Oct. 20, 1931. A. H. MOON

BAND TIGHTENING TOOL.

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3 Sheets-Sheet 2
My invention relates to band tightening tools and particularly to such tools as are adaptable for use in tightening a relatively wide band such as is required for binding together sheets of metal of great weight.

In the art for tightening bands about packages the use of band tightening tools is old and well known. Most of these band tighten- ers have a cam element to hold one end of the band and another element having a slot therein through which the other end of the band is to be inserted. The last named slotted element is then rotated and the band tightened about the package. When the desired tension is reached the band is nailed to the package and the cam released. The rotatable element having the slot is then reversed and the curled end of the band pulled back through the slot. With light and narrow bands such a device serves a useful function but when heavy, thick, metal bands or those which are of considerable width are required, it becomes almost impossible to remove the curled end of the band from the slotted element, and much labor and time is required.

It is the object of my invention to provide a band tightening tool which will have a slotted rotary element which will be quickly detachable from the tool so that when the desired tension is achieved and the band secured to the package, the rotary element may be removed lengthwise from the curl of metal extending about it.

It is further my object to provide a slotted pin which is so shaped that it will accommodate a band of desired width without any base or support for the pin.

The above and other structural advantages to which reference will be made during the ensuing disclosure I accomplish by that certain combination and arrangement of parts of which I have shown a preferred embodiment.

In the drawings:

Figure 1 is an end perspective view of the tool.

Figure 2 is an end elevation showing the tool in use.

Figure 3 is a perspective view of the spreader.

Figure 4 is a perspective view of the tool in use.

Figure 5 is a perspective view of a modified and simplified type of tool consisting of a slotted pin.

Figure 6 is a diagrammatic perspective view of the pin shown in Figure 5 in use with a band secured about a pack of metal sheets prior to the start of the tightening operation.

Figure 7 is a diagrammatic side elevation of the band tightening tool shown in Figure 5 after the tool has been rotated to tighten the band.

Figure 8 shows a side elevation of a suitable wrench for tightening the tool.

Figure 9 is a perspective view of the tool in use on a stack of sheets.

A stack of metal plates or sheets are indicated at 1. The tool indicated in Figures 1-4 is placed on top of a wood nailing strip which rests on top of the upper surface of the uppermost sheet. With this type of tool a nailing strip, usually a two by four, as is indicated at 2, having short pieces of one by four as is indicated at 3 spaced thereon providing a clearance space between their ends in which the tool is placed, is provided. With such an arrangement the tops of the nailing strips will be level with the bottom of the split pin and the bottom of the clamping shaft so that the band will rest directly on top of the nailing strips and extend horizontally across the stack of sheets.

The band tightening tool has a base 4 with upwardly flanged side walls 5 across which the band tightening shaft and the clamping shaft extend. For clamping the end of the band a cam shaft 6 journaled in the sides 5 as indicated at 7 is provided. The cam shaft has a portion extending through the side 5 and a handle 8 is provided for turning down the cam shaft to firmly clamp the end of the band between the cam shaft and the upper surface of the base. A worm 9 is mounted in an orifice in one of the side walls, being journaled as indicated at 10, and an end 11 of the worm is squared so that a tool or ratchet handle may be inserted on the squared end.
to rotate the drive. The worm meshes with a worm wheel 12 mounted on a stub shaft 13. The shaft has an octagonal aperture 14 extending through it which retains an octagonal end of the slotted shaft 15. The end of the shaft 15 opposite the octagonal portion is journalized in a bushing 16 and in order to prevent the slotted end of the shaft from pinching when under a heavy load I provide a spreader 17 having a flattened portion 18 which fits within the shaft.

The manner in which the tool is used is as follows: The tool is placed in the space between the pieces of the nailing strips and the stationary end of the band, as is indicated at 19, is placed under the cam shaft. The handle is then turned to firmly clamp the band. The band is then extended around the package to be bound, and the free end which are indicated at 20 is inserted in the slot. If the band is unusually heavy or wide the band may be placed on the upper surface of the base and the slotted shaft then inserted in place so as to embrace the band.

A handle is then placed on the squared end of the worm shaft and the slotted shaft is rotated to bring about a desired tension on the band. Nails are then driven through the band to firmly secure it to the nailing strips. The slotted shaft is then removed from its mounting and withdrawn from the curl of metal which it has formed during the tightening operation.

As has been previously remarked, thicknesses of metal and widths of bands may be applied with my new tool which would have been impossible with tightening tools not provided with quickly removable slotted shafts. While I have shown a specific worm drive other arrangements of gears or a ratchet may be used for rotating the slotted shaft. A modification which immediately suggests itself is the replacement of the worm with a ratchet wheel and the further incorporation of a pawl member with a mounting handle for actuating the ratchet. Still further modifications will readily occur to those skilled in the art.

In the modification shown in Figures 5-9 the tool is greatly simplified, consisting in this instance of a slotted pin only.

The tool illustrated in Figures 5-9 consists of a single pin or shaft of suitable diameter and having a length sufficient to take a band of any required width, plus the distance required for a wrench or lever on both ends.

The pin indicated at 15a is slotted from one end up to within a reasonable distance of the other end to insure strength at the closed end of the pin. The slot is of a width sufficient to receive two thicknesses of band, doubled, if necessary, and enough added clearance to permit the pin to slip over the bands freely.

Both ends of pin are squared as indicated at 21 to receive a wrench, as is shown at 22, although a ratchet or special lever for revolving the pin may be used instead of the wrench suggested. The end of the pin on which the slot occurs is furnished with a spreader 17a having a flattened portion 18a which is inserted within the slot in the pin to present springing or pinching together when the pin is rotated and a heavy load is applied.

The operation of the tool is similar to that shown in the other figures. A single band 20a is placed around a pack 1a of sheet steel of any desired width, depth or length, either crosswise or lengthwise of the pack. The band is brought up on both sides or ends and over the top of filler blocks 23a and 23 and the ends of the band are lapped at least the diameter of the pin 15a and as much more as desired. Any excess length of band will not interfere with the operation of the tool.

The band, after having both ends placed in the slot, is rotated in either direction by means of a wrench or lever or any other special tool. When sufficient tension has been applied, the band may be nailed to the blocks 22 and 23. In the meantime tension may be held by means of fastening the handles of the wrenches or levers with which the tool is tightened. The handles may be held in various ways, either manually or by fastening to the band already under tension by means of a chain, wire or other special adjustable holder. A place may be provided to insert a chain or holder on the crosswise cushion 22A and 22B, as shown in Figure 9 at either end of the nailing strip below the band.

After the band has been securely nailed to blocks, the pin may be easily removed by pulling out lengthwise and the curled portion of the band will remain substantially exactly as it has been formed.

By leaving the curled portion another feature will be added to the utility of the device as the dismantling of the bands may be done with the use of a similar pin or lever. The pin being inserted in the curled portion after uncurling will, with the application of the pin to each band separately and with the winding of the band around the pin, allow the nails to be readily removed from the cushions. This modification of tool may be used in conjunction with other methods of fastening the bands after tightening.

For the purpose of welding bands, an additional band, as shown diagrammatically in Figure 7 at 30, may be used. If the band is extended crosswise of the case, it will lie on top of the pack and bend down at the sides. The encircling band will then be tightened as in the previous case and welded to the additional band at both sides of the pack where both of the bands lap, as at the points 31.
In the bands to be welded the curled portion of the band and that portion extending out from the curl to the weld may be removed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A band tightening tool comprising a base with sides, a slotted shaft, and a rotary driving member for said slotted shaft, said shaft being detachably mounted in said rotary driving member intermediate said sides, and detachably journaled in said sides at each of its ends.

2. A band tightening tool comprising a base with sides, a slotted shaft journaled at its ends in both of said sides, and a rotary driving member for said slotted shaft, said shaft being detachably mounted in said rotary driving member intermediate said sides and being detachable therethrough.

3. A band tightening tool comprising a base having flanged sides in which a clamping cam shaft and a slotted rotary shaft are journaled, said slotted rotary shaft being journaled at both ends in said flanged sides, and extending therethrough, and being quickly removable in a direction in alignment with its axis, said slot extending to an end of said shaft, and spreader means in said end to prevent pinching of said shaft.

4. A band tightening tool comprising a base having flanged sides in which a clamping cam shaft and a slotted rotary shaft are journaled, said slotted rotary shaft being journaled at both ends in said flanged sides and extending therethrough, and quickly removable in a direction in alignment with its axis, said slot extending to an end of said shaft, and means for preventing the collapsing of the slotted end under tension, said means comprising a spreader insertable in said end beyond the flanged side in which said end is journaled.

5. A band tightening tool comprising a base, a slotted rotary shaft journaled at both ends in said base, means surrounding a portion of said shaft for rotating said shaft and disengageable therefrom and a spreader in the slotted end thereof to prevent the collapse of the shaft.

ALVA H. MOON.