip to new positions, the mechanism being readily swung back by the return movement of the cam 22 into proper position for welding. When the desired extent of welding has been completed, the cam 22 is loosened and the appliance can then be slipped sideways off the band and removed entirely from the package. While this would apparently leave a gap between the adjoined band portions and the adjacent side of the package, I have found that by sufficiently tensioning the band before the welding is effected, this portion of the band will be drawn down towards the package by the tendency to equalize the tension in different parts of the band, thereby making such a gap negligible in practice.

In my appliance means are provided for the sidewise insertion of the looped band into housing and for the sidewise withdrawal of said looped band after the lapping end portions of the band shall have been fastened or united together. Such sidewise insertion and withdrawal of the band is attained by the provision of a horizontal longitudinal opening in the lower part of the housing. In the embodiment shown in Figures 1, 2, 3, 4, 5, and 6, the housing 1 at one side (the left side of Figures 4 and 5) is closed, but at the opposite side the horizontal and longitudinal slot referred to is provided by relatively spacing the shoes 2, 3, and the lower edge portion of the side member 4, as clearly shown in Figures 1, 2, 4 and 5. Obviously, the end portions of a looped band may be inserted freely through said longitudinal horizontal space or opening, or the appliance may be slipped sidewise over the lapped portions of the band, the movement being laterally with respect to the housing. Again, the united or fastened end portions of the band are removable in a lateral or sidewise direction through the slot or opening in the housing.

My appliance is movable bodily with respect to the package during the operation of tensioning the band for the purpose of drawing said band into engagement tightly with the package. It is desirable to preclude the movement of the band or of the appliance in a direction laterally of the band during the tensioning operation, and, moreover, it is desirable to preclude such relative lateral movement of the lapped terminal portions of the band and the appliance at and during the fastening operation obtaining in the example shown, by the use of welding electrodes, one of which is movable in a direction crosswise of the band. Means are provided for precluding a relatively lateral movement or displacement of the lapped band ends and the appliance during the tensioning or joining, or during both tensioning or joining, and while such means may be of various forms, I have shown in Figures 4, 6, 8 and 9, the shoe 2 as being provided in its top face with a groove for receiving the lapping portions of the band. This groove occupies such relation to the horizontal longitudinal space

or slot in one side of the housing formed by the parts 1, 4, that the lapping ends of the looped band do not slip sidewise out through the longitudinal space or slot, and this is true more particularly when the tension members 9, 10, are engaged with the lapped portions of the band. Obviously, the described construction provides means for retaining the terminal portions of the loop during the tensioning operation, as well as during the joining or welding operation, and said construction thus prevents withdrawal sidewise of the loop terminals at the described stages.

Moreover, the welding portion of my appliance can not only be used for joining the overlapping portions of a single band to each other, but can also be used speedily and effectively for weld-joining the intercepting portions of metal bands encircling a package in relatively transverse directions. Thus, my appliance can be used as above described for tensioning two metal bands extending at right angles to each other about an ordinary rectangular box as shown in Fig. 14, and can then be used for welding the overlapping portions of the two bands to each other along a line or strip diagonal of both bands. To allow for this, I desirably form the stationary electrode 27 with a recess permitting the extension of transversely overlapping strips through the same, as for example after the manner of Fig. 13. Being thus able to use the same appliance without any change whatever both for tensioning and weld-joining the ends of separate bands and for securing relatively transverse bands to each other, I can readily employ my appliance also for banding objects having corners which would not be indented by the band, or for use in cases where the shrinkage of the banded objects might tend to loosen the bands and permit a sliding of the latter, which sliding will be prevented in either case by thus securing the severed bands to each other.

However, while I have heretofore described my appliance as embodied in a form in which the tensioning is effected by a continuous movement of the strip-engaging rollers, and in which substantially the entire operating mechanism is moved with respect to the feet or shoes by the releasing of the cam, I do not wish to be limited to these or other details of the construction and arrangement here disclosed, it being obvious that the same might be modified in many ways without departing from the spirit of my invention. For example, Figs. 7 and 8 show an embodiment in which the tensioning rollers 42 are not mounted on the same shaft as the worm wheel 8, but are operatively connected to the worm wheel through a mechanism which affords a step-by-step movement of the tensioning wheels 42. For this purpose, I am showing in Figs. 8 to 12 inclusive an eccentric 43 fast upon the shaft of the worm wheel 8 and hence adapted to reciprocate an eccentric rod 44 connected to an arm 45. This arm 45, together with the wheels 42 are mounted on an eccentric sleeve 46 which is loose on a shaft 47 and which sleeve may be shifted in position by means of an adjusting arm 48. Pivoted to the pin 49 which connects the arms 45 with the eccentric arm 44 is a dog 50 engaging a ratchet wheel 51 which is fastened between the two wheels 42. Thus arranged, it will be seen from Fig. 8 that rotation of the worm wheel 8 will operate through the eccentric 43 and the eccentric arm 44 to rock the arm 45 backward and forward, in doing which this arm will cause the dog 50 to move the ratchet 51 step-by-step and will therefore cause a corresponding stepwise movement of the tensioning wheels 42 which are locked against reverse movement by a spring-pressed pawl 61. In the embodiment thus shown, I have connected the eccentric sleeve 46 with a portion of the casing through a spring 53 continuously tending to turn the eccentric to a position in which it lowers the wheels 42 (and therefore tending to clamp these wheels against the upper of the wire strips) but permitting the rollers to be raised by a movement of the handle 48 against the tension of the said spring when the appliance is to be slipped into its initial position or moved from one position to another.

With either embodiment, it will be obvious that after the appliance has been placed in position for tensioning the loop, the mere pressing of the button 26 starts it in operation and the tensioning can then be effected to the desired extent without any attention on the part of the operator. During this tensioning, the strains on the overlapping wire ends will tend to move the shoe 2 and the rollers 9 in opposite directions, hence they will tend to slide the appliance backwards in equalizing the strains. With the shoes convexed to permit easy sliding and with the appliance untouched by the operator and only connected to the source of power through a flexible shaft, my appliance is free to adjust itself in position. Consequently, I can equalize the tensioning of the band in opposite directions towards the appliance, which would not be possible with a hand-operated machine or indeed with any manually guided machine, since the operator would more or less consciously exert pressure in one direction or another.

Moreover, by adjusting the bushing 19 against which the tension-controlling spring presses, I can quickly and easily predetermine the extent of the tensioning strain on the wire loops, according to the size and character of the object which is being banded, and according to the stiffness of the wire.

To enable even an inexperienced operator to control the tension properly, I desirably provide an indicator for showing the relative adjustment of the tension-controlling spring. Thus, I may mount a graduated gage 55 on the rear of the casing, which gage can be read opposite the hexagonal part of the bushing 20, so that the operator only needs to be instructed as to the proper gage reading for any given size and type of object.

I claim as my invention:

1. In a wire banding appliance, tensioning mechanism, power means for actuating the tensioning mechanism, an electric circuit controlling the power means, and means responsive to a predetermined tensioning of the wire by the tensioning mechanism for controlling the said electric circuit.

2. In a wire banding appliance, mechanism for tensioning the band, electric motor driven means for actuating the said mechanism, a circuit supplying the motor; and means responsive to a predetermined tensioning of the band, for breaking the circuit.

3. In a wire-tensioning appliance, wire-tensioning mechanism, power means for actuating the mechanism, an electric circuit controlling the power means, a switch controlling the electric circuit; and means, responsive to the resistance which the wire offers to the tensioning, for operating the switch.

4. In an appliance for tensioning a flat wire loop having portions thereof overlapped, a support including a gripper element engaging one of the overlapping wire portions, a tensioning element engaging the other overlapping wire portion opposite the gripper element, mechanism for causing the tensioning element to move the last named wire portion with respect to the gripper element and the first named wire portion, a carrier for the tensioning element and the said mechanism, and means for moving the carrier with respect to a support to release the tensioning element from its engagement with the second named wire portion.

5. In a mechanism for tensioning a wire band, a wheel engaging the band to move the same in the desired direction, an electric motor connected for rotating the wheel, a switch controlling the operation of the motor, and means responsive to the effective torque of the wheel for actuating the switch to open the motor circuit.

6. In a mechanism for tensioning a wire band, mechanism for imparting relative slidable movement to the ends of the band while overlapped longitudinally with their tips extending in opposite directions, driving means for the said mechanism, and means responsive to a predetermined tensioning of the wire band for halting the driving means.

7. In a package-banding machine, wire-tensioning means, driving mechanism for the same including a worm-wheel and a worm driving the latter, and means actuated by the back-thrust on the worm for halting the driving mechanism.

8. In a wire tensioning appliance, wire tensioning mechanism including a worm wheel and a worm driving the latter; power-driven means for rotating the worm, a mounting for the worm arranged for permitting a sliding of the latter in the direction of its back thrust without disturbing the connection between the worm and the worm wheel, yielding means for resisting the sliding of the worm in the said direction, and means actuated by such sliding of the worm for halting the said driving means.

9. Wire-pulling means including a worm-wheel, a worm driving the latter, a shaft fast upon the worm, a bearing for the said shaft arranged for permitting a longitudinal sliding of the shaft therein, a sleeve non-rotatably carried by the shaft, yielding means normally preventing the sleeve and the shaft from sliding in one direction; means for rotating the shaft; and means operated by a sliding of the sleeve in the said direction, for halting the shaft-rotating means.

10. In an appliance for wire-banding a package or the like, a support adapted to rest upon the package, a carrier movably mounted on the support, a tensioning wheel and a driving mechanism for the same both mounted on the carrier, and means for adjusting the position of the carrier with respect to the support.

11. In a mechanism for tensioning a wire band about a package, mechanism arranged for moving an end of the wire band in one direction while maintaining the other end rigid with respect to the mechanism, a support for the mechanism slidably resting on the package, and flexible driving means connecting the said mechanism with a source of power, the flexibility of the driving means permitting the said support to move with respect to the package in response to the strains on the wire band.

12. In a mechanism for tensioning a wire band about a package, wire-tensioning mechanism, a carrier for the said mechanism, and relatively spaced shoes supporting the carrier and resting upon a surface of the package, the said shoes presenting convexed faces towards the package to permit of their sliding over irregularities in the surface of the latter.

13. In an appliance of the class designated, means for tensioning overlapping portions of a wire band, means for welding overlapped band portions to each other along a transverse line while the band is held under tension, and means for releasing the tensioning means from the band without

shifting the latter in position with respect to the wire band, the appliance being then slidable to other positions for permitting the transverse interwelding of the overlapped band portions along other lines.

14. In an appliance for wire-banding a package or the like, wire-tensioning mechanism, a source of power connected thereto, a manually operable push switch mounted jointly with the said mechanism and controlling the supply of power; and means responsive to a predetermined tensioning of the wire band for operating the same push switch.

15. In an appliance for wire-banding a package or the like, a support adapted to rest upon the package, a carrier movably mounted on the support, a tensioning wheel and a driving mechanism for the same both mounted on the carrier, spring means continuously tending to move the carrier in one direction with respect to the support, and means for moving the carrier in the opposite direction.

16. In an appliance for banding an object with a loop of wire having its proposed terminal portions in longitudinal overlapping relation adjacent to the package, a support having a gripper part disposed between the package and the nearer of the overlapping wire portions; a mechanism carrier pivoted upon the support; tensioning mechanism mounted on the carrier and including a wire-pulling member arranged for engaging the other overlapping wire portion; and means for moving the carrier with respect to the support to bring the wire-pulling member into and out of its said engaging relation to one of the overlapping wire portions.

17. In an appliance for tensioning a wire band about a package or the like, transmission means including a rotating driving element, a driven element geared to the driving element, a mounting for said elements permitting rotation of the driving element without the corresponding rotation of the driven element, power means connected to the driving element; and means responsive to a predetermined extent of the said action of the mounting, for halting the power means.

18. In an appliance for banding an object with a loop of wire having its proposed terminals longitudinally overlapped adjacent to the package, wire-gripping means disposed between the package and the overlapping wire portions and engaging only one of the latter, wire-pulling means engaging the other of the overlapping wire portions and arranged for sliding the latter with respect to the said wire-gripping means; a portable mounting for all of the aforesaid mechanism, and driving means flexibly connected to the wire-pulling means; the said mounting being slidable with respect to the package, the slidability of the mounting cooperating with the flexibility of the connection to permit the said mounting to move with respect to the package during the tensioning of the wire in response to strains on the wire loop.

19. In an appliance of the character described, the combination with a support having a lateral entrance slot for the work, means carried by the support for frictionally and movably engaging the work, driving means operatively connected to the said means, control means also carried by the support for automatically halting the driving means when a predetermined effect has been attained, and means for thereafter releasing the first named means from the work to permit the latter to be withdrawn through the said slot.

20. In a wire-banding appliance, tensioning mechanism, power means for actuating the mechanism, adjustable means responsive to a predetermined tensioning of the wire band for halting the power means, and means for indicating the adjustment of the said adjustable means.

21. In a wire-tensioning appliance, wire-tensioning mechanism, power means for actuating the same, an electric circuit controlling the same, a switch controlling the same, means responsive to the tensioning for actuating the switch, and means for indicating the tension at which the said responsive means actuates the switch.

22. Mechanism as per claim 9, in combination with means for adjusting the yielding means, means for indicating the extent of the said adjusting.

23. In a package-banding machine, wire-tensioning means, driving mechanism for the same including a worm-wheel and a worm driving the latter, control means responsive to the back-thrust on the worm for halting the driving mechanism, and means for adjusting the control means to vary the back-thrust required for actuating the latter.

24. In a portable machine for banding a package, means for holding the terminal portions of a looped band in relatively lapping position, means for tensioning a looped band, means for securing said lapped ends to each other, a carrier for said means, said carrier having means for the insertion laterally of the disconnected ends of a loop and for the lateral withdrawal of the secured ends of the same looped band, and means to retain said lapped ends against relative displacement to the carrier at the period of operation of said means.

25. A portable package banding mechanism embodying a supporting member provided with a smooth bottom to adapt said package banding mechanism as an entirety to slide relatively to a package upon which said supporting member is adapted to rest.

means carried by said supporting member for placing tension on a looped band the end portions of which are positioned in side by side relation during the operation of said tensioning means, and means carried by the supporting member for electrically welding said end portions of the band while the latter is under tension.

26. A portable package banding mechanism embodying a supporting member provided with a smooth bottom to adapt said package banding mechanism as an entirety to slide relatively to a package upon which said supporting member is adapted to rest, band-tensioning means carried by said supporting member, electrical band-welding means also carried by said supporting member, and controlling means for said electrical band-welding means.

27. A portable package banding mechanism embodying a two part supporting member the parts of which are relatively movable and one part of which is adapted to rest upon a package to be banded, a plurality of co-operable tensioning members carried respectively by said relatively movable parts of the two part supporting member, and a plurality of welding electrodes carried respectively by the relatively movable parts of said supporting member.

28. A portable package banding mechanism embodying a two part supporting member the parts of which are connected for relative movement, a tension member carried by one part of said supporting member, a second tension member carried by an other part of the supporting member and in co-operative relation to the first named tension member, a welding electrode carried by one part of said two part supporting member, and a second welding electrode carried by the other part of said two part supporting member and in co-operative relation to the first named welding electrode.

29. In an appliance for wire banding a package or the like, a support adapted to rest upon the package and including a shoe adapted to be interposed between the package and the two end portions of a wire band when the said end portions are overlapped longitudinally of each other with their tips extending in opposite directions, wire tensioning means carried by the support for tightening the band about the package, and securing means carried by the support at a predetermined distance from the tensioning means and operable for securing the overlapped band portions directly to each other subsequent to the tensioning whereby the said securing may be effected at a predetermined point on the wire loop and without moving the appliance with respect to the package.

30. A package banding appliance comprising in a unitary and portable mounting adapted to rest upon the package, means for tensioning overlapping portions of a wire band encircling the package, and means for welding overlapped band portions to each other along a line transverse of the wire band while the latter is held under tension.

31. In a machine for banding packages, wire-tensioning means including a friction wheel engaging the wire, a mounting for the friction wheel arranged for permitting the same to be moved into and out of engagement with the wire, and manually operable means associated with the mounting for holding the wheel in frictional engagement with the wire.

32. A package banding machine, comprising in a unitary and portable appliance means for holding wire in a loop encircling the package and with one end portion longitudinally and contiguously overlapping an adjacent loop portion, tensioning means for tightening the loop about the object, securing means for securing overlapped wire portions directly to each other while the tightened loop is held under tension, means for automatically discontinuing the tensioning when the desired tightness is reached, and a support including common means for spacing the said tensioning and securing means from the package.

33. A banding machine comprising a support adapted to rest upon a package, a step-by-step tensioning mechanism carried by the support for tightening a wire loop about the package and holding the same under tension, a wire-joining mechanism carried by the support and spaced from the tensioning mechanism longitudinally of the wire of the loop and arranged for directly uniting terminal wire loop portions to each other, said wire-joining mechanism having an element with respect to which one terminal loop portion is stationary during the tensioning of the loop while the other terminal loop portion is movable past the said element during the tensioning.

34. In a package banding appliance, a portable support, step-by-step tensioning mechanism carried by the support and including a rotatable member engaging a portion of a wire loop encircling the package for tightening the loop about the package, and wire-joining mechanism carried by the said support and arranged for directly uniting overlapped wire loop portions at a predetermined spacing from the step-by-step mechanism and while the latter is holding the loop under tension.

35. In a portable machine for bundling a package with wire, means for tensioning a wire loop about the package, means for thereafter securing overlapping portions of the wire loop directly to each other, and a common carrier for both of the aforesaid means, the said carrier being adapted to rest upon

the package during the operation of the machine and having a lateral and substantially horizontal opening for the sidewise insertion of the wire loop and the corresponding withdrawal of the united wire loop portions in combination with means for preventing such sidewise withdrawal of the wire during the tensioning of the loop.

36. A portable machine for banding a package with wire, comprising in a unitary and portable machine means for tensioning a wire loop around the package, means for thereafter securing overlapping portions of the wire loop directly to each other; and a common carrier for both of the aforesaid means, the said carrier being adapted to rest upon the package during the operation of the machine and having a lateral and substantially horizontal slot for the sidewise insertion of the wire loop and the corresponding withdrawal of the united wire loop portions, in combination with means for preventing such sidewise withdrawal of the wire during the said securing of loop portions to each other.

37. In an appliance for banding a package with a loop of wire, tensioning mechanism for tightening the loop about the package, means for securing overlapped wire portions of the tensioned loop directly to each other, a common carrier adapted to rest directly on the package and carrying both the said mechanism and the said means and having an opening permitting the lateral insertion and withdrawal of portions of the loop, and means mounted on the carrier and co-operating with the tensioning mechanism for preventing such withdrawal during the operation of the tensioning mechanism.

38. In an appliance for banding a package with wire, means for holding the wire in the form of a loop encircling the package, tensioning mechanism for tightening the loop about the package, wire-joining mechanism for directly uniting overlapped wire portions while the loop is under tension, and means engageable with a band for precluding lateral displacement of the band relatively to the appliance during the tensioning operation of the wire joining operation.

39. A portable machine for banding a package with wire, comprising in a unitary and portable machine means for tensioning a wire loop around a package, power means for actuating the same, controlling means for said power means, and means responsive to a predetermined tensioning of the wire by such tensioning means for controlling said power controlling means.

40. In a portable machine for banding a package with wire, a unitary and portable means for tensioning a wire loop around a package, means for thereafter securing overlapping portions of the wire loop directly together, a carrier for both of said means, said carrier having means for permitting insertion of the loop and corresponding withdrawal of the united loop portions, said carrier being provided with means to prevent sidewise withdrawal of the wire during the securing of the loop portions.

41. In a portable machine for banding a package with wire, means for holding overlapping ends of the wire in fixed position, tensioning means, means for securing the overlapping ends to each other, a carrier for said means, and means cooperating therewith to permit insertion of the wire loop and the united loop portions, and means for preventing withdrawal other than sidewise, of the wire during the securing of the loop portions together.

42. In a portable machine for banding a package, a carrier provided with a smooth face whereby said carrier is adapted to slide over a package, means for retaining the ends of a looped band in lapping relation, tension means supported on the carrier and operable for effecting a relative movement between the band and the carrier, whereby said carrier automatically adjusts itself to position during the tensioning of the band and thus distributes the tensioning effect equally in opposite directions from the carrier, means for joining the lapped ends, and means for retaining said lapped ends against lateral displacement relatively to said carrier.

43. In a machine for banding a package, a carrier, means for retaining the ends of a looped band in relatively lapping position, tension means including a rotatable member and a driving member slidable relatively to the rotatable member, and means for fastening the lapped ends to each other.

44. In a machine for banding a package, a carrier, means for retaining the ends of a looped band in relatively lapping position, a rotatable tension member, a driving member slidable relatively to said rotatable member, a worm and worm gear intermediate said rotatable member and the slidable member, and means for fastening the lapping ends of said looped band.

45. In a machine for banding a package, a carrier, tension means for a looped band, welding means movable relatively to said band, and means for automatically arresting the flow of current to said welding means upon the completion of the welding operation.

46. In a machine for banding a package, means for tensioning a looped band, means for retaining the end portions of said looped band in lapping relation, welding means including a member movable crosswise of said lapped ends, means for feeding current to said welding member when moved in one direction, and means for cutting off the flow

of current to said member when moved in a reverse direction.

47. In a machine for banding a package, means for tensioning a looped band, means for retaining the end portions of said looped band in lapping relation, welding means including a member movable to and fro in a direction crosswise of said lapped ends, means for establishing and cutting off the flow of current to said welding member, and means for applying pressure to said welding member.

Signed at Chicago, December 27th, 1918.

JOHN SHERMAN McCHESNEY.