Aug. 9, 1932. E. W. DUSTON 1,870,243

COLLAPSIBLE SPOOL OR BLOCK

Filed March 27, 1929

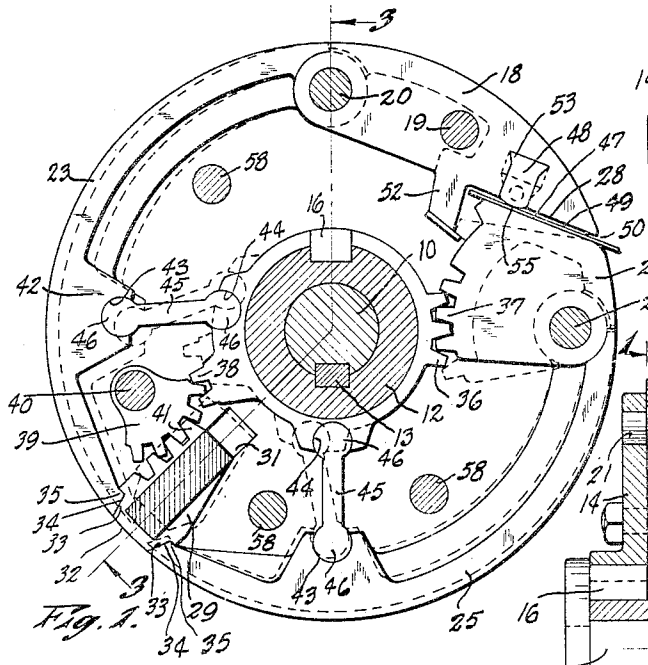


Fig. 1.

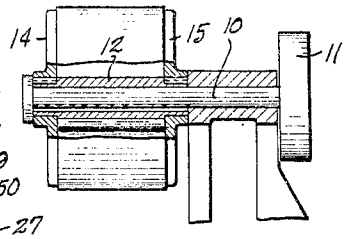


Fig. 3.

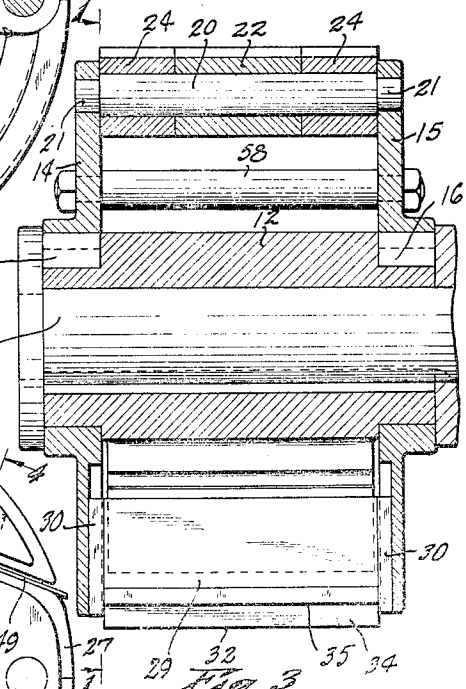


Fig. 3.

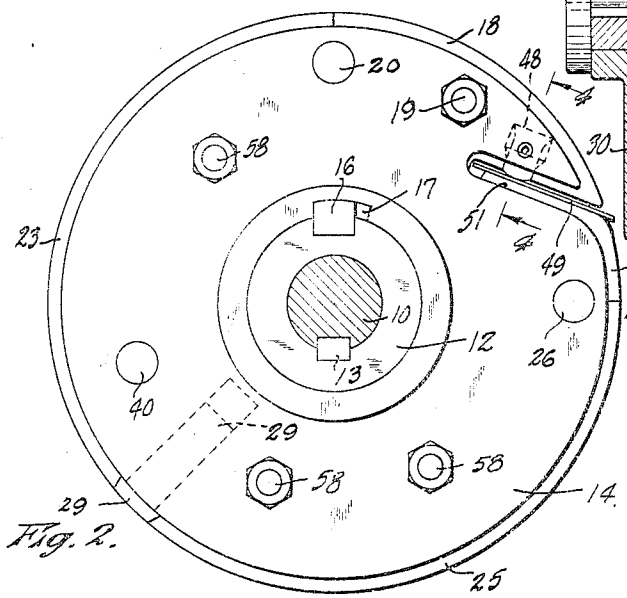


Fig. 2.

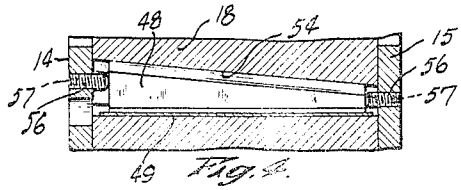


Fig. 4.

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# UNITED STATES PATENT OFFICE

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## COLLAPSIBLE SPOOL OR BLOCK

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This invention relates to a collapsible winding block or spool, particularly to a block for winding strips of sheet metal as they come from the rolls, and has for an object to provide an improved block which is of simple and rugged construction, and particularly to provide a collapsible block which will not mark the metal when wound under a high tension.

It is also an object of the invention to provide a block of this type which is automatic.

It is another object of the invention to provide a block in which the metal gripping jaws are adjustable for different thicknesses of metal so that a full circle may be maintained by the outer surface of the block when expanded no matter what the thickness of the metal being wound may be.

With the foregoing and other objects in view, the invention consists in certain novel features of construction, combinations and arrangements of parts, as will be more fully disclosed in connection with the accompanying drawing. In this drawing,

Fig. 1 is a transverse section substantially on line 1—1 of Fig. 3 showing the block expanded in full lines and collapsed in dotted lines.

Fig. 2 is an end elevation of the block.

Fig. 3 is a longitudinal section substantially on line 3—3 of Fig. 1.

Fig. 4 is a detail section substantially on line 4—4 of Fig. 2, and

Fig. 5 is a partial side elevation and partial longitudinal section showing the block mounted for use.

The block is mounted on any suitable shaft 10 driven by any suitable means, such as a pulley 11 from any suitable source of power. Mounted on this shaft is a hub or sleeve 12 which is keyed to the shaft, as shown at 13. Mounted on this hub or sleeve is a pair of spaced heads or end plates 14 and 15 which are each keyed to the sleeve 12 by a key 16. The key is mounted in the sleeve while the keyways 17 in the end plates are of greater width than the key, as shown in Fig. 2, to permit a limited relative turning movement between the sleeve and the end plates, in the present construction about 12 degrees.

Extending between the end blocks or plates 14 and 15 is a stationary segment 18, it being mounted on a longitudinal shouldered separating bolt 19 and a similar pivot bolt 20 which may be shouldered at its opposite ends and supported, as shown at 21, in the end plates. As shown in Fig. 3, the central ear 22 is on a pivoted segment 23 while the outer ears 24 are on the stationary segment 18, and therefore, the segment 23 is hinged at one end to the stationary segment 18. A similar segment 25 extends in the opposite direction from the other side of the stationary segment 18, and although it is not directly pivoted to the segment 18 it is mounted on a hinged pin 26 similar to the pin 20 and extending between the heads 14 and 15 so as to be carried thereby. Also hinged on this pin is a jaw section 27, and it is mounted to swing toward and from the inner wall 28 of the stationary segment 18. The free ends of the two segments 23 and 25 are spaced from each other and mounted between them is a movable section 29. This section is mounted to move toward and from the periphery of the block by any suitable means but is preferably mounted to slide substantially radially of the block. For this purpose it has at its opposite ends guide ribs 30 running in radial slots 31 in the inner surfaces of the end plates 14 and 15 so that the section 29 is rigidly guided for movement toward and from the periphery of the block. Its outer edge surface 32 is curved to correspond with the curvature of the periphery of the block when it is expanded as, of course, are also the surfaces of the segments 18, 23, 25 and jaw 27, so that when the block is expanded its outer surface is substantially circular. The free

ends 33 of the segments 23 and 25 are tapered somewhat, as shown in Fig. 1, so that the opening between them is somewhat narrower than the periphery of the block, and the outer portion of the section 29 is similarly tapered so that when the block is expanded, as shown in full lines in Fig. 1, the tapered surfaces 34 of the section 29 closely fit the inclined surfaces 33 of the sections 23 and 25 giving a continuous outer surface to the periphery of the block. It is also preferred that the section 29 be provided with shoulders 35 at the inner ends of the inclined surfaces 34 to engage the inner walls of the segments 23 and 25 to thus prevent the section 29 moving outwardly too far and to insure that its outer surface 32 is flush with the outer surfaces of the segments 23 and 25.

The sections 23 and 25, section 29 and jaw 27 are all connected with the sleeve or hub 12 so as to be simultaneously operated thereby for collapsing or expanding the block, and the block is expanded or collapsed by relative movement of the end plates 14 and 15, and therefore, the sections 18, 23, 29, 25, 27 relative to the sleeve 12. For this purpose the sleeve 12 is provided with gear teeth 36, preferably running throughout its entire length, meshing with similar gear teeth 37 on the jaw section 27. Also on this sleeve are gear teeth 38, also preferably extending throughout the length of the sleeve, meshing with a segmental gear 39 pivoted on a rod 40 mounted in and extending between the heads 14 and 15. This gear also meshes with a rack 41 formed on one side of the section 29 so that relative turning movement of the sleeve 12 with respect to the end plates 14 and 15 will swing the gear 39 and shift the section 29 outwardly or inwardly in the guideways 31. The two large segments 23 and 25, however, are operated in a somewhat different manner. They are each provided on their inner walls with ribs or lugs 42 having a milled groove 43 extending throughout the length of the section and greater than a semi-circle in cross section so that the side walls overhang. Similar grooves 44 are provided in the outer surface of the sleeve 12, and links 45 having substantially cylindrical ribs 46 extending along the opposite side edges are placed in the grooves 43 and 44 by sliding them in from one end. The overhang of the grooves 43 and 44 securely connects the segments 23 and 25 to the sleeve 12 and the connection between the links and the segments and the sleeve are pivotal connections permitting the links to swing relative to the sleeve as will be apparent. If the sleeve 12 turns clockwise from the full line position of Fig. 1 to the dotted line position it will be apparent that the free ends of the segments 23 and 25 will be swung inwardly and at the same time the section 29 will be shifted inwardly, thus reducing the outer diameter of the block and collapsing it to permit easy removal of the coil of sheet metal which may be wound on the block. The same movement also swings the jaw section 27 counterclockwise to the dotted line position of Fig. 1 to shift its wall 47 from the jaw block 48 and thus release the end 49 of the metal strip, there being a narrow slot 50 between the edge of the segment 18 and the section 27 to permit insertion of the free end of the strip. The outer end of the plate 14 is provided with a slot 51 in alignment with this slot to permit the coil of metal to be removed from the block by sliding it longitudinally thereof and off the outer end. There may be a stop wall 52 provided on the inner wall of the section 18 to prevent insertion of the end of the strip 49 too far into the block.

The jaw block 48 is preferably adjustable so as to compensate for different thicknesses of metal to be wound. For this purpose it is tapered longitudinally, as shown in Fig. 4, and a similarly inclined guideway is formed in the section 18. At its upper edge the block 48 is provided with outwardly extending tapered ribs 53 and the upper edge of the guideway 54 is tapered in a similar manner so that as the block 48 is shifted longitudinally its inner or clamping surface 55 is projected more or less from the face 28 of the section 18, and therefore, its position relative to the clamping surface 47 of the jaw block 27 may be varied. A convenient means for shifting this block 48 and holding it in adjusted position are set screws 56 threaded into the end plates 14 and 15 and having countersunk recesses 57 in their outer ends for insertion of an operating tool. The end plates 14 and 15 may be held by cap screws on the ends of the rods 20, 26 and 40 or by shouldered spacing bolts 58 or both.

In operation the end 49 of the sheet to be wound is inserted between the jaw section 27 and the block 48 when the block is collapsed, the elements being in the dotted lines of the position of Fig. 1. Immediately the shaft 10 is started to rotate by a suitable control mechanism, not shown, the inertia of the elements 14, 15, 18, 23, 25 and 27 carried thereby causes the hub or sleeve 12 to be rotated relative to the other elements of the block and cause the jaw section 27 to be swung to the full line position of Fig. 1 to firmly grip the end of the metal against the block 48. The same movement of the section 12 swings the segments 23 and 25 outwardly to their full line positions and also the section 29 is shifted outwardly to fill the gap between the free ends of these segments, thus making a block having a continuous outer surface except for the small slot 50 and with no ridges or other openings to mark the metal being wound. It has been found in practice that any uneven surfaces in the

block or free openings would mark the finished metal and will show up in several layers of metal wound on the block which must, therefore, be cut off at the end of the reel and thrown away as scrap. The narrow slot 50 where the metal is gripped is unobjectionable. After the reel has been wound on the block the shaft 10 stops rotating and the momentum of the wound metal and other elements of the block cause them to shift relative to the sleeve 12 because of the lost motion between the keyway 17 and key 16, which will be opposite to the motion above described in expanding the block. The momentum, therefore, collapses the block reducing its outer diameter at the same time releasing the free end 49 of the metal strip and the entire coil of sheet metal may be easily removed by sliding it off the end of the block. The block may also be expanded or collapsed by holding the outer portion of the block and turning the shaft.

It will be apparent from the foregoing description that the construction is a very simple one and that the block can, therefore, be made of a strong and rigid construction. Also that the outer surfaces of the various sections and segments of the block are continuous when the block is expanded so there is nothing to mark the surface of the metal, thus reducing the amount of scrap which is produced by this block. Also that the operation of the block both in expanding and collapsing is automatic.

Having thus set forth the nature of my invention, what I claim is:

1. In a collapsible block, a shaft, a sleeve keyed to the shaft, a pair of spaced end plates mounted on the sleeve and keyed thereto in a manner to permit limited turning movement relative to the sleeve, a pair of segments mounted between the end plates and pivoted thereto, said segments extending in opposite directions from their pivots and spaced from each other at their free ends, a movable section capable of filling the spaced free ends when the block is expanded, longitudinally extending links pivoted at their opposite edges to the segments and the sleeve to swing the segments by relative turning movements of the end plates, and a gear connection from the sleeve to said section to shift said section to and from the gap between the free ends of the segments by said relative turning movements.

2. In a collapsible block, a shaft, a sleeve keyed to the shaft, a pair of end plates mounted for limited turning movement relative to the shaft, a pair of segments mounted between and pivoted to said plates and extending in opposite directions from their pivots, a radially movable section between the free ends of the segments and guided for sliding movements in said plates, links pivoted to the sleeve and the respective segments to swing them about their pivots, a rack on said sliding section, a gear meshing with said rack, and a connection from the sleeve to said gear for operating it.

3. In a collapsible block, a shaft, a segment, a gripping member mounted to project from the inner wall of said segment, said member being longitudinally tapered and mounted in a similarly tapered guideway in the segment, means for shifting the member longitudinally to vary the amount it projects from the segment, a movable clamping jaw arranged to cooperate with said member, pivoted segments forming the outer wall of the block, said segments and jaw being mounted for limited turning movement relative to the shaft, and connection between the shaft and said pivoted segments and jaw to shift them by said relative movements.

4. In a collapsible block, a drive shaft for rotating the block, a sleeve keyed to the shaft, a pair of spaced end plates mounted for limited turning movement relative to the sleeve, curved segments pivoted between the end plates and movable to and from the normal outline of the block, a section movable radially of the block and capable of closing the space between the free ends of the segments when the block is expanded, said section being connected with the sleeve for its operation, opposed longitudinal circular grooves in the inner walls of the segments and the outer wall of the sleeve and greater than a semi circle in cross section, and links extending longitudinally between the sleeve and segments and provided with cylindrical ribs along their opposite edges seated in said grooves to form pivotal connections.

5. In a collapsible block, a shaft, a sleeve keyed to the shaft, a pair of spaced end plates mounted for limited turning movement relative to the sleeve and having laterally extending grooves in their inner walls, a stationary segment secured to and mounted between the plates, a pair of curved segments pivoted to the plates one at each side of the stationary segment and extending in opposite directions therefrom, a pivoted jaw segment movable toward and from the stationary segment adapted to cooperate therewith to hold the metal to be wound, a radially movable section adapted to close the space between the free ends of the pivoted segments and having ribs at its opposite ends guided for sliding movements in the grooves in the inner walls of the end plates, a gear connection between the pivoted jaw and the sleeve, a gear and rack connection between the radially movable section and the sleeve, and link connections between the pivoted segments and the sleeve whereby the segments and sections are shifted by the relative turning movement of the plates.

6. In a collapsible block, a shaft, a sleeve keyed to the shaft, a pair of end plates

mounted for limited turning movement relative to the shaft, a pair of segments mounted between and pivoted to said plates and extending in opposite directions from their pivots, a radially movable section between the free ends of the segments and guided for sliding movements in said plates, and means operated by relative turning movement of the sleeve and plates to shift the segments and section to expand and collapse the block.

In testimony whereof I affix my signature.

ERNEST W. DUSTON.