

Nov. 2, 1948.

T. W. KERR

2,452,856

MATERIAL HANDLING DEVICE

Filed June 8, 1945

2 Sheets-Sheet 1

Fig. 1.

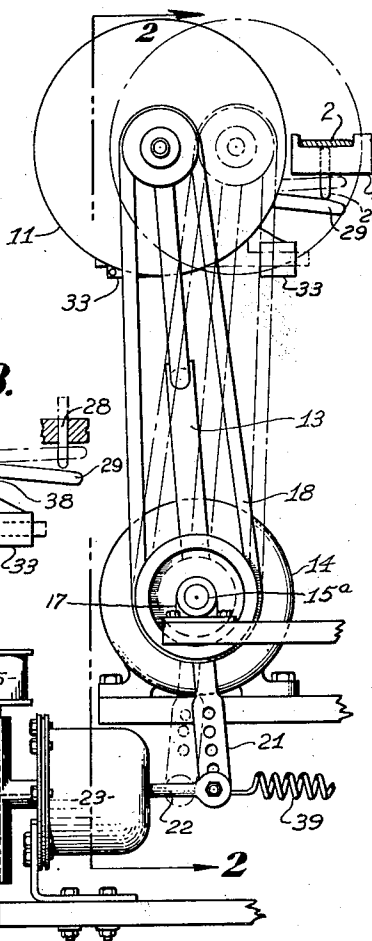


Fig. 3.

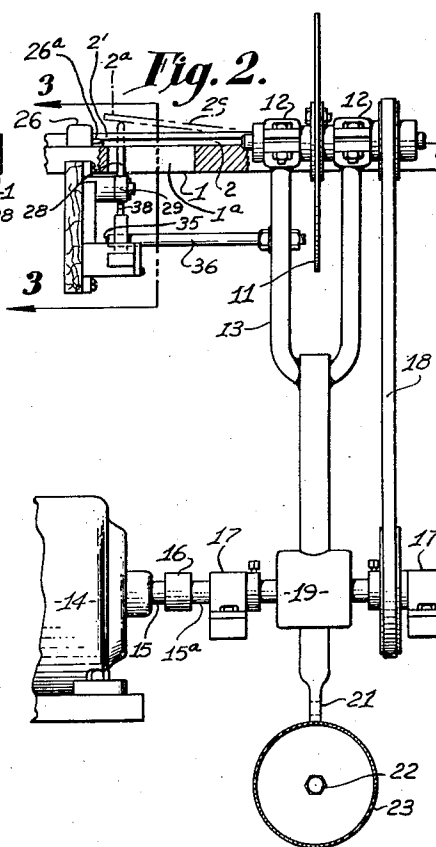
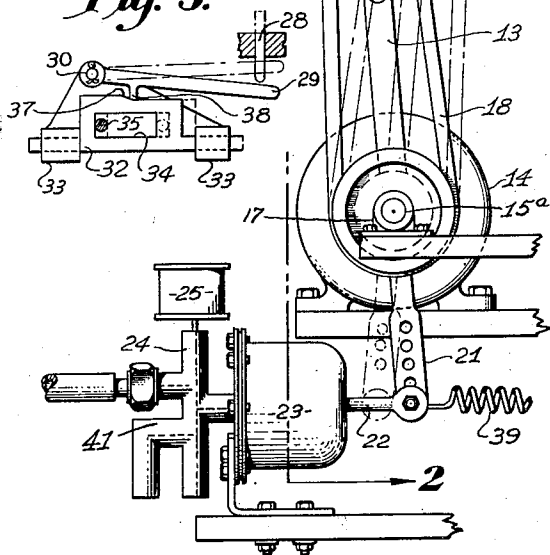


Fig. 2.

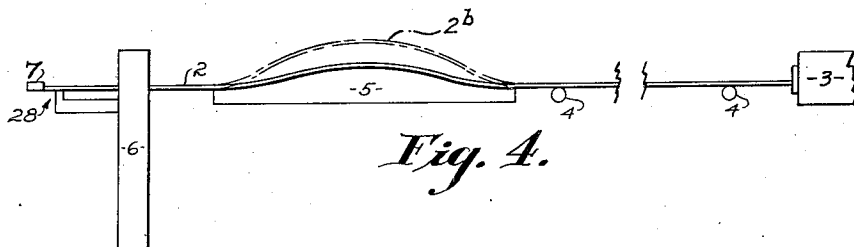


Fig. 4.

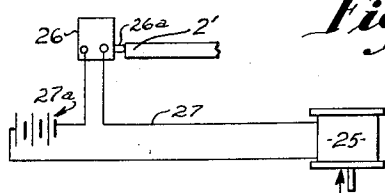


Fig. 5.

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2 Sheets-Sheet 2

Fig. 6.

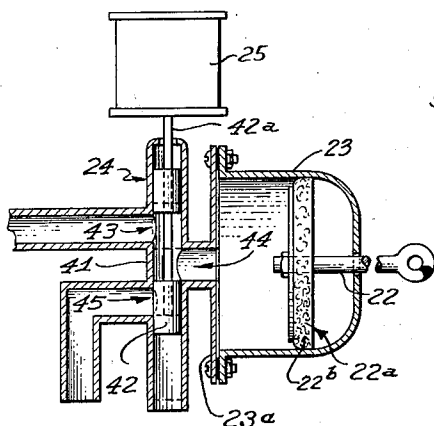


Fig. 8.

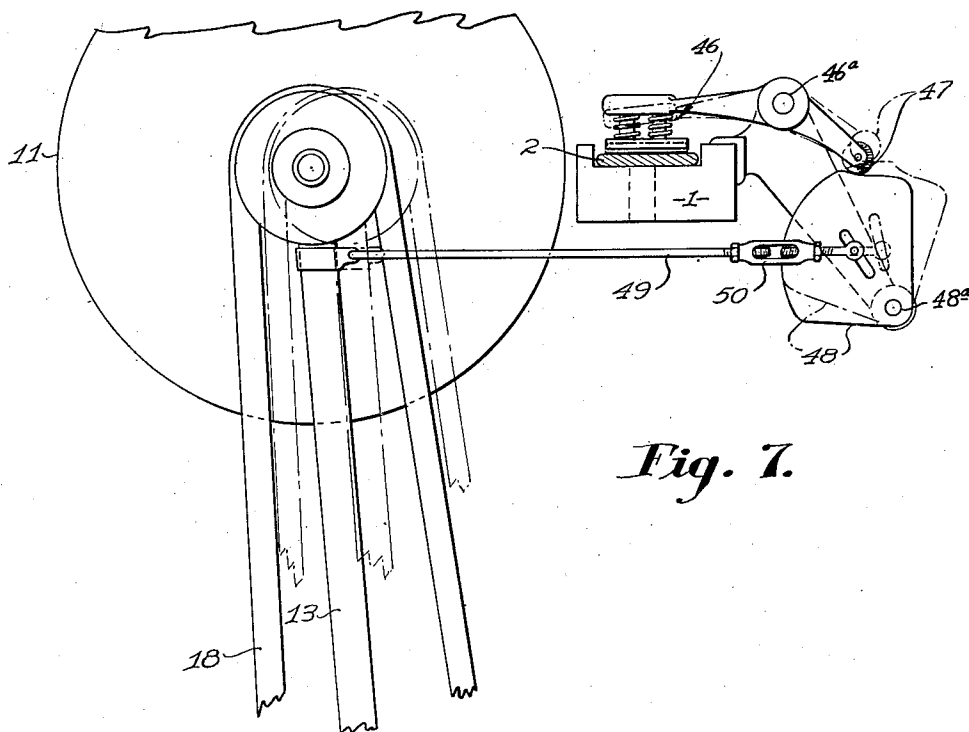
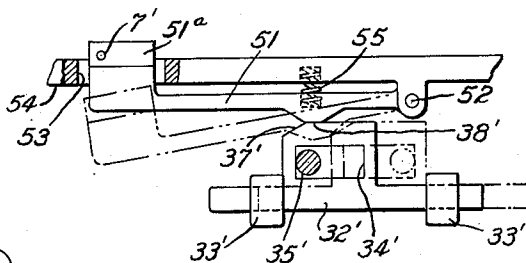


Fig. 7.

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2,452,856

MATERIAL HANDLING DEVICE

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Application June 8, 1945, Serial No. 598,229

11 Claims. (Cl. 164—76)

1

This invention relates to material handling devices and pertains particularly to a device adapted to sever successive equal length pieces from a longitudinally movable strip of material where the production of a plurality of separate pieces of material of substantially equal length is desired.

One of the particular objects of the invention is to provide a construction which will function to sever equal length pieces from a strip of material which is fed longitudinally into the apparatus, in which a severing means is automatically actuated by the strip of material itself in the successive repetition of the severing operation.

A further object of the invention is to provide a device of character described in which the strip of longitudinally moving material is brought into engagement with a stop member to establish a given length of material to be severed from the end of said strip, and which is adapted to automatically sever the given lengths of material from the end of the strip, eject the severed end, and return the severing means into position to repeat the severing operation.

A further object of the invention is to provide a severing means adapted to produce a plurality of equal length pieces of material from an elongated strip of such material, which is capable of accurate repetition of the severing action in the production of such plurality of pieces, in a substantially automatic operation.

A further object of the invention is to provide a device of the character described, which is adapted to operate upon a continuously moving strip of material, in which the severing means is adapted to cause interruption of the travel of such material at the position at which severing takes place under conditions such that the continuously moving strip is caused to build up or store a moving force such as to cause the strip of material at the position of severing to move quickly past the severing means into a new position immediately upon removal of the severing means from engagement with the strip and to thereby cause ejection of the severed portion.

The device of the present invention may comprise, essentially, a supporting member adapted to receive and guide a strip of material adapted for longitudinal movement, together with stop means positioned to engage a free end of said strip and thereby locate the free end to establish a given length of material to be severed. A severing mechanism is provided in position to move transversely through the strip of material at the

2

point at which severing is desired, together with stop-disengaging means to cause disengagement of the free end of said strip from the stop means as the severing means is again moved out of engagement with the strip upon the completion of a severing operation. The preferred embodiment of the invention relies upon the stop means to initiate and conclude the operation of the severing means, and a suitable control mechanism is provided to cause operation of the stop-disengaging means in timed relation to the movement of the severing means whereby the severed end is disengaged from the device and pushed out of the severing zone of the mechanism by the longitudinal movement of the strip of material upon which further severing operations are to be conducted.

Other objects and features of the invention will be brought out in the ensuing description of certain embodiments thereof, or will be apparent from such description. The accompanying drawings illustrate two embodiments of the invention and referring thereto:

Fig. 1 is a partly sectional elevational view of the device showing a severing means in position to engage a strip of material;

Fig. 2 is a partly broken away elevational view as taken on line 2—2 in Fig. 1;

Fig. 3 is a sectional detail thereof as taken on line 3—3 in Fig. 2;

Fig. 4 is a diagrammatic representation of the severing mechanism as applied to a strip of continuously moving material;

Fig. 5 is a diagrammatic representation of an electrical circuit which may be used with the device;

Fig. 6 is a sectional view of a form of valve mechanism which may be employed for a pneumatic operating means which will cause the operation of the severing means;

Fig. 7 is a fragmentary view corresponding to the upper portion of Fig. 1 showing a modified form of the invention,

Fig. 8 is a view corresponding generally to Fig. 3, illustrating a modification in the operating means for the device.

Referring to Figs. 1 to 6 of the drawings, the device may comprise an elongated material support 1 adapted to carry an elongated strip of material 2 on which the severing operation is to be performed. This strip of material may be of such character as to be subject to formation by an extrusion device, as shown diagrammatically in Fig. 3, where the continuous production of separate equal length pieces of material from a con-

3

tinuously moving strip of such material is desired. Alternatively, the strip 2 may be an individual strip which is manually fed into the severing device for the production of such equal length strips. For the production of separate pieces from a continuously moving strip of material I may provide an arrangement of apparatus as shown in Fig. 4 in which the continuously moving strip of material 2 is supported on suitable rollers or the like 4 and is conducted over an arcuate support portion 5 which will cause the material to assume a curved path throughout a portion of its length before reaching the position of the severing means 6. The length and arcuate formation of the portion 5 will be governed by the characteristics of the material of which the strip 2 is formed. Beyond the severing means 6 I provide a stop member generally indicated at 7 to interrupt the longitudinal movement of the strip 2 when a given length of material has been located beyond the severing means.

In Figs. 1-3 I have shown a form of severing means which may be employed according to this invention, comprising a circular saw or cutting disc 11 mounted on suitable bearings 12 and carried by a supporting yoke 13. The supporting yoke 13 is suitably mounted so as to produce a translatory motion of the saw or disc 11 with respect to the material support member 1 and the elongated strip of material 2 carried thereby, such as a pivotal mounting at a position removed from the axis of rotation of the disc 11, and this pivotal mounting may be provided through a driving motor 14 having a shaft 15 coupled through couplings 16 to a shaft member 15a carried in bearings 17. A drive belt 18 is utilized to connect the shaft 15a to the shaft of the disc 11 and the yoke 13 is journaled for free rotation on the shaft 15a through a journal assembly 19.

The yoke 13 is carried to a position below the pivotal mounting on the shaft 15a to form an actuating arm 21 to which a piston rod 22 may be pivotally connected. A piston 22a is mounted on the piston rod 22 and is provided with a piston leather 22b. The piston 22a is slidably mounted within a cylinder 23 provided with a cylinder head 23a connected to a control valve assembly 24 under control of a solenoid 25. The stop member 7 may comprise a "microswitch" 26 provided with an operating button 26a adapted to be engaged by the free end 2' of the elongated strip of material to be operated upon. The switch 26 is adapted to close the electrical circuit 27 through a battery 27a to the solenoid 25, causing the solenoid to be energized when the strip of material 2 contacts the operating button 26a.

Means are provided for dislocating the free end of a severed piece of material with respect to the stop member 7, to permit a repetition of the severing operation and as an example, such means may comprise an ejector member 28 slidably mounted with respect to the support 1 and preferably positioned in a suitable slot 1a therein for adjustment toward and away from the severing means as the stop member 26 is adjusted toward and away from such severing means to establish different lengths of cut off material. The ejector member 28 is adapted for vertical movement under the influence of a lift lever 29 pivotally mounted on a support bracket as at 30 and movable through the agency of a slide 32 mounted in suitable bearings 33 and provided with a slot 34 adapted to be engaged by an actuator arm portion 35 on the outer end of an actuating arm 36 secured to the yoke 13. A cam shoulder 37 is

4

provided on the slide 32 in position to engage a cam follower 38 on the lift lever 29. The length of the slot 34 will be so selected with respect to the amount of movement required to carry the severing means from the full line to the dot-dash line position indicated in Fig. 1, in such manner that the actuator arm end portion 35 will engage the end of the slot 34 in the slide 32 as the movement of the severing means toward the dot-dash position is substantially completed, after which the slide 32 will be moved to the right (Fig. 3) and the lift lever 29 rotated counter-clockwise to lift the ejector member 28. Upon upward movement of the ejector member 28 by the lift lever 29 as above described, the free end 2' of the then severed portion of the elongated strip 2 will be raised to the dot-dash position shown at 2a in Fig. 2. When the end 2' is disengaged from the button 26a the circuit to the solenoid 25 will be opened, which causes a return of the severing means or cutting disc 11 to the full line position of Fig. 1. As the cutting disc is being returned to the full-line position the actuator arm 36 will travel freely in the slot 34 until the end 35 reaches the left-hand end of the slot 34 at which time the slide will be moved a short distance to the left (to the full line position of Fig. 3) allowing the follower 38 to fall off the cam 37. This will be so timed as to cause the ejector member 28 to remain in an upper position holding the end 2' away from the stop member 26 until the cutting disc 11 is moved clear of the strip 2. When the cutting disc is clear of the strip 2 the main portion of the strip 2 will be released, and its forward movement past the position of the severing means then engage and move the severed end piece to the left in Fig. 2, over the top of the stop member 26 into a suitable collecting hopper, for example, the newly formed end of the strip 2 being guided along the support 1 until contact is made at 26a and the operation is repeated.

During the time that the cutting disc 11 is making its severing cut on the material 2, the continuous feeding of the strip 2 as shown in Fig. 4, or further movement applied manually, will result in the section 2b thereof which is located over the arcuate support section 5 to be deformed away from the support 5 into some such position as shown in dot-dash lines at 2b. This is a result of the stoppage of the longitudinal movement of the strip 2 by the severing means 11, and as the cutting disc 11 is withdrawn from a severing engagement, the portion 2b will tend to straighten out into contact with the support 5, pushing the severed end 2c over the stop member 26 as above described.

It will be appreciated that a continuous movement of the strip 2 as shown in Fig. 4 will not be essential to the operation of the device inasmuch as individual pieces of material may be hand fed into the severing mechanism, coming to rest against the stop 26 and providing for the full operation of the device under the manual pressure of the operator which tends to feed the strip 2 to the left in Fig. 4 at all times. The manual dexterity of the operator may be of a very low order inasmuch as the severing operation will not be reinitiated until the strip has again come in contact with the stop member 26, which definitely fixes the longitudinal dimension of the strip to be severed, and as soon as the disc 11 starts into the strip 2 in a repetition of the severing device the free end of the strip is definitely located and spaced by the severing means and pressure against the stop button 26a is main-

tained. This will insure the completion of the severing operation resulting from the movement of the disc 11 transversely of the strip of material until the stop-disengaging means has been operated to disengage the free end of the strip from the stop means. As the cutting disc is moved toward the full line position of Fig. 1 it is necessary for the operator to maintain a longitudinal pressure upon the strip 2 so that as soon as the cutting disc is removed from engagement with the strip the portion of the strip under the manual control of the operator will push the severed end 2c out of position, allowing a new portion of the strip 2 to come into place.

It will be appreciated that the disengagement of the free end of a severed piece of material 2c from the stop member 7 is a relative proposition, i. e., the strip of material may be bodily moved out of engagement with the stop member, as specifically described above, or the stop member 7 may with full equivalence be moved out of engagement with the severed strip. Such a modification is illustrated in Fig. 8, and may comprise a slide 32', corresponding in function to the slide 32, mounted in suitable bearings 33' and provided with a slot 34' adapted to be engaged by an actuator arm 35' operatively linked to the yoke 13. A cam shoulder 37' is provided on the slide 32' in position to engage a cam follower portion 38' on a lift-lever 51 pivotally mounted as at 52 on a fixed portion of the supporting structure and carrying a stop member 7' (such stop member comprising an operating button corresponding to that shown at 26a, on a "micro-switch" or the like). The end portion 51a of the lift lever 51 which carries the stop member 7' is extended through an opening 53 in the support member or table 54 upon which the strip to be severed is carried (corresponding to the member 1), and a spring bias member 55 is preferably provided to cause the lever 51 to move to the dot-dash position upon lateral movement of the slide 32' to the dot-dash position, which retracts the stop member 7' from the opening 53, out of engagement with the strip (not shown).

The showing in Fig. 8 is adaptable to installation at the far side of the position of severing, after the manner of the clamping arrangement shown in Fig. 7, in which case the actuator arm 35' will be carried to such far side, as was illustrated in connection with the actuating extension 49-50 for the cam 48. If the structure is more preferably to be located at the near side of the positioning of severing, the lift lever 29 may be provided with a vertical extension at its outer end, which may carry a stop member as shown at 7' in Fig. 8, as will be apparent to a skilled mechanic.

The valve mechanism 24 under control of the solenoid 25 may comprise a valve housing 41 provided with a slidably disposed piston valve 42 having a valve stem 42a connected to the solenoid 25. A port 43 is provided connecting to a suitable reduced pressure source, which communicates with the cylinder port 44 in the upper position of the valve 42 (the position obtaining when the solenoid 25 is energized), placing the interior of cylinder 23 in communication with the source of reduced pressure. This causes the piston 22a to move to the left in Fig. 6 under influence of atmospheric pressure on the right-hand side of piston 22a, which in turn causes the cutting disc 11 to move to the right in Fig. 1. Upon release of the current which holds the solenoid 25 in upper position, the valve 42 will drop, sealing off the port 43

and opening the cylinder port 44 into communication with the atmosphere through port 45. This allows atmospheric air to enter the cylinder 23 and the cutting disc assembly is moved to the left in Fig. 1 under the influence of a spring return member 39.

In Fig. 7 I have illustrated the construction as provided with an auxiliary clamping mechanism adapted to engage the elongated material strip 2 and rigidly hold it clamped against the support member 1 to prevent longitudinal movement of the material during the operation of the severing means. Referring specifically to Fig. 7, this clamp construction may comprise a spring-faced clamp member 46 pivotally mounted to the support structure as at 46a and located at the near side of the position of the cutting disc 11 at which the severing is to take place, i. e., away from the free end 2c referred to above. The clamp member may be provided with an actuating roller 47 at the opposite side of the pivotal mounting 46a which is adapted to be operated by an actuating cam 48 pivotally mounted on the frame member as at 48a and rotatable in consonance with the movement of the yoke 13 through an actuating rod 49 secured at one end to the yoke 13. A turn-buckle or the like may be provided as at 50 to adjust the length of the actuating rod 49 so that the clamping device is adaptable to engagement with material strips 2 of different vertical thicknesses.

It will be appreciated that various modifications in the device of this invention may be made by one skilled in the art without departing from the spirit of this invention. For example, while I have shown a pneumatic type of actuating means to cause the motion of the cutting-disc to sever the material, any other type of motive power may be supplied to the invention according to the requirements of any particular installation. Similarly, while I have shown the severing means as comprising a rotatable cutting disc 11, the equivalence of a blade type of severing means will occur to those skilled in the art. For the above and other obvious reasons I do not choose to be limited to the specific details of the forms of invention herein shown and described, but rather to the scope of the subjoined claims.

I claim:

1. A material handling device adapted to sever equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip from between one position entirely out of engagement with said strip into severing engagement with said strip and thence into a second position severing said strip; actuating means for effecting said transverse movement of said severing means between said positions in both directions; stop-disengaging means adapted to effect relative movement between said stop means and such free end to effect disengagement therebetween; and control means associated with said severing means for actuating said stop-disengaging means in timed relation to the movement of said severing means.

2. A device as set forth in claim 1, said support member including an arcuate supporting portion

adapted to cause said strip to assume a curved path throughout a portion of its length, and said severing means being disposed between the position of said free end and the position of said curved path portion of said strip.

3. A material handling device adapted to sever successive equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip of material from between one position entirely out of engagement with said strip into severing engagement with said strip and thence into another position severing said strip; actuating means for effecting said transverse movement of said severing means between said positions in both directions; ejector means positioned adjacent said stop means and adapted to engage said strip adjacent said free end thereof and move said free end out of engagement with said stop means; and control means associated with said severing means for actuating said ejector means in timed relation to the movement of said severing means whereby said free end of said strip is moved out of engagement with said stop means as said severing means is moved toward said other position.

4. A material handling device as set forth in claim 2, said severing means being adapted to engage said strip and retain the same against longitudinal movement toward said free end, and said ejector means being adapted to retain said free end of said strip out of engagement with said stop means while said severing means is moved out of engagement with said strip after completion of a severing operation.

5. A material handling device adapted to sever successive equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement in a generally horizontal plane; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip of material from between one position entirely out of engagement with said strip into severing engagement with said strip and thence into another position severing said strip; actuating means for effecting said transverse movement of said severing means between said positions; ejector means positioned adjacent said stop means and adapted to engage said strip adjacent said free end thereof and move said free end upwardly out of engagement with said stop means; and control means associated with said severing means for actuating said ejector means in timed relation to the movement of said severing means whereby said free end of said strip is moved out of engagement with said stop means as said severing means is moved toward said other position from said one position.

6. A material handling device adapted to sever successive equal length pieces from a strip of material, which comprises: a support member adapted to receive and guide a strip of longitudinally movable material for longitudinal movement and

including an arcuate supporting portion adapted to cause said strip to assume a curved path throughout a portion of its length; stop means positioned to engage a free end of a strip located on said support member and interrupt the movement thereof at said free end; severing means disposed between said free end and said curved path portion of said strip, said severing means being movable transversely with respect to the length of said strip between one position entirely out of engagement with said strip to another position severing said strip, and adapted to engage said strip and retain the same against longitudinal movement when in said other position; and ejector means adapted to engage said strip at a position adjacent said stop means and to move said free end out of engagement with said stop means, and means for actuating said ejector means in a timed relation to the movement of said severing means between said two positions.

7. A material handling device adapted to sever equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip from between one position out of engagement with said strip into severing engagement with said strip and thence into another position severing said strip; ejector means located adjacent said stop means and movable into a position engaging said strip adjacent said free end thereof to move said free end transversely out of engagement by said stop means; operating means for effecting transverse movement of said severing means between said two positions in both directions; control means associated with said severing means and adapted to cause said ejector means to move said free end out of such engagement as said severing means approaches said other position and to maintain said free end out of such engagement during the completion of the movement of the severing means to said other position and until the severing means is returned toward said one position and has moved out of engagement with said strip after completing a severing operation.

8. A material handling device adapted to sever successive equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip of material from between one position entirely out of engagement with said strip into severing engagement with said strip and thence into another position severing said strip; actuating means for effecting said transverse movement of said severing means between said positions in both directions; ejector means positioned adjacent said stop means and adapted to engage said strip adjacent said free end thereof and move said free end out of engagement with said stop means; cam means associated with said severing means and with said ejector means, said cam means being movable to a first position such as to cause

said ejector means to engage said strip in response to the movement of said severing means as said severing means moves into said other position, and adapted to persist in said first position during completion of the movement of said severing means into said other position and during movement of said severing means out of said other position toward said one position, and being further movable out of said first position to a second position such as to cause said ejector means to move away from engagement with said strip in response to the movement of said severing means as said severing means moves out of engagement with said strip and moves into said one position.

9. A material handling device adapted to sever successive equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip of material from between one position entirely out of engagement with said strip into severing engagement with said strip and thence into another position severing said strip; actuating means for effecting said transverse movement of said severing means between said positions in both directions; control means associated with said stop means and adapted to cause operation of said actuating means to move said severing means from said one position towards said other position during engagement of said stop means by said free end of said strip; and to cause operation of said actuating means to move said severing means from said second position to said one position during disengagement of said stop means by said free end ejector means controlled by the movement of said severing means and positioned adjacent said stop means, said ejector means being adapted to cause disengagement of said free end from said stop means as said severing means is moved into said other position, whereby said severing means is moved from said second position toward said one position by said actuating means.

10. A construction as set forth in claim 9, said ejector means being adapted to move away from engagement with said strip in response to the

movement of said severing means as said severing means is moved out of engagement with said strip and into said one position.

11. A material handling device adapted to sever successive equal length pieces from a longitudinally movable strip of material, which comprises: a support member adapted to receive and guide a strip of material for longitudinal movement; stop means positioned to engage a free end of a strip located on said support member and interrupt the longitudinal movement thereof; severing means located in spaced relation to said stop means, said severing means being adapted for transverse movement with respect to said strip of material from between one position entirely out of engagement with said strip into severing engagement with said strip and thence into another position severing said strip; actuating means for effecting said transverse movement of said severing means between said positions in both directions; ejector means positioned adjacent said stop means and adapted to engage said strip adjacent said free end thereof and move said free end out of engagement with said stop means; clamp means positioned to engage said strip adjacent the position of engagement thereof by said severing means, said clamp means being associated with said severing means and being movable into engaging position upon movement of said severing means out of said one position in a severing operation, and movable out of engaging position upon movement of said severing means into said one position following completion of a severing operation; and control means associated with said severing means for actuating said ejector means in timed relation to the movement of said severing means whereby said free end of said strip is moved out of engagement with said stop means as said severing means is moved toward said other position.

THEODORE W. KERR.

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

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Certificate of Correction

Patent No. 2,452,856.

November 2, 1948.

THEODORE W. KERR

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 2, line 25, for the word "devise" read *device*; column 7, line 35, claim 4, for the claim reference numeral "2" read 3; column 9, line 40, claim 9, for "sereving" read *severing*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of March, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.