June 25, 1957 G. W. MATHEWSON 2,796,891

HOLDING PAWL DEVICE

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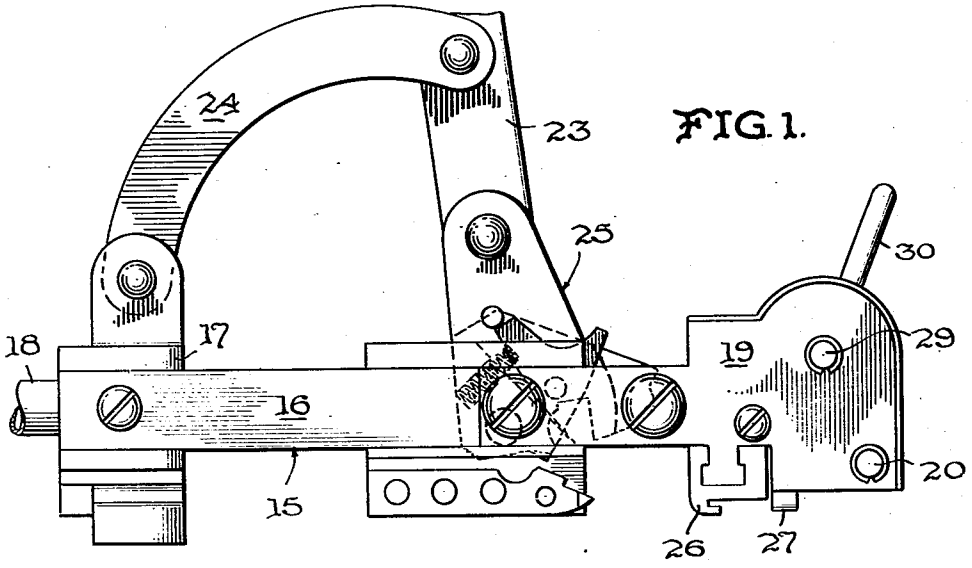
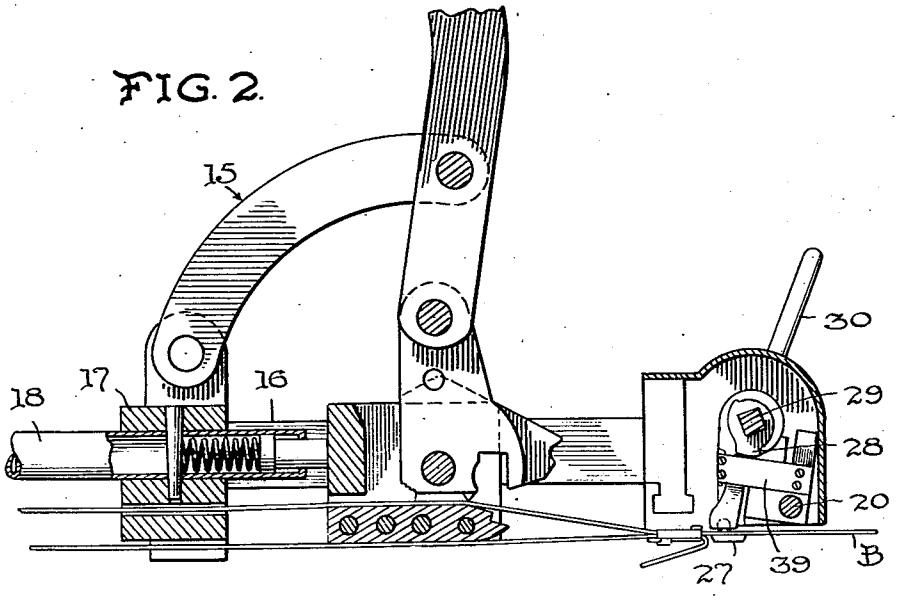


FIG. 1.

FIG. 2.



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FIG. 3.

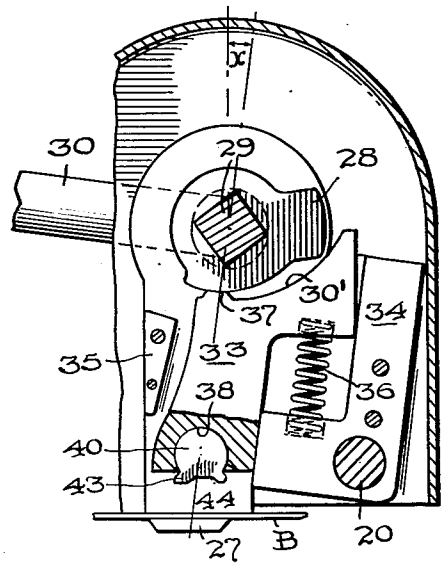


FIG. 4.

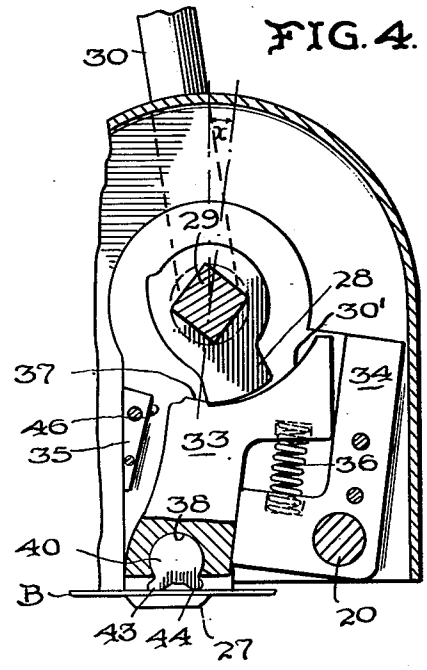


FIG. 5.

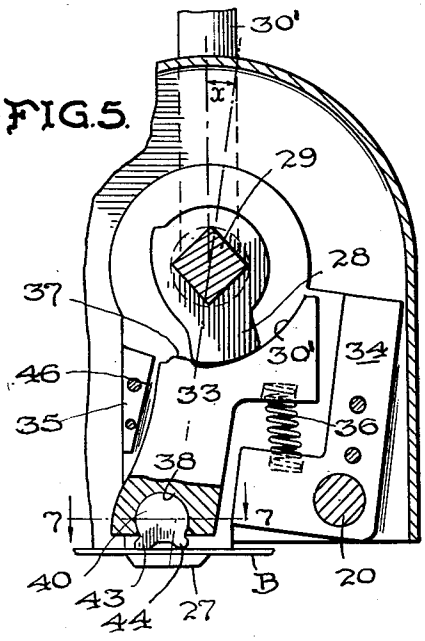


FIG. 6.

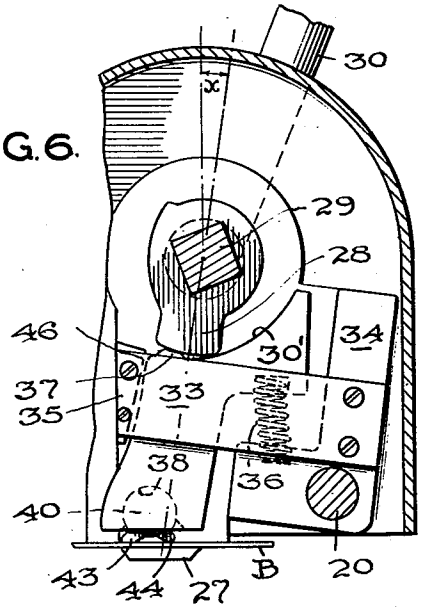
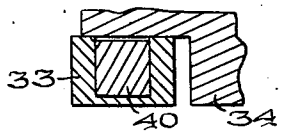


FIG. 7.



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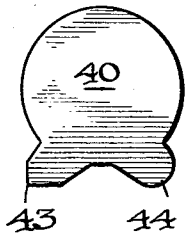


FIG. 8.

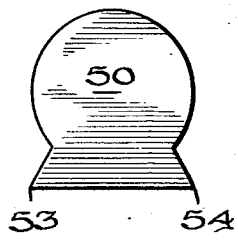


FIG. 9.

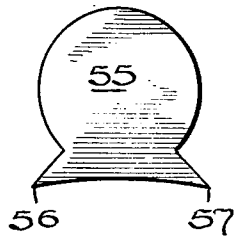


FIG. 10.

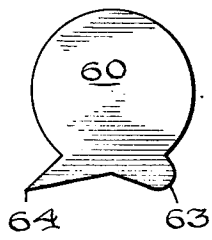


FIG. 11.

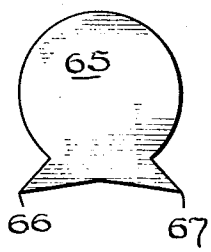


FIG. 12.

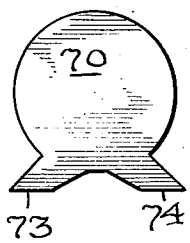


FIG. 13.

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HOLDING PAWL DEVICE

Gordon W. Mathewson, Syracuse, N. Y.

Application December 21, 1953, Serial No. 399,292

14 Claims. (Cl. 140—93.4)

This invention relates generally to a clamping or holding device and more particularly to an improved holding pawl which is especially suited for use in a strap fastening tool.

Strap fastening tools are well known in the art and are used for the banding or strapping of packages by metallic straps and buckles. The tool tensions or tightens the strap about a package, cuts the strap to the required length, and finally forms, couples and seals the end of the strap to the buckle.

The band or strap, during certain of the operations described, is held against slipping by means of one or more dogs or pawls whose serrated faces press the band against one or more anvil members to clamp it tightly against slipping. It has been found that repeated use of the strapping tool results in the filling up of the serrations with fine bits of metal so as to lessen the holding power of the pawl. On the other hand, some of the pawls tear or undesirably scrape the bands so as to result in their failure.

Furthermore, while the various strapping tools have been generally satisfactory, they are, as a whole, characterized by other disadvantages which limit their utility. For example, the holding pawls of some tools are not adapted to operate on different gauge strapping or require impractical and inconvenient adjustments. The operating means for the pawls of most structures does not permit the band to be held against slipping in one direction while permitting slipping in the other during tightening of the band about the package, etc.

Accordingly, the chief object of the present invention is to provide an improved holding pawl device which will obviate the above mentioned and other undesirable characteristics of known structures.

Another important object of the present invention is to provide an improved holding pawl structure which may be readily installed in conventional strapping tools to increase their utility.

A further important object of the invention is to provide an improved holding pawl device which will automatically adjust itself to strapping varying widely in gauge and hold it without slipping in one direction while permitting tightening or tensioning of the band in the other direction by the strapping tool.

A still further important object of the present invention is to provide an improved holding pawl structure having a pawl formed without teeth or serrations which will firmly grip the strapping without damage from scraping or tearing the same regardless of its temper.

Other objects and advantages of the present invention will become apparent during the course of the following description.

In the drawings, I have shown one embodiment of the invention. In these showings:

Figure 1 is a side elevational view of a strapping tool in which the holding pawl device comprising the present invention may be mounted;

Figure 2 is a longitudinal sectional view thereof showing strapping material being firmly gripped by the device comprising the present invention;

Figures 3, 4, 5 and 6 are fragmentary, enlarged, vertical, elevational views of the head end of the strapping tool shown in Figures 1 and 2, showing the improved holding pawl in this position when at rest and when in successive strips of engagement with strapping material;

Figure 7 is a horizontal sectional view taken on the line 7—7 of Figure 5; and

Figures 8–13, inclusive, disclose various forms of holding pawl which may be successfully used in the holding pawl device comprising the present invention.

While the holding dog device has utility in varied applications, it has particular suitability for strapping tools of all types including those disclosed in Patents 2,612,802–3 to McAneny, 2,643,687 to Schlage et al., and 2,612,804 to Craig. By way of illustration only, the invention has been disclosed as mounted in the above Craig patent.

Referring to Figures 1 and 2 of the drawings, numeral 15 designates the strapping tool as a whole which comprises a pair of laterally spaced side rails 16 which are connected at their rear ends by a transverse block 17 from which a tool handle 18 projects rearwardly. At their forward ends, the side rails 16 terminate in head portions 19 connected by a transverse rod 20.

The strapping tool 15 is provided with an operating lever 23 pivoted to a pair of toggle links 24 which are in turn pivoted to the block 17. At its forward end, the lever 23 is pivotally connected to the strap tightening and buckle forming elements which are designated 25 as a whole and form no part of the present invention except to cooperate therewith. The forward end of the tool includes buckle supports 26 and anvil members 27 which are spaced laterally and moved together under the strapping band B so as to enable the latter to be clamped thereagainst by a pair of pawls, all as set forth in the Craig patent.

It is to be understood that in showing applicant's improved holding pawl device as applied to Craig, that a pair of devices are provided so that Craig's manner of operation of the pawls toward and away from each other is the same as before. Similarly, when the device comprising the present invention is applied to a strapping tool using a single pawl, only one of applicant's devices is used.

Referring to Figures 3–7 of the drawings, a cam 28 is rotatably mounted on a shaft 29 which is adapted to be rotated by a cam operating lever 30 fixed to an outer end thereof, the shaft being journalled in the side plates 16. The cam 28 operatively engages the upper arcuate surface 30′ of an inverted L-shaped pawl carrier 33 which is constrained for motion in a generally vertical plane by an L-shaped member 34 fixed on the rod 20 forwardly thereof and by a triangularly shaped thrust piece 35 rearwardly thereof.

The pawl carrier 33 is urged against the cam 28 by a spring 36 mounted in sockets formed in the upper surface of the short leg of the member 34 and in the bottom surface of the short leg of the pawl carrier as shown. The concavedly arcuate upper surface of the pawl carrier 33 terminates in a raised portion 37 for a purpose to be described. The bottom surface of the pawl carrier 33 is formed with a semicircular slot 38 including more than 180 degrees so as to oscillatably receive and retain therein the mating body portion 40 of a pawl having spaced strap engaging feet 43 and 44. The pawl is retained in the slot by the side rails 16 or by a restraining strap 39.

The strapping engaging surfaces of the spaced feet 43 and 44 are smooth and it will be apparent that these

band gripping surfaces cannot therefore become clogged with minute metal particles or foreign matter to lessen their effectiveness.

An important feature of the invention resides in the spacing and configuration of the pawl carrier **33** and the restraining members **34** and **35**, as together with the cam **28**, these members insure the effective holding of any gauge strapping in a range of thickness from 3 to 30 thousandths of an inch thick against the anvils **27** by the pawl **40**, the latter by virtue of its carrier **33** automatically adjusting for the different thicknesses. The design also permits the strapping to be pulled to the left (as seen in the drawings) during tensioning while effectively holding the strap against movement to the right as will be described.

In the operation of the strapping tool **15**, it is necessary that the strapping B be held by the pawl **40** between tensioning movements and while the buckle is being formed. The movement of the pawl holding device from non-clamping to full clamping positions is illustrated in Figures 3–6 inclusive. As shown in Figure 3, each pawl carrier **33** is held off the strapping B and against the side of each cam **28** by the springs **36**.

Omitting the motion of the pawls and the anvils **27** towards and away from each other as provided for in the Craig patent, movement of the cam lever **30** in a clockwise direction will move the cam **28** into engagement with the upper arcuate surface **30'** of the pawl carrier **33**. The carrier is thus forced downwardly as shown in Figure 4 until the pawl **40** engages the strapping B at which time the cam is just commencing to engage the raised portion **37** on the left upper surface of the carrier.

Further rotation of the cam lever **30** urges the cam **28** against the surface **37** causing the relatively floating carrier to move to the left a predetermined distance as defined and limited by the right hand edge surface of the member **35** as shown in Figure 5 to make a single line or point contact therewith at **46**. Final movement of the cam lever **30** to the position of Figure 6 forces the cam **28** upon the high or raised portion **37** of the carrier to force the pawl **40** tightly against the strapping B. It is to be noted that the line of pressure from the cam through the carrier and the pawl **40** to the strapping B is approximately 7 degrees from the vertical.

This 7 degree angle together with the rotary mounting of the pawl **40** in the carrier **33** is responsible for the ability of the device comprising the present invention to permit the strapping, when tightly held as shown in Figure 6, to be pulled to the left in tensioning operations of the tool **15** and yet not permit motion to the right.

The action here is readily apparent. Movement of the strapping to the left will cause the single point of contact **46** of the carrier to be the pivot point of a clockwise rocking movement acting to compress the spring **36**. However, due to the 7 degree angle of the pressure line described, the reverse is not true as attempted movement of the strapping to the right merely increases the holding pressure of the pawl **40** on the strap.

It has been found that with the relative clearances of the parts shown that the 7 degree angle will permit the pawl holding device to automatically adjust for the various gauge sizes mentioned, the relative thickness of the strap controlling the distance the pawl rides the strap and is moved to the left. Any material adjustment or variation in the clearances of the parts or the angle will necessitate complementary adjustments of the cooperating parts. When the buckle has been formed by the strapping tool **15**, the cam lever **30** is rotated counterclockwise to the position shown in Figure 3.

In Figure 8, I have shown the preferred form of pawl **40** as is also shown to a lesser scale in Figures 3–6 inclusive. It will be noted that the feet **43** and **44** vary slightly in configuration. The foot **43** is flat surfaced with pointed edges while the forward or outer edge of the foot **44** is rounded. This prevents the tipping of the pawl **40** while passing over a burr on the surface of the strapping material.

The form of pawl **50** shown in Figure 9 varies from that in Figure 8 primarily in that the feet **53** and **54** form a continuous flat surface. This type of pawl is advantageously used where soft strapping material is used as there is no danger of the feet digging into the strap to scrape or tear it.

The pawl **55** is quite similar to **50** except for the base which is slightly V-shaped and more suitable for harder strapping. The pawl **60** is similar to pawl **55** with a more pronounced V between the pointed feet **63** and **64**, the latter being rounded as is foot **44**.

The pawl **65** is quite similar to the pawl **55** with a more pronounced V between the pointed legs **66** and **67** while the pawl **70** has pointed legs **73** and **74** with spaced flat surfaces. It is to be emphasized that any of the pawl forms shown is fully operable in the pawl carrier **33** in the manner described to obtain the advantages of operation herein set forth.

It will thus be seen that the holding pawl device comprising the present invention may be readily adapted for use with strapping tools and in other applications, will automatically adjust for varying strapping thicknesses and permit tensioning but not slackening of the band, all in a simple but highly efficient manner.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a strapping tool of the type described including a rotatable cam and an anvil against which strapping may be clamped, a carrier floatingly positioned for universal movement in a vertical plane between the anvil and the cam, said carrier being of inverted L-shaped and having a concave upper surface terminating in a raised portion, a pawl rockably mounted in the lower part of said carrier, guide means mounted adjacent said carrier and limiting its range of movements, and means mounted in a portion of said guide and acting against said carrier to hold it against the side of said cam and the pawl away from the strapping on the anvil.

2. In a strapping tool of the type described including a rotatable cam and an anvil against which strapping may be clamped, a carrier floatingly positioned for universal movement in a vertical plane between the anvil and the cam, said carrier being of inverted L-shape and having a concave upper surface terminating in a raised portion, a pawl rockably mounted in the lower part of said carrier, guide means mounted adjacent said carrier and limiting its range of movements, and means mounted in a portion of said guide and acting against said carrier to hold it against the side of said cam and the pawl away from the strapping on the anvil, said cam being operative to force said carrier and said pawl downwardly against the material on the anvil.

3. In a strapping tool of the type described including a rotatable cam and an anvil against which strapping may be clamped, a carrier floatingly positioned for universal movement in a vertical plane between the anvil and the cam, said carrier being of inverted L-shape and having a concave upper surface terminating in a raised portion, a pawl rockably mounted in the lower part of said carrier, guide means mounted adjacent said carrier and limiting its range of movements, and means mounted in a portion of said guide and acting against said carrier to hold it against the side of said cam and the pawl away from the strapping on the anvil, said cam being oper-

ative to force said carrier and said pawl downwardly against the material on the anvil, the line of force between said cam and the anvil being at an angle to the vertical whereby said pawl holds the material against slippage in one direction while permitting its movement in the opposite direction.

4. In a strapping tool of the type described including a rotatable cam and an anvil against which strapping may be clamped, a carrier floatingly positioned for universal movement in a vertical plane between the anvil and the cam, said carrier being of inverted L-shape and having a concave upper surface terminating in a raised portion, a pawl rockably mounted in the lower part of said carrier, guide means mounted adjacent said carrier and limiting its range of movements, and means mounted in a portion of said guide and acting against said carrier to hold it against the side of said cam and the pawl away from the strapping on the anvil, said cam being operative to force said carrier and said pawl downwardly against the material on the anvil, said carrier having a toggle-like movement with said cam enabling it to automatically adjust for differences in the thickness of the material.

5. A device as recited in claim 1 wherein said pawl has at least one flat material-engaging surface extending the width of said pawl.

6. A device as recited in claim 1 wherein said pawl has spaced, flat material engaging faces extending the width of the pawl.

7. A device as recited in claim 1 wherein said pawl has spaced material-engaging faces, the outer edge of one of said faces being rounded to prevent tipping of the pawl by material surface imperfections.

8. A device as recited in claim 1 wherein said pawl has spaced material engaging faces, the outer edge surface of one of said faces being pointed.

9. A device as recited in claim 1 wherein said pawl has a generally concave material engaging face in cross section.

10. A device as recited in claim 3 wherein said pawl has at least one flat material-engaging surface extending the width of said pawl.

11. A device as recited in claim 3 wherein said pawl has spaced, flat material engaging faces extending the width of the pawl.

12. A device as recited in claim 3 wherein said pawl has spaced material-engaging faces, the outer edge of one of said faces being rounded to prevent tipping of the pawl by material surface imperfections.

13. A device as recited in claim 3 wherein said pawl has spaced material engaging faces, the outer edge surface of one of said faces being pointed.

14. A device as recited in claim 3 wherein said pawl has a generally concave material engaging face in cross section.

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