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GRIPPING ELEMENT FOR FEED FINGERS

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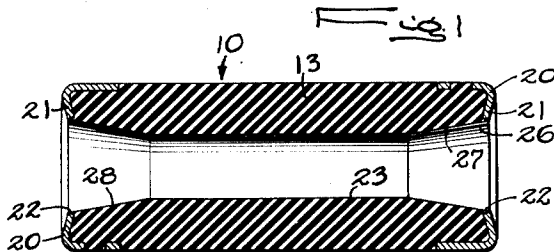
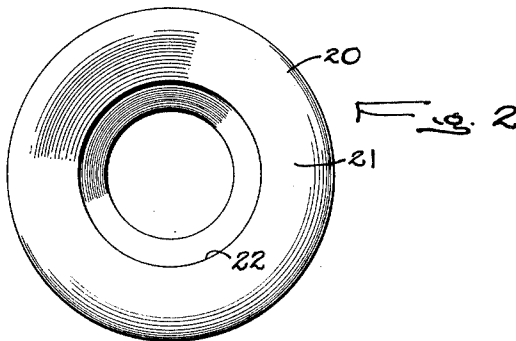
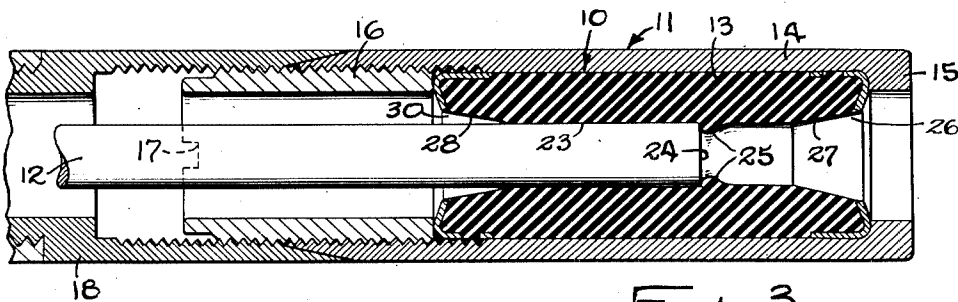
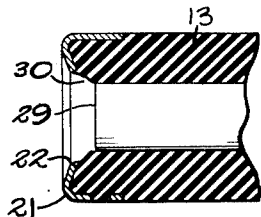


Fig. 4

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GRIPPING ELEMENT FOR FEED FINGERS

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1 Claim. (Cl. 279—96)

This invention relates to a gripping element for an automatic screw machine feed finger of the type in which the force for frictionally gripping the exterior of the work bar is produced by the axial compression of a sleeve of resiliently yieldable material such as rubber.

The general object is to prolong the service life of a gripping element of the above character without detracting from its effectiveness in gripping work bars of different sizes.

A more detailed object is to provide such a tubular gripping element having its interior contoured in a novel manner to prevent shearing or tearing out of the resilient material by the end of the work bar as the latter is forced through the element.

The invention also resides in the novel shaping of the interior of the gripping element.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a longitudinal cross-sectional view of a gripping element embodying the novel features of the present invention.

Fig. 2 is an end view.

Fig. 3 is a longitudinal sectional view of a feed finger and work bar illustrating the use of the improved gripping element.

Fig. 4 is a fragmentary view similar to Fig. 3 showing the work bar and gripping element in a different relation.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment. It is to be understood however, that I do not intend to limit the invention by such disclosure but aim to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claim.

The improved gripping element indicated generally at 10 is adapted for use in the so-called feed finger 11 of an automatic screw machine to frictionally grip the exterior of a work bar 12 and advance the bar step by step as the finger is reciprocated back and forth in successive cycles of the screw machine. In the form shown, the element includes a sleeve 13 of soft and resiliently yieldable material such for example as oil resistant synthetic rubber. The external diameter of the sleeves is only slightly less than the internal diameter of the tubular shell 14 of the feed finger in which the gripping element is received against an intumed flange 15.

The tube is longer than the gripping element 10 and its other end is internally threaded to receive the externally threaded end portion of a plug 16 which is adapted to engage the other end of the gripping element so that by screwing the plug into the shell 14, the rubber may be compressed around the work bar. Such axial adjustment may be effected by a suitable tool engaging a cross slot 17 on the plug. To mount the finger in a screw machine, the plug 16 projects beyond the end of the shell and is screw threaded into a tube 18 threaded at its outer end to fit into the feed head of a screw machine.

To enable the compressive force to be applied over the entire areas of the sleeve ends, the latter are preferably enclosed by cups 20 whose external surfaces are substantially flush with the exterior of the sleeve 13. Each cup has an intumed flange 21 whose inner edge defines a hole 22 which is aligned axially with the sleeve and is somewhat larger than the work bars to be handled.

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The flanges 21 abut rigidly against the ends of the sleeve and engage the plug 16 and the shoulder 15 so as to distribute the compressive force evenly around the sleeve.

Throughout a major portion of its length and spaced from at least one of its ends, the rubber sleeve 13 is formed with a continuous internal wall 23 of substantially the same uniform diameter and cross-sectional shape as the stock to be fed by reciprocation of the feed finger. For feeding cylindrical work bars, the wall is molded to a cylindrical contour. By virtue of the flowable character of the sleeve material, the sleeve wall 23 will be contracted radially as the sleeve is compressed axially, the magnitude of the gripping pressure being proportional to the amount of axial compression of the sleeve.

In feed fingers of the above character as heretofore produced, the internal wall of the sleeve has been made of uniform cross-section throughout its full length so that the rubber material completely fills the entire space defined within the shell around the exterior of the work bar and between the abutments 21. I have found that such complete filling of the space between the abutments frequently results in serious damage to the work-engaging rubber surface and the loss of effective gripping action after a comparatively short period of service use. This is due to the fact that as the squared and relatively sharp end 24 of each new work bar is forced through the gripping element, a part of the rubber rolls up just ahead of the bar end and bulges inwardly as indicated at 25. When the bar end approaches the leading abutment 21, it coacts with the edge 22 to tear or shear off a part of the rubber from the interior of the sleeve. As this action is repeated with the insertion of each new work bar, the sleeve soon becomes so deformed that its effectiveness in producing the desired gripping action is destroyed.

I have discovered that such complete initial filling of the space within the shell 14 with rubber is unnecessary to the attainment of the proper work gripping action and that the objectionable shearing off of the rubber in service use may be avoided by forming within the sleeve and adjacent the abutment 21 a cavity 26 which is of the proper contour and volume to receive the rubber 25 which rolls up ahead of the bar as it is forced through the sleeve. Preferably, the cavity extends around the entire interior of the sleeve and is defined by a continuous tapered surface 27 which gradually flares outwardly and axially of the sleeve beginning at a point spaced a short distance away from the abutment. Where as here, the main gripping portion 23 of the sleeve is cylindrical, the surface 27 is made frusto-conical tapering from the diameter of the sleeve wall 23 to the diameter of the abutment edge 22. The latter thus coincides with the base of the cone whose surface is herein concentric with the sleeve wall 23 and has a taper of about ten degrees.

A similar length 28 of the sleeve interior at the other end of the sleeve is flared outwardly not only to render the gripping element reversible within the shell 14 but also to avoid shearing off of the rubber at the other end 29 of the gripping element as the work bar is used up and its trailing end becomes disposed within the sleeve.

In service use, the gripping element, after mounting in the shell 10 and extension of a work bar therethrough, is compressed axially by screwing the plug 16 into the shell. This contracts the internal surface of the sleeve forcing the surface 23 of uniform diameter into firm gripping engagement with the exterior of the work while leaving thin cavities 26 and 30 between the surfaces 27 and 28 and the exterior of the bar. In the operation of the screw machine, the trailing end 29 of the work bar eventually moves into the sleeve 13 as illustrated in Fig. 4. In the next advance of the feed finger, any rubber which tends to roll up behind the bar end will, as the conical surface 28 reaches the bar end, flow outwardly into the cavity 30 before the bulge 25 encounters the abutment edge 22. The danger of any part of the rubber becoming pinched between the bar end and the edge and sheared off as the edge passes the bar end is thus avoided.

Similarly, when a new work bar is inserted, the bulge 25 which forms ahead of the bar end 24 as the latter moves through the surface 23, is dissipated as it enters the leading cavity 26 and before reaching the leading

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flange 22. This is due to the fact that the volume of the rubber material thus displaced by the bar in advancing through the sleeve bore while the latter is contracted radially to a diameter less than the bar is less than the volume of the cavity 26.

By shaping the interior of the sleeve as described above, the usefulness and service life of the gripping element is greatly extended without at the same time detracting from the effectiveness of the element in producing and maintaining the desired frictional gripping action throughout the use of the feed finger in feeding a succession of work bars through the screw machine.

I claim as my invention:

In a feed finger for frictionally gripping a workbar axially through successive strokes of the finger, a gripping element comprising a sleeve of resiliently yieldable material having an internal wall which is of cylindrical contour over the major portion of the sleeve length and over an end portion of such length is a conical frustum merging with the end of said cylindrical wall and flaring outwardly to the end of the sleeve, and rigid cups enclosing opposite ends of said sleeve and having intumed flanges abutting the sleeve ends and movable toward each other to compress the sleeve axially and thereby contract said

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cylindrical wall radially around the workbar, the aperture defined by the flange adjacent said conical wall being larger in diameter than said cylindrical wall and merging with the base of the conical wall at the end of the sleeve, said conical wall having a diameter at its base substantially larger than the diameter of the workbar and cooperating with the exterior of the workbar to form an annular tapering cavity adjacent the flange and increasing in radial thickness progressively toward the latter to provide space for disappearance of the internal bead of the sleeve material which forms behind the end of the workbar during the passage of the bar and through the feed finger in successive feeding strokes thereof.

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