May 23, 1944. J. H. BRAMBLE 2,349,608

STRAP-STRETCHING DEVICE

Filed May 20, 1943 2 Sheets-Sheet 1

Fig. 1.

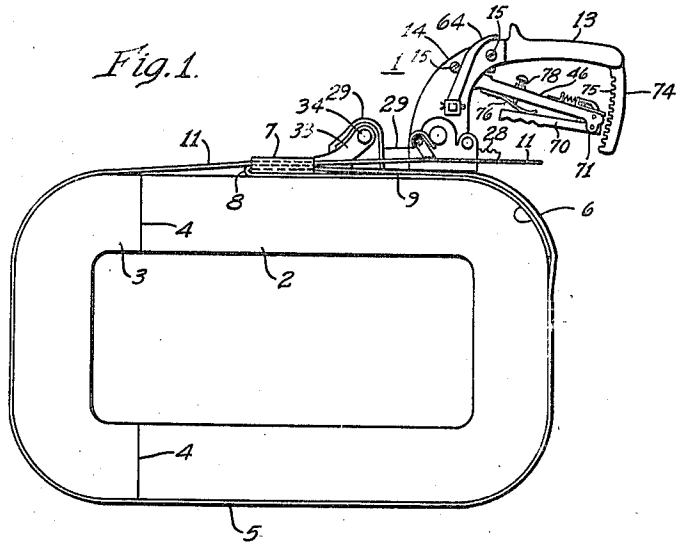
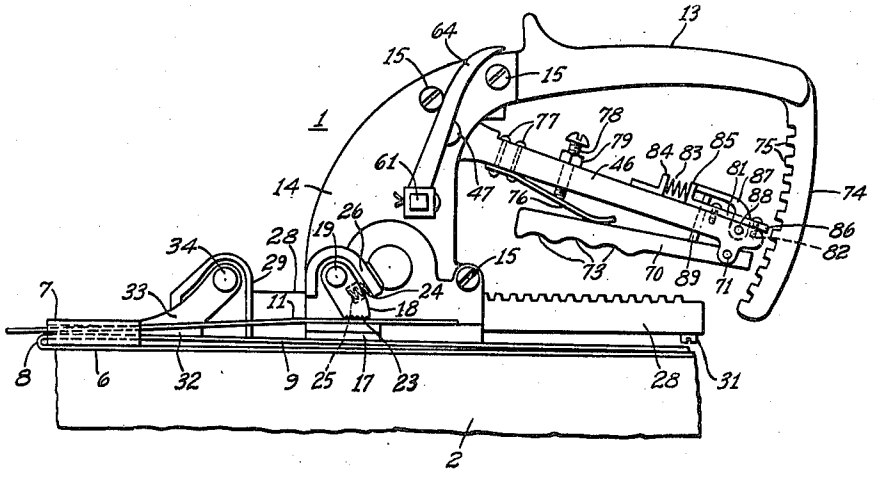



Fig. 2.




WITNESSES:

C. J. Welles.

Jean C. Groome

INVENTOR

John H. Bramble.

BY

Franklin E. Hardy

ATTORNEY

May 23, 1944. J. H. BRAMBLE 2,349,608

STRAP-STRETCHING DEVICE

Filed May 20, 1943 2 Sheets-Sheet 2

Fig. 3.

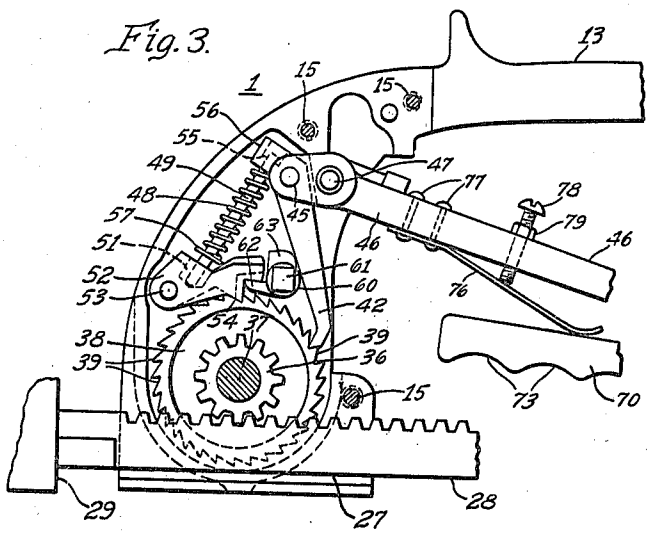
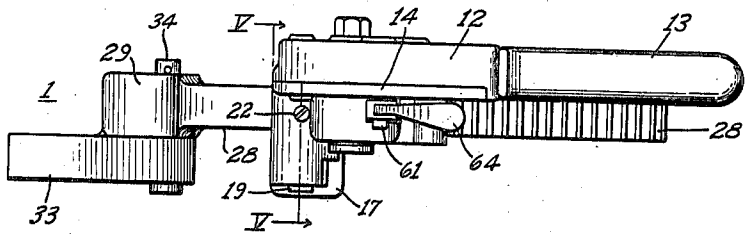



Fig. 4.



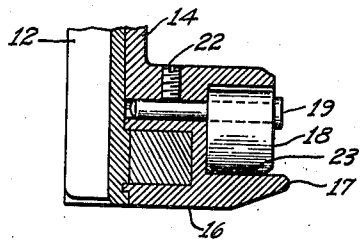




Fig. 5.

WITNESSES:

C. J. Welles.

Rue C. Groome

INVENTOR

John H. Bramble.

BY

Franklin E. Hardy

ATTORNEY

Patented May 23, 1944 2,349,608

# UNITED STATES PATENT OFFICE

2,349,608

## STRAP-STRETCHING DEVICE

John H. Bramble, Sharpsville, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application May 20, 1943, Serial No. 487,797

8 Claims. (Cl. 254—79)

My invention relates to devices for stretching or tightening straps or bands of metal about a substantially solid mass and for maintaining a predetermined tension on the strap or band until it is fastened. The invention is adaptable for applying steel bands about core structures of transformers where it is desirable to apply the band under a predetermined tension to maintain a continuous predetermined pressure on the core parts.

Devices for stretching or tightening a strap or band around a box or package are known, but generally these articles are compressible and there is no particular reason for maintaining a predetermined tension of the band. When the article enclosed by the strap or band is compressible, no rapid increase in the tension on the band takes place upon operation of the stretching device. However, when a solid article, such as the iron core of a transformer, is to be enclosed within a metal strap under a predetermined tension, it becomes necessary to provide for controlling this tension, since a relatively slight stretching of the strap beyond its desired value will greatly increase the stresses on it, and failure to bring the strap to the desired tension will cause it to fail in its purpose of maintaining a desired force on the parts of the core.

In a copending application of John K. Hodnette, Serial No. 377,472, filed February 5, 1941, for Electrical induction apparatus, a core and coil assembly for transformers is disclosed in which the core parts are formed of loops of magnetic material wound layer upon layer and bonded together. The loops are cut to form two U-shaped core portions which are assembled about the coils of the transformer and held in place by metal bands surrounding the core loops. The band or strap is placed about the core loop and drawn to a predetermined tension and fastened in place to maintain a predetermined pressure upon the butt joints of the core loops. With the ordinary tool employed for stretching the band about the usual type of articles, it is difficult to apply the desired pressure because a very slight increase in the stretch of the band about the solid mass of iron greatly increases its tension. If this tension is too great, the band will break. If it is not great enough, the band will not maintain the desired pressure on the butt joint.

It is an object of the present invention to provide a strap-stretching device that will bring the strap to a desired tension about a solid article and will not increase the tension above the desired amount.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment of the invention, reference being had to the accompanying drawings, in which:

Figure 1 is an elevational view of a core loop with the strap-stretching device applied for stretching a steel strap about the loop;

Fig. 2 is an enlarged side elevational view of the device shown in Fig. 1;

Fig. 3 is a side elevational view of a portion of the strap-stretching device with a part of the casing removed to illustrate the operating mechanism;

Fig. 4 is a top plan view of the strap-stretching device; and

Fig. 5 is a detailed sectional view taken on the line V—V of Fig. 4.

Referring to the drawings, and particularly to Figs. 1 and 2 thereof, the tool 1 is shown in position for applying a strap about a core loop comprising two U-shaped portions 2 and 3 for maintaining a predetermined pressure at the butt joint surfaces 4 between the two U-shaped core portions. Referring to Fig. 1, the strap 5 is shown having one end 6 extending over the corner of the core and extending along the surface of the loop under a clip 7 and bent at 8 to extend through the clip 7 which surrounds the strap, the strap continuing, as shown at 9, over the end portion 6 and about the core loop, and extending about the core loop, the other end portion 11 of the strap extending also through the clip 7 and positioned so as to be gripped by the tool for tightening about the core loop. The clip 7 is a steeve or band of metal about the two ends of the strap 5, when the strap is pulled tight is crimped to deform the edges of the steeve and of the ends of the strap passing therethrough to fasten them in a well known manner.

The tool comprises a frame member 12 formed integrally with a handle 13 and including a casing section 14 normally secured to the casing by screws 15 to form a unitary part thereof. The casing is provided with a lower flat surface 16 extending horizontally at the lower surface of the complementary frame portions 12 and 14 in a plane substantially parallel with the direction of the handle 13. The lower forward portion of the casing section 14 is provided with a foot or flange 17 projecting laterally therefrom and which extends horizontally above the surface of the article about which the steel band is to be stretched to form a gripping member cooperating with the pivoted gripping member 18 mounted on a pivot

pin 19 and secured in place by a setscrew 22. One end 11 of the strap 5 is adapted to lie in contact with the foot or flange 17 and to be engaged by the serrated gripping surface 23. The gripping member 18 is normally moved into engagement with the strap 11 by means of a coil spring 24 which engages a recess 25 formed in the gripping member and bears against a flange 26 formed in the casing 14. It will be noted that the position of the gripping member 18 is such that as the strap 11 is pulled toward the left, as viewed in Fig. 2, it tends to tighten the grip of the member 18 on the strap and to press it more tightly against the foot or flange 17.

The casing members 12 and 14 are provided with a horizontal guideway 27 adapted to accommodate a rack bar 28 which is formed at one end with an enlarged head 29, and which may be provided with a detachable screw 31 for retaining the rack bar in its guideway. The head 29 may be provided with gripping members similar to the members 17 and 18, but, as disclosed, are shown as provided with a foot or flange member 32, which is positioned below the end 11 of the metal strap, and an upper member 33 positioned above the strap 11 and pivoted on the head 29 by the pin 34. The members 32 and 33 provide a "duckbill" for engaging the clip 7 for forcing it in a direction away from the gripping members 17 and 18.

The gripping member comprising members 17 and 18 and the gripping member comprising members 32 and 33 form two relatively movable members which are operated away from each other for the purpose of stretching the strap 5 about the core loop. The mechanism for effecting this operation comprises a pinion 36 which measures with the teeth of the rack bar 28 and which is mounted on a shaft 37 having bearings in the opposite walls of the casing sections 12 and 14. The hub of the pinion 36 carries an integrally formed ratchet wheel 38 by which the pinion is rotated, and the teeth 39 of the ratchet wheel are adapted to be engaged by a pawl 42, which is located within the chamber of the casing members 12 and 14, and pivotally connected by a pin 45 with an operating lever 46, which is pivotally mounted on a pin 47 carried by the casing members. The upward movement of the lever 46 from the position illustrated in Figs. 2 and 3 cause the pawl 42 to move downwardly and effects rotation of the ratchet wheel 38 and the pinion 36, the pawl 42 being normally moved into engagement with the ratchet teeth by the spring 48.

The spring 48 is mounted about a pin 49, the lower end of which engages a socket 51 formed in the upper side of a detent 52 which is pivoted on a pin 53 mounted in the casing. The detent 52 is provided with a tooth 54 adapted to engage the teeth 39 of the ratchet wheel to prevent reverse rotation thereof. The upper end of the pin 49 is positioned within a socket 55 in a projecting head 56 forming a part of the pawl 42. The lower end of the spring 48 engages a collar 57 mounted on the pin 49 and the upper end of the spring 48 engaging the projecting head 56. When the pawl 42 is operated to rotate the ratchet wheel 38, the detent 52 rises over the teeth of the ratchet wheel and engages a tooth in a new position to hold the ratchet wheel against reverse rotation during a reverse movement of the pawl 42.

To permit the release of the ratchet wheel and to allow a relative return movement of the head 29 and the rack bar 26 after these parts have been actuated to effect the desired stretching of the steel band 5, the detent 52 is moved upwardly about its pivot 53 and the pawl 52 is simultaneously moved out of engagement with the ratchet teeth 39. This operation is effected by a releasing member 60 mounted on a shaft 61 and provided with a projection 62 adapted for engaging the underside of the detent 52 and also with an upwardly extending part 63 which serves as a cam to effect movement of the pawl 42 away from engagement with the teeth 39 of the ratchet wheel. A lever 64 is provided for rotating the shaft 61 in a clockwise direction to effect the release of the pawl 42 and the detent 52 from engagement with the teeth of the ratchet wheel 38.

In order to provide for limiting the pressure or tension to be applied to the steel strap 5, a second lever 70 is provided mounted upon a pin 71 at the outer or movable end of the lever 46 and extending inwardly along the lever 46. The levers 46 and 70 are mounted directly below the handle 13, so that the lever 70 and the handle 13 together provide hand grips whereby the two levers 70 and 46 may be moved upwardly by the fingers engaging the finger grooves 73. A rack 74 is provided extending downwardly from the handle 13 and provided with teeth 75 on the inner side thereof adjacent the outer end of the lever 46. A spring member 76 is shown mounted on the lever 46, as by rivets 77, and adapted to engage the lever 70. An adjusting screw 78 is provided having a nut 79 associated therewith for varying the position of the spring 76.

A locking member 81 is shown positioned on the outer end of the lever 46, and slidably attached thereto by screws 82 extending through slots in the member 81, to permit the member to move under the force of a spring 83. One end of the spring 83 is engaged by a fixed abutment 84 mounted on the lever 46 and the opposite end engages an abutment 85 extending outwardly from the body portion of the locking member 81. The outer end 86 of the locking member 81 is adapted to engage between the teeth 75 of the rack 74, but is normally held in its illustrated position by a latch member 87 mounted on the lever 86 by the pin 88 and engaging one side of the abutment 85. A pin 89 extends from the lever 70 through an opening in the lever 46 to engage the latch 87.

After the steel band has been positioned about the core loop, as shown in Fig. 1, the members 17 and 18 gripping the end 11 thereof and the members 32 and 33 engaging the end of the clip 7, a continued up and down movement of the levers 70 and 46 by a repeated gripping or closing of the hand about the handle 13 and the lever 70 causes the ratchet wheel to move in the above-described manner to operate the rack bar 28 so as to move the head 29 toward the left or away from the main body of the device, thus drawing the steel strap 5 about the core loop. As this operation continues until the tension of the strap increases, the amount of force on the lever 70 necessary to move the lever 46 to cause movement of the ratchet wheel and of the rack bar increases with the tension on the strap. The force from the lever 70 which is gripped by the fingers, is applied to the lever 46 through the spring 76 which flexes with the increase in force being applied, so that with the increase in applied force, the lever 70 moves closer to the lever 46 with each successive upward movement thereof. The setscrew 78 is so adjusted that at the desired tension it must be applied to the steel strap. The upward movement of the lever 70 with respect to the lever 46 will move the pin 89 sufficiently to release the

latch 87 and permit the locking member 81 to be forced by the spring 83 between the teeth 75 in the rack member of the device to thus lock the device against further operation and to thus prevent further increase in the tension on the strap 5. With the stretching tool in this position, another tool is then applied to the clip 7 to crimp the clip in a well known manner, so as to lock or permanently fasten the ends of the strap 5 in its permanent position. The lever 64 is then operated as above-described to release the ratchet wheel for reverse movement, thus permitting the head 29 to move toward the main frame member, so that the end 11 of the strap moves to the right with respect to gripping member 18, thus releasing the grip and permitting separation of the tool from the strap.

It will be understood by those skilled in the art that modifications may be made in the details of the structure illustrated and described without departing from the spirit of my invention, and it is intended that the above description of a preferred embodiment of the invention be taken in an illustrative and not in a limiting sense.

I claim as my invention:

1. The combination in a strap-stretching device, of a pair of relatively movable members, means carried by each of said relatively movable members and constructed to grip the ends of a flat metal strap with said ends overlapping one above the other, and means for moving said relatively movable members away from ecah other for drawing said strap taut around an article and maintaining said overlapping portions in taut condition, said means comprising a manually operable lever for applying a force for moving said relatively movable members and a single locking means operable upon the application of a predetermined force by said lever for locking said lever against further movement in either direction.

2. The combination in a strap-stretching device, of a frame, a rack bar having movement in said frame, means carried by said bar and additional means mounted on said frame for separately engaging the opposite ends of a strap with the ends overlapping one above the other, means carried by said frame including a ratchet wheel for effecting movement of said rack bar relative to said frame, a pawl adapted to engage said ratchet wheel, a handle mounted in fixed position on said frame, operating means movable with respect to said handle for effecting a reciprocating movement of said pawl, means for applying force to the operating means including a lever and a calibrating spring, and a single locking means operated upon the application of a predetermined force to the operating means for locking the operating means against further movement in either direction.

3. The combination in a strap-stretching device, of a pair of relatively movable members, means carried by each of said relatively movable members and constructed to grip the ends of a flat metal strap with said ends overlapping one above the other, and means for moving said relatively movable members away from each other for drawing said strap taut around an article and maintaining said overlapping portions in taut condition, said means including a lever pivotally mounted on said device, a second lever mounted on the first-named lever, biasing means between said two levers through which force applied to the second-named lever is transmitted to the first-named lever for operating the stretching device, said biasing means being effective for varying the relative positions of the two levers with variations in the force transmitted, and a single locking means for interrupting further movement of the first-named lever upon the application of a predetermined force thereto.

4. The combination in a strap-stretching device, of a pair of relatively movable members, means carried by each of said relatively movable members and constructed to grip the ends of a flat metal strap with said ends overlapping one above the other, and means for moving said relatively movable members away from each other for drawing said strap taut around an article and maintaining said overlapping portions in taut condition, said means including a lever pivotally mounted on said device, a second lever pivotally mounted on the outer end of the first-named lever and extending inwardly along the first-named lever, biasing means between said two levers through which force applied to the second-named lever is transmitted to the first-named lever for operating the stretching device, said biasing means being effective for varying the relative positions of the two levers with variations in the force transmitted, and locking means for interrupting further movement of the first-named lever upon the application of a predetermined force thereto.

5. The combination in a strap-stretching device, of a frame, a rack bar having movement in said frame, means carried by said bar and said frame for engaging a strap, means carried by said frame including a ratchet wheel for effecting movement of said rack bar relative to said frame, a pawl adapted to engage said ratchet wheel, a handle mounted in fixed position on said frame, operating means movable with respect to said handle for effecting a reciprocating movement of said pawl, said means including a lever pivotally mounted on said device, a second lever mounted on the first-named lever, biasing means between said two levers through which force, applied to the second-named lever, is transmitted to the first-named lever for operating the stretching device, said biasing means being effective for varying the relative positions of the two levers with variations in the force transmitted, and locking means for interrupting further movement of the first-named lever in either direction upon the application of a predetermined force thereto through the second named lever.

6. The combination in a strap-stretching device, of a frame, a rack bar having movement in said frame, means carried by said bar and said frame for engaging a strap, a handle mounted in fixed position on said frame, means carried by said frame including a ratchet wheel for effecting movement of said rack bar relative to said frame, a pawl adapted to engage said ratchet wheel, operating means movable with respect to said handle for effecting a reciprocating movement of said pawl, said means including a lever pivotally mounted on said device, a second lever pivotally mounted on the outer end of the first-named lever and extending inwardly along the first-named lever, biasing means between said two levers through which force applied to the second-named lever is transmitted to the first-named lever for operating the stretching device, said biasing means being effective for varying the relative positions of the two levers with varia-

tions in the force transmitted, and a single locking means for interrupting further movement of the first-named lever upon the application of a predetermined force thereto.

7. The combination in a strap-stretching device, of a frame, a pair of relatively movable members supported on said frame, means carried by each of said relatively movable members and constructed to grip the ends of a flat metal strap with said ends overlapping one above the other, and means for moving said relatively movable members away from each other for drawing said strap taut around an article and maintaining said overlapping portions in taut condition, said means comprising a lever pivotally mounted on the frame of said device, a second lever pivotally mounted on the outer end of the first-named lever and extending inwardly along the first-named lever, a locking rack extending adjacent the path of movement of the outer end of the first-named lever, a locking member mounted on said first-named lever and positioned for movement into engagement with said locking rack, means biasing said locking member into engagement with said locking rack, and latching means for normally retaining said locking means out of engagement with said locking rack, biasing means between said two levers through which force applied to the second-named lever is transmitted to the first-named lever for operating the stretching device, said biasing means being effective for varying the relative positions of the two levers with variations in the force transmitted between them, and means operable upon the transmission of a predetermined force between the two levers for releasing the latching means for permitting operation of said locking member to engage said locking rack and prevent further operation of said lever.

8. The combination in a strap-stretching device, of a frame, a rack bar having movement in said frame, relatively movable means carried by said bar and by said frame for engaging a strap, means carried by said frame including a ratchet wheel for effecting movement of said rack bar relative to said frame, a pawl adapted to engage said ratchet wheel, a handle mounted in fixed position on said frame, an operating lever pivotally mounted on the frame of the device, a second lever pivotally mounted on the outer end of the first-named lever and extending inwardly adjacent the first-named lever, a rack extending adjacent the path of movement of the outer end of the first-named lever, a locking member mounted on said first-named lever and positioned for movement into engagement with said rack, means biasing said locking member into engagement with said rack, and latching means for normally retaining said locking member out of engagement with said rack, biasing means between said two levers through which force applied to the second-named lever is transmitted to the first-named lever for operating the strap-stretching device, said biasing means being effective for varying the relative positions of the two levers with variations in the force transmitted, and means operable upon the transmission of a predetermined force between the two levers for releasing the latching means for permitting operation of said locking member to engage said rack and prevent further operation of said lever.

JOHN H. BRAMBLE.