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V. H. FRAY
HOPPER-FEED APPARATUS FOR METAL THREAD
SCREW BLANKS AND THE LIKE

2,639,445

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2 Sheets-Sheet 1

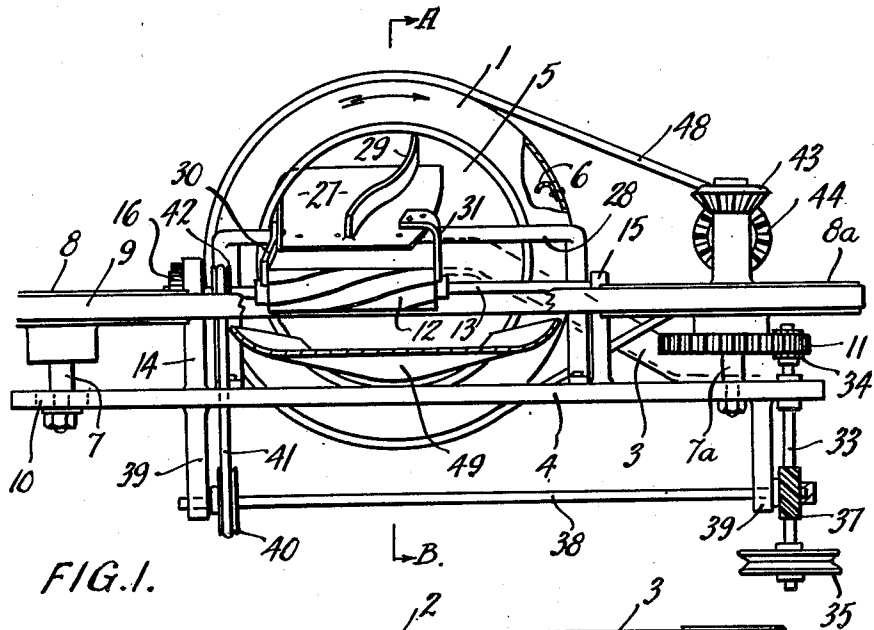


FIG. 1.

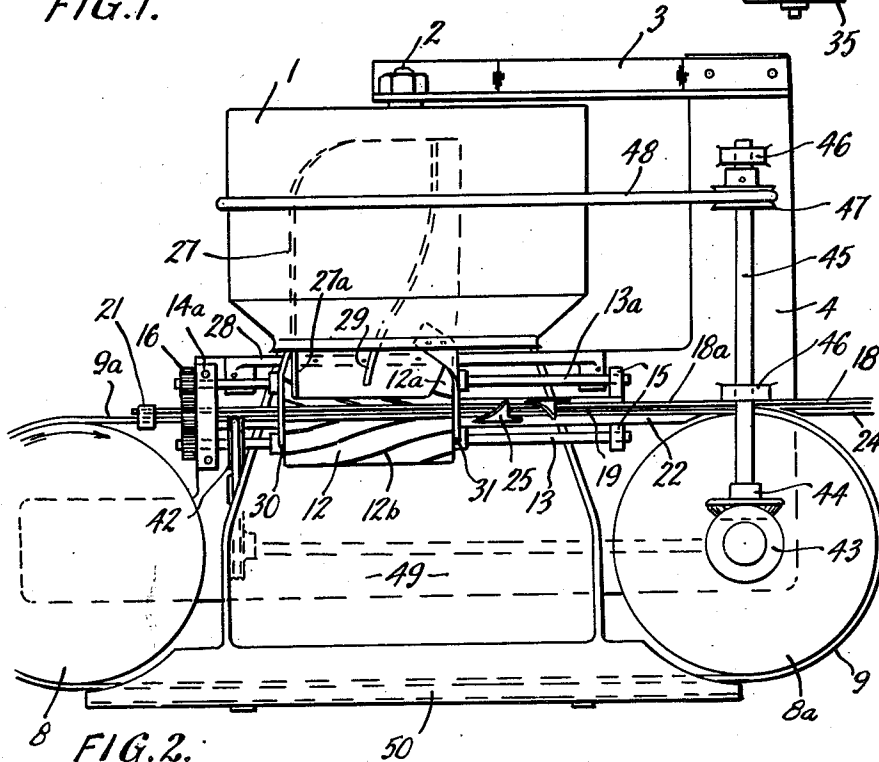


FIG. 2.

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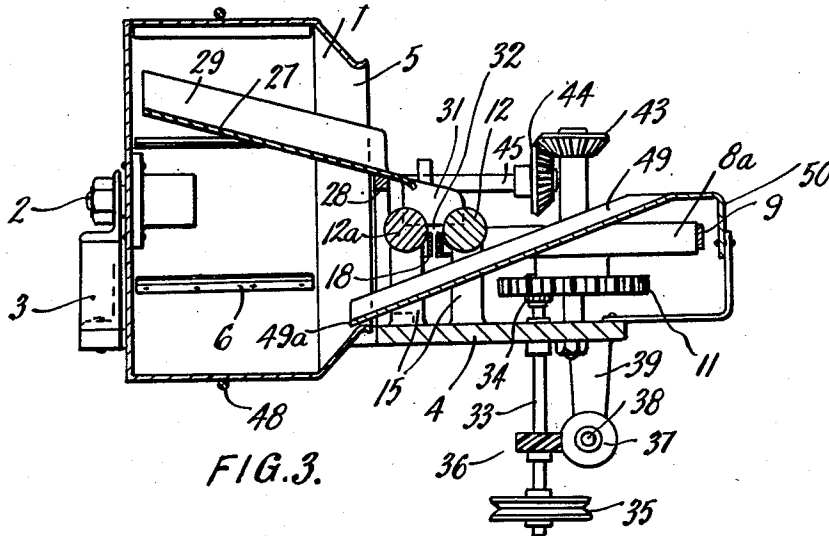
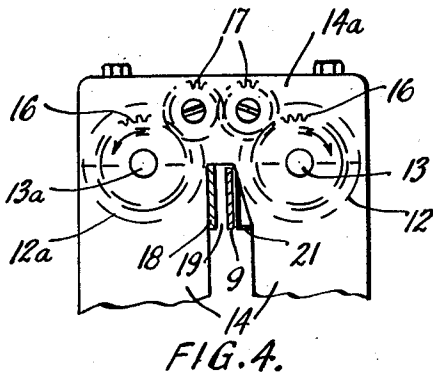
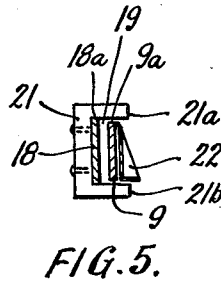
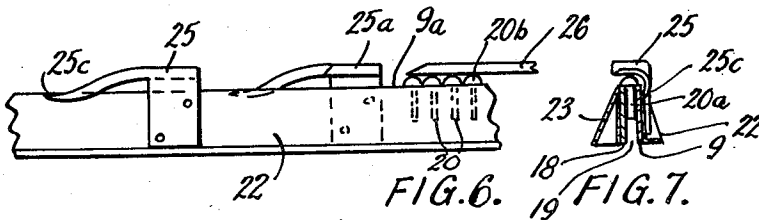
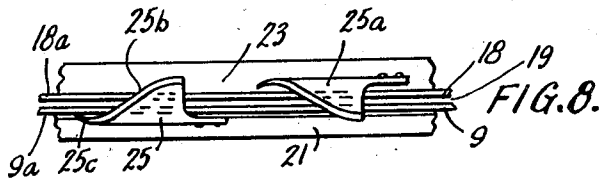
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HOPPER-FEED APPARATUS FOR METAL
THREAD SCREW BLANKS AND THE
LIKEVictor Hill Fray, Auckland, Auckland,
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4 Claims. (Cl. 10—170)

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This invention relates to hopper-feed apparatus whereby metal thread screw blanks and the like are placed into a hopper and are fed from same in a constant stream one behind the other in correct position to pass to machines such as thread rollers and screw nickers for receiving thread rolling and nicking treatment therein, the objects of the present invention being the provision of an improved hopper-feed apparatus which will effect its required operation at an increased speed which will render it capable of coping with the improved speed of operation of the thread rolling and screw nicking machines.

Hopper-feed apparatus for metal thread screw and the like blanks is known and is suitable for use in conjunction with the old slow speed thread rolling and nicking machines, but with improvements in the latter machines, the known hopper-feed apparatus is now incapable of keeping pace with the other machines and to provide several hoppers in an effort to supply the required feed of the blanks is clumsy, costly and troublesome.

My invention provides a hopper-feed apparatus of an entirely new form which will provide a supply of the screw blanks in excess of the numbers required to be fed to the thread rolling and to the screw nicking machines so that these latter will be kept fully engaged in their operations up to capacity.

Broadly the invention comprises improved hopper-feed apparatus for metal thread screw blanks and the like wherein a rotatable hopper for holding the blanks is provided with means for discharging batches of said blanks therefrom, such discharged blanks being deposited on to conveyor means including a traveling band and which present a gap in which the blank shanks can hang vertically parallel with the flat face of the band suspended with their heads bearing on the edge of the band of the conveyor means, means being provided for receiving the blanks as deposited from the hopper for agitating and spreading same on the conveyor means and means provided for ejecting blanks when incorrectly carried by the conveyor means.

In describing the invention, reference will be made to the accompanying drawings in which:

Figure 1 shows a front elevation of apparatus embodying the invention with the front part of the band and the tray broken away to enable the roller behind same to be seen, part of the hopper also being broken away to show a vane or blade therein.

Figure 2 is a plan view of Fig. 1.

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Figure 3 is a sectional end elevation on line A—B of Fig. 1.

Figure 4 is an enlarged end elevation of the roller bearings at the inward travel end of the band,

Figure 5 is an enlarged elevation of the band guide,

Figure 6 is an enlarged elevation showing the blank ejectors,

Figure 7 is a sectional end elevation of Fig 6 and

Figure 8 is a plan view of Fig. 6.

In the apparatus shown, a hopper 1 of cylindrical drum form is rotatably mounted on a horizontal spindle 2 which is secured to a suitable support 3 extending from a bedplate or frame 4, such hopper 1 having an opening at its front 5 and a number of longitudinally disposed vanes or blades 6 secured at suitable intervals to its inner periphery (see Figs. 1 and 3) suitable drive means being applied for effecting rotation of the hopper 1 as hereinafter referred to.

Two vertical spindles 7 and 7a rigidly secured to the bedplate or frame 4 rotatably carry band wheels 8 and 8a over which an endless conveyor band or belt 9, made of flexible ribbon steel or the like, is disposed to travel, the back portion of the band 9 being adapted to travel between the wheel 8 and wheel 8a across the hopper front opening 5 so that such band 9 by having its wide surfaces vertical presents a top conveying edge 9a.

The spindle 7 of the band wheel 8 may be disposed within a slotted hole 10 (see Fig. 1) in the bedplate 4 so as to enable movements of the spindle 7 for tensioning of the band 9, while the band wheel 8a may have means such as a gear wheel 11 secured thereto for receiving suitable power drive.

Disposed parallel with the band 9 at the portion of same adjacent to the hopper opening 5 there are two rollers 12 and 12a, the respective spindles 13 and 13a of which are rotatably carried in pairs of bearings 14 and 15 secured to the bedplate 4, the rollers 12 and 12a being so spaced apart as to present an opening between same which is preferably just a little more than wide enough to permit the heads of the screw or like blanks to pass, the surfaces of the rollers 12 and 12a having preferably helix grooves or the like 12b formed therein.

The ends of the roller spindles 13 and 13a extending beyond the pair of bearings 14 have gear wheels 16 secured thereto (see Fig. 4) and the bearing cover 14a carries two idler pinions

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17 which mesh with each other and with the respective gear wheels 16 so that the two rollers 12 and 12a will rotate at like speeds but in opposite directions as indicated by the arrows in Fig. 4 so as to act as means for agitating and for spreading the blanks on the conveyor means disposed parallel with such rollers 12 and 12a.

The top conveying edge 9a of the band 9 is substantially on the horizontal centre line between the two rollers 12 and 12a and this band 9 along with a thin but rigid bar 18 substantially closes the space between the rollers 12 and 12a, this rigid bar 18 being parallel with the band 9 and nearer to the hopper opening 5 and being rigidly carried as by being secured to the bearings 14 and 15, such rigid bar 18 and the band 9 having a vertical gap 19 between same which is such as to permit the shanks 20a of the screw or like blanks 20 (see Figs. 6 and 7) to pass freely into same with the heads 20b resting on the edge 9a of the band 9 and on the edge 18a of the rigid bar 18, the band 9 and the rigid bar 18 together presenting conveyor means for the blanks 20.

The rigid bar 18 extends beyond the bearings 14 and 15 and at the end thereof, in the vicinity of the wheel 8, it is adapted to carry a band guide 21 (see Fig. 5), such guide 21 having horizontal bars 21a and 21b between which the band 9 travels so as to maintain it in true travelling position on the wheels 8 and 8a.

Extending closely along the side of the band 9 opposite to that of the rigid bar 18 there is a rubbing strip or bar 22, this being as of triangular cross section (see Fig. 5) and carried as by the bearings 14 and 15 so as to prevent the band 9 from outward spring or whip action whereby it would cause the width of the gap 19 to vary.

A stiffening strip 23 also of triangular cross section (see Fig. 7) is secured to the rigid bar 18 for a short portion of its length as between the rollers 12 and 12a and the bearings 15; the rigid bar 18 carrying or beyond the present apparatus (if so desired) to form along with a further rigid bar 24 a chute of known form for conveying the screw or like blanks 20 to a screw nicking machine or thread roller machine as the case may be.

Suitably rigidly secured as to the rigid bar 18 or its stiffening strip 23 and to the rubbing strip 22 there are preferably two blank ejectors (see Figs. 6, 7 and 8) for the removal of blanks 20 which are not correctly carried by the band 9 and the rigid bar 18, these blank ejectors 25 and 25a each presenting a curved blade which has a sharpened and inclined leading edge 25b extending to a point 25c, the respective ejectors 25 and 25a being made of right and left hand form so that the points 25c will extend closely alongside and downward from the top edges 9a and 18a of the band 9 and rigid bar 18a respectively, while the leading edge 25b will be at such a height above such top edges 9a and 18a as to just permit the heads 20b of the blanks 20 to travel thereunder when correctly in place, a retaining bar 26 being secured (if so desired) closely above the band 9 and bar 18 (see Fig. 6) so as to ensure the blanks being retained within the gap 19 after they have passed the ejectors 25 and 25a up to the time they reach the point of discharge, such retaining bar 26 being well known in respect of chutes and the like for conveying screw and like blanks.

It is to be understood that in the handling of screw blanks 20 these may be of an eighth of an

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inch in size and have very short shanks 20 or have long shanks, those with short shanks of say quarter of an inch in length being most difficult to dispose within the gap 19, while the blanks with long shanks are easier to handle in that the shanks more readily tend to hang down within the gap 19.

It has been found that the ejectors 25 and 25a handle the blanks of short length and small size more satisfactorily than the known roller type ejectors, the latter tending to eject quite a number of the blanks following one which is incorrectly located, while the present ejectors remove only the one defectively placed blank.

Accordingly the improved ejectors are preferred in the case of small short length blanks, but in the case of an apparatus treating large and long shank blanks, the known roller type of ejector can be readily applied in the known manner.

An inclined hopper chute 27 which is rigidly secured to a support 28 secured to the bedplate 4, extends into the hopper 1 through the open end 5 thereof and terminates in a position above and in line with the space between the rollers 12 and 12a, such hopper chute 27 having a raised edge 27a and a baffle plate 29 for directing the blanks 20 towards the end of the rollers 12 and 12a nearest to the bearings 14, end plates 30 and 31, which may be rigidly carried by the hopper chute 27, extending across the ends of the rollers 12 and 12a so as to close the gap between same except in the case of the end plate 31 which leaves a sufficient space 32 (see Fig. 3) between the bottom edge of same and the top edges 9a and 18a of the band 9 and the rigid bar 18 to permit the heads 20b of the blanks 20 to pass.

Any suitable power drive may be applied for giving simultaneous drive to the hopper 1, band 9 and rollers 12 and 12a, one drive of suitable form comprising the provision of a vertical driving shaft 33 rotatably mounted to the bedplate 4 and having a pinion 34 in mesh with the gear wheel 11 of the band wheel 8a, such vertical driving shaft 33 also carrying a driving pulley 35 for receiving suitable belt drive and a skew gear 36 in mesh with a similar gear 37 on a countershaft 38 which is suitably carried in bearings 39 disposed under the bedplate 4, the countershaft 38 having a pulley 40 over which a belt 41 passes through a hole in the bedplate 4 to over a pulley 42 secured on one of the roller shafts 13.

For imparting drive to the hopper 1, the band wheel 8a may carry a bevel pinion 43 which meshes with a similar pinion 44 secured to a countershaft 45 which is mounted in bearings 46 extending up from the bedplate 4, this countershaft 45 having a pulley 47 secured thereto whereby a belt 48 can pass over same and over the hopper 1.

A suitable tray 49 is secured to the bedplate 4 and is inclined down to have its lip 49a extending into the lower portion of the open end 5 of the hopper 1, the front end of the tray 49 being suitably shaped to act as a guard 50 over the front portion of the band 9.

It will be noted that no legs are shown as giving support to the bedplate 4 and apparatus attached thereto, the reason for this being that the hopper-feed apparatus is complementary to a thread rolling machine or a screw nicking machine which carries the hopper-feed apparatus and the bedplate 4 of the latter may be integral with or attached to the bedplate of the machine

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to which the blanks are fed and the power drive for the hopper-feed apparatus obtained from such screw nicker or thread rolling machine.

Furthermore, the hopper-feed apparatus may be in an elevated position in relation to the screw nicker or thread roller apparatus and does not necessarily operate in the truly horizontal position as shown in Fig. 1, but may be inclined at an angle down towards the wheel 8a and the discharge point at the right of the machine so that gravity will assist the conveyor action of the band 9 in conveying the blanks 20.

It was originally proposed to have two traveling bands 9 with their respective wheels 8 and 8a, one of such bands taking the place of the present rigid bar 18, it being also originally proposed to pass the adjacent portions of the two bands through the centre of the hopper which had openings at both ends.

It has been found in actual practice that one traveling band 9 operates more satisfactorily than two bands in that the blanks tend to settle into position in the gap 19 more quickly and that the additional mechanism for two travelling bands was not warranted, it having also been found that by passing the bands through the hopper 1, the main working portion of the apparatus became too inaccessible.

In use or operation, the machine is set in motion so that the drive causes the hopper 1 to rotate in the direction as indicated by the arrow in Fig. 1, the rollers 12 and 12a are rotated outwardly as indicated by the arrows in Fig. 4 and the band wheels 8 and 8a are rotated clockwise as indicated by the arrow in Fig. 2, the blanks 20 to be hopper fed being deposited into the tray 49 over the guard portion 50 of the latter, such blanks 20 sliding down the tray 49 into the hopper 1.

The rotation of the hopper 1 causes its vanes or blades 6 to pass through the bulk of the blanks 20 and to carry quantities or batches of same upward until they roll off such vanes 6, the falling blanks 20 dropping on to the hopper chute 27 down which they slide to be directed by the raised edge 27a and the baffle plate 29 into the space between the rollers 12 and 12a and also on to the top edges 9a and 18a of the band 9 and the rigid bar 18 between such rollers 12 and 12a.

The blanks 20 fall in heaps or batches at short intervals and because of the outwardly rotating rollers 12 and 12a, are spread about between the end plates 30 and 31 so that in the main, the shanks of the blanks 20 enter the gap 19 and the heads 20b rest on the edges 9a and 18a to travel along the gap 19 through the space 32 below the end plate 31.

The action of the rollers 12 and 12a is also such as to agitate and move about the blanks 20, the helix grooves 12b in such rollers 12 and 12a catching the corners of the heads or shanks of the blanks and in the event of a blank of a larger size than those being treated getting into the apparatus, it will get thrown out by the rotating rollers as being unable to pass between same because of its head being too large in size.

The main bulk of the blanks very quickly assume correct position in the gap 19 and are caused to travel because of the movement of the band 9 assisted by gravity in the event the apparatus is inclined, but on occasion when handling very small and short blanks, one will come to rest across the gap 19 on top of the top edges 9a and 18a.

To assume such an incorrect position, the

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shank of the blank must extend outwardly beyond either the band 9 or the rigid bar 18, in that in any other position its shank could drop down into the gap 19.

Accordingly, with the shank of the blank extending out beyond the band 9, it would encounter the inclined leading edge 25b of the ejector 25 and this would cause such blank to be moved sideways so as to roll over the rigid bar 18 and to drop into the tray 49 to again pass back to the hopper 1.

The incorrectly placed blank may have its shank extending towards the rigid bar 18 side of the gap 19, in which case it may pass the ejector 25 to then encounter the ejector 25a and be removed thereby.

The blanks 20 within the gap 19 having passed the two ejectors 25 and 25a then travel along the conveyor and pass off the band 9, they being then supported by some additional mechanism, such as the rigid bar 18 or an extension thereof and the further rigid bar 24 which convey the blanks as by gravity plus the weight of blanks behind to the screw nicker or thread rolling machine.

I claim:

1. Improved hopper-feed apparatus for headed metal thread screw blanks and the like wherein a hopper for holding the blanks is provided with means for discharging said blanks therefrom, such discharged blanks being deposited onto conveyor means formed in part by a traveling band and which presents a gap in which gap the blank shanks can hang vertically parallel with the adjacent face of the band suspended with their heads bearing on the conveyor means, means for ejecting blanks when incorrectly carried by the conveyor means, and means for receiving the blanks as deposited from the hopper and agitating and spreading same on the conveyor means comprising a pair of rotatably mounted power driven rollers disposed parallel with the conveyor means and having a space between same the bottom of which is closed by such conveyor means, the surfaces of such rollers having helix grooves or the like formed therein and rigidly mounted end plates extending across the ends of the rollers to close the gaps between same except for a space between the bottom edge of one end plate and the top of the conveyor means.

2. Improved hopper-feed apparatus for metal thread screw blanks and the like comprising a hopper of cylindrical drum form rotatably mounted on a horizontal spindle secured to a support extending from a bedplate or frame, an open front to said hopper and vanes or blades on the inner periphery of said hopper, two vertical spindles secured to the bedplate with band wheels rotatable thereon on which an endless conveyor band travels, a rigidly supported guide for such band, a rigid bar disposed parallel with the portion of band adjacent to the open front of the hopper with a gap between such rigid bar and the band, two rotatably mounted rollers disposed parallel to the rigid bar and band with a space between which is closed by said rigid bar and band, a rigid rubbing strip for the band and a stiffening strip for the rigid bar, a rigidly mounted hopper chute extending into the hopper through the open end thereof to terminate in a position above the rollers, rigidly supported end plates extending across the ends of the rollers, rigidly supported blank ejectors disposed over the rigid bar and band, tray means with a lip extending into the open end of the hopper

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and power drive means for effecting simultaneous rotation of the hopper, the rollers and the band wheels.

3. A feeding apparatus for headed screw blanks and the like comprising an endless band the width of which is greater than the thickness thereof, spaced band wheels rotatably supported with their axes disposed vertically and having the said band extending thereabout for driving thereby, a guide member extending along a portion of said band in horizontally spaced relationship thereto thereby providing an elongated gap therebetween with the surface of said band corresponding to the width thereof comprising a vertically disposed side of said gap, the distance between said guide member and band being less than the transverse dimension of the heads of the blanks and greater than the transverse dimension of the shanks thereof, means for supplying blanks to said gap in oriented condition so that the shanks of the blanks enter said gap and the heads of such blanks are supported on the upper edge of said band with the shanks prevented from appreciable tilting transverse of said gap by the said surface of the band and said guide member, and means to rotate at least one of said band wheels thereby causing the blanks to be fed through said gap in single file order with their heads uppermost.

4. A feeding apparatus for headed screw blanks and the like comprising a cylindrical drum-type hopper mounted for rotation about a horizontal axis, an endless band, a pair of band wheels rotatably supported with their axes extending verti-

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cally and in horizontally spaced relationship with the said band extending about said wheels for driving thereby, a guide member extending along a portion of said band in horizontally spaced relationship thereto thereby providing an elongated gap therebetween with the face of said band corresponding to the width thereof comprising a vertically disposed side of said gap, a pair of elongated rollers rotatably supported above said gap with their axes extending substantially horizontally and spaced to provide an elongated opening between the rollers substantially aligned with said gap, a chute extending from the discharge of said hopper to a location above said rollers, and means to rotate said rollers, band wheels and hopper, whereby blanks in the hopper are delivered therefrom by said chute to said rollers and are deposited by the latter in said gap in oriented condition with the shanks of the blanks extending therein and with the heads of the blanks resting upon said band whereupon the oriented blanks are carried along said gap in single file order by said band.

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