Dec. 7, 1926. 1,609,994

L. M. ELLIS

AUTOMATIC FEED MECHANISM

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Fig. 1.

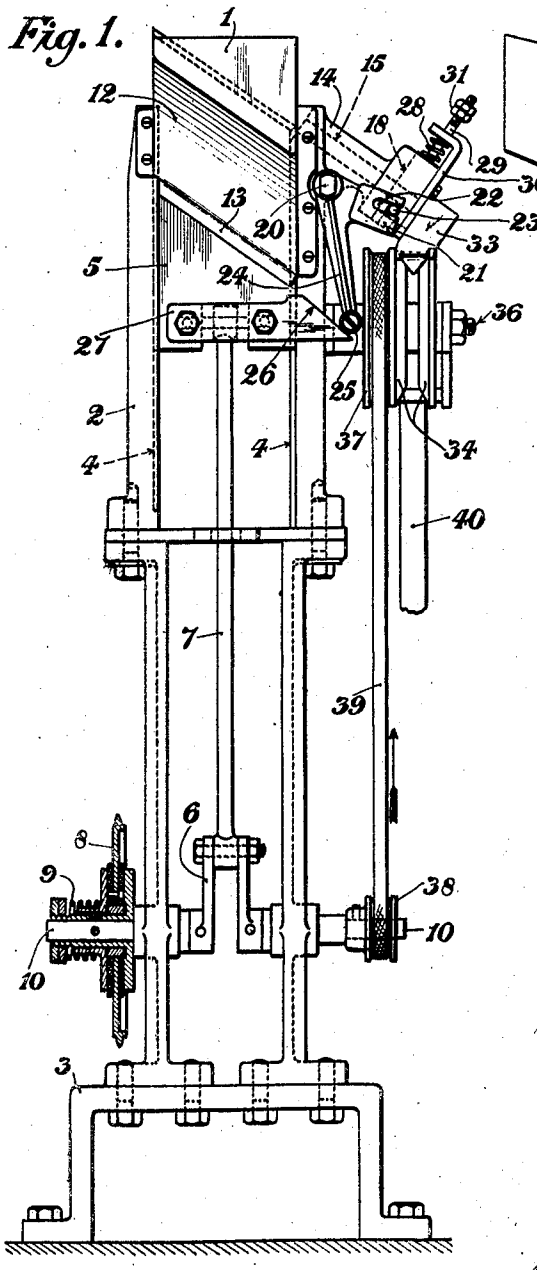
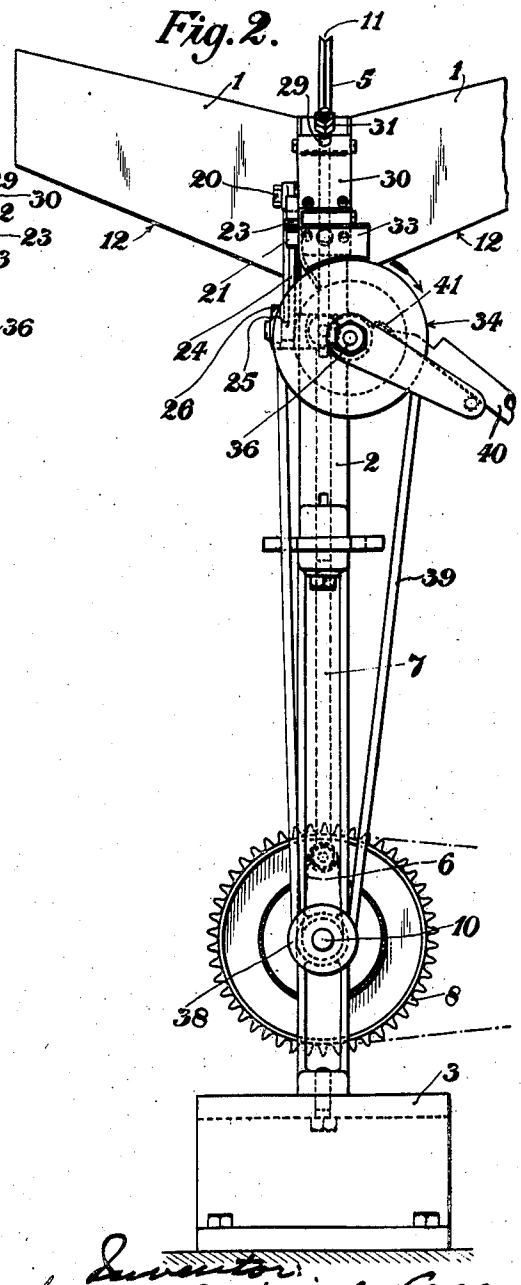


Fig. 2.



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AUTOMATIC FEED MECHANISM

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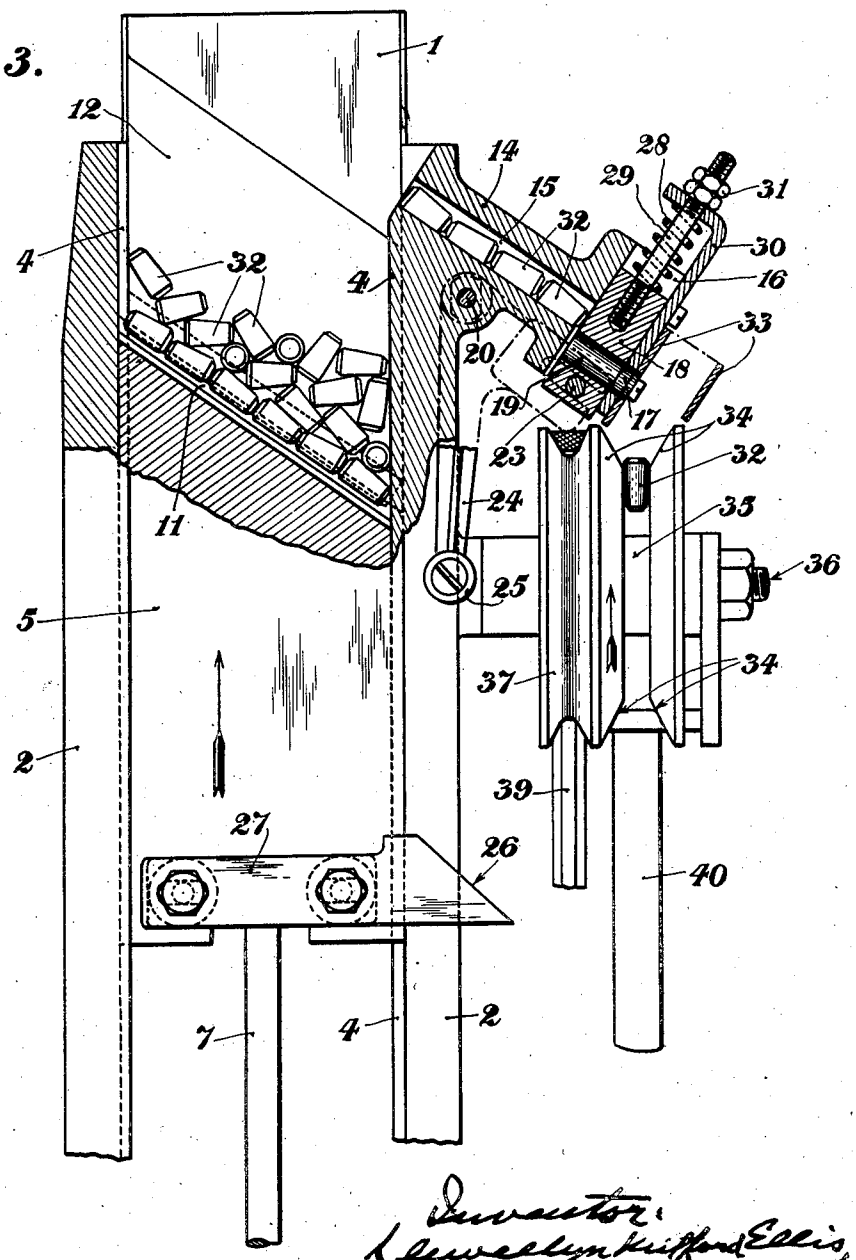
Fig. 3.



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AUTOMATIC FEED MECHANISM

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Fig. 4.

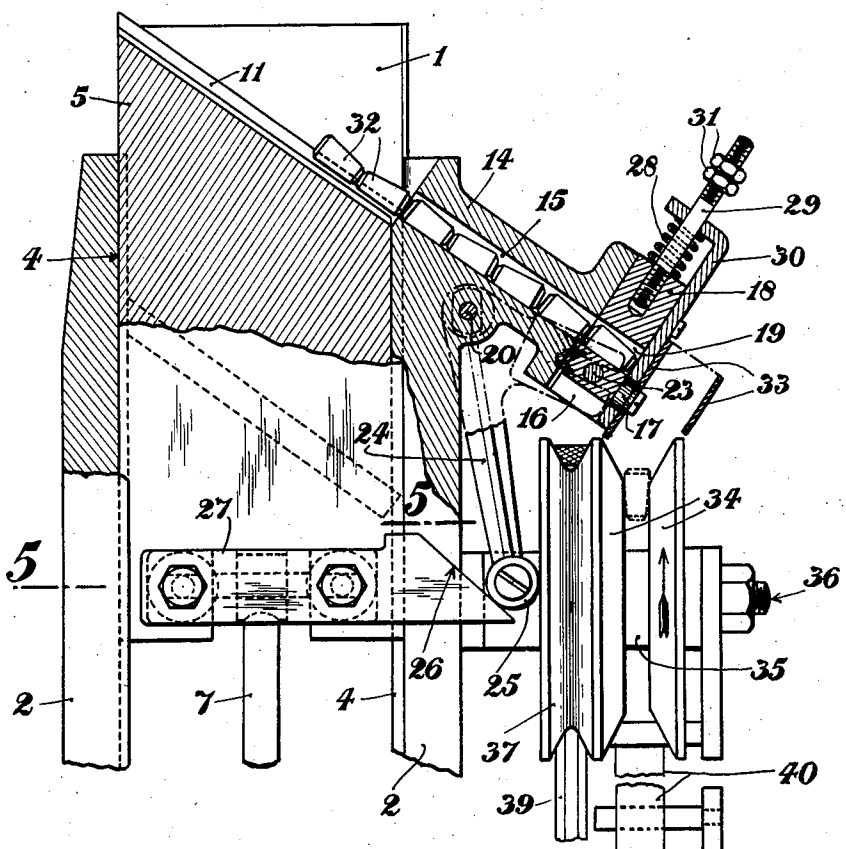
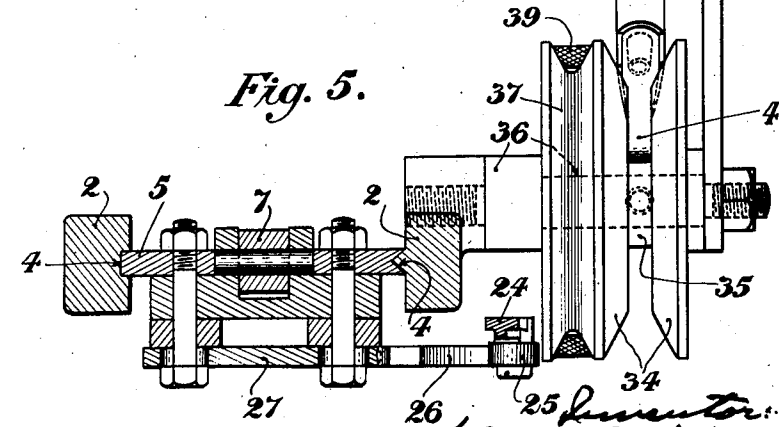


Fig. 5.



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AUTOMATIC FEED MECHANISM

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Fig. 6.

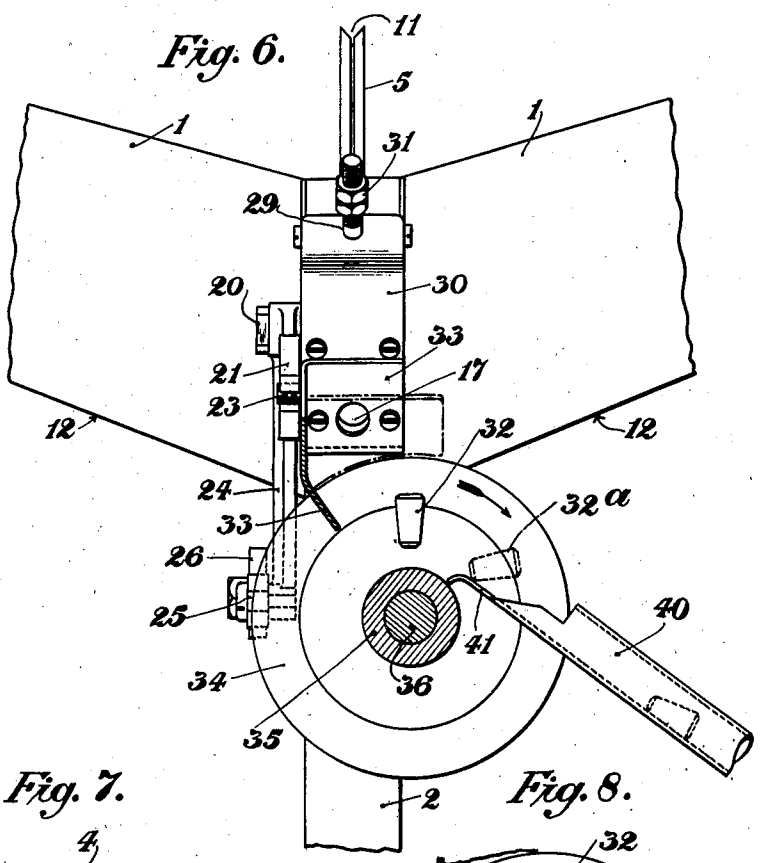


Fig. 7.

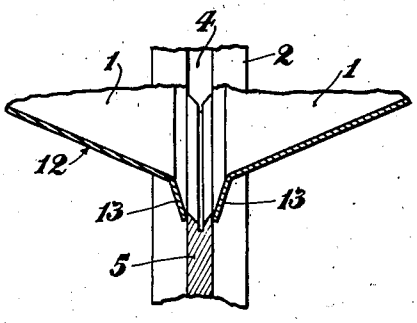
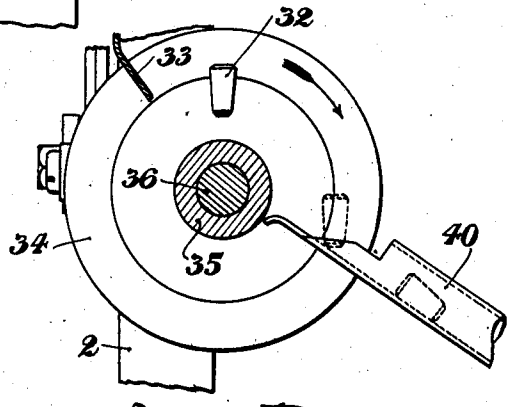


Fig. 8.



Inventor:
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Patented Dec. 7, 1926. 1,609,994

UNITED STATES PATENT OFFICE.

LLEWELLYN MILFORD ELLIS, OF BIRMINGHAM, ENGLAND, ASSIGNOR TO THE TIMKEN ROLLER BEARING COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO.

AUTOMATIC FEED MECHANISM.

Application filed April 5, 1924, Serial No. 704,545, and in Great Britain March 11, 1924.

The object of the present invention is to provide improved and efficient feed mechanism for automatically delivering taper or other bearing rollers, screws, rivets or other analogous articles.

The improved feed mechanism comprises essentially a hopper or container for the rollers or articles to be delivered, and a reciprocating member or plate moving up and down within the hopper or container, and adapted on each up-stroke to raise a certain number of the rollers or articles opposite, or adjacent to, a passage or opening through which they are caused automatically to be delivered. The rollers are preferably fed into a reciprocating delivering member or slide which carries them one at a time opposite an opening through which they may fall or pass. Where the feed mechanism is employed for taper bearing rollers, such as for feeding them on to a grading machine, it is preferably arranged to deliver the said rollers on to a specially constructed wheel adapted to cause them to be delivered on to a chute in such a manner that the larger ends of all the rollers face the same direction, the said chute being arranged, for example, to convey the rollers to the grading machine.

Figure 1 of the accompanying drawings is a front elevation of the improved feed mechanism, as constructed in accordance with this invention, and as adapted for automatically feeding or delivering taper bearing rollers.

Figure 2 illustrates a side elevation of the improved feed mchanism.

Figure 3 is a sectional view through the upper portion of the feed mechanism on a larger scale, showing the reciprocating member or plate at the bottom of its stroke and in the act of moving upwards, the view also showing, in section, the feed-passage to which the rollers are conveyed.

Figure 4 is a sectional view showing the reciprocating member or plate at the top of its stroke, and illustrating the manner in which the rollers move from the said member or plate into the feed passage.

Figure 5 represents a section on the line 5—5, Figure 4.

Figure 6 is a view of the wheel between the flanges of which the rollers are caused to drop, before being delivered to the chute.

Figure 7 illustrates a sectional view through the bottom of the hopper showing the manner in which the reciprocating member or plate is arranged to pass therethrough.

Figure 8 shows the manner in which the chute is arranged when it is desired for the rollers to be delivered with their larger ends facing the opposite direction.

The same reference numerals indicate corresponding parts in each of the figures.

Referring to Figures 1 to 7 of the drawings, the improved feed mechanism comprises a hopper or container 1 which is carried by the upper ends of a pair of vertical standards 2, which are laterally separated and carried by a suitable base 3. The upper portions of these standards 2 are formed along their opposed faces with vertical guides 4 for engaging the longitudinal edges of an elongated plate 5. This plate is adapted to be moved up and down along the guides 4 by means of a crank 6 to which it is attached by a connecting rod 7, the crank being carried by a shaft 10 mounted within suitable bearings in the lower portion of the standards 2 and adapted to be rotated through the medium of a sprocket wheel 8, which may be frictionally held upon the shaft by a coiled spring 9; or other means may be employed for effecting the rotation of the shaft. The upper edge of the plate 5 is inclined, as shown in Figures 3 and 4, the said edge being formed throughout its length with a V-groove 11 (Figure 7) adapted to receive and hold a number of the rollers end to end. The bottom of the hopper 1 is of a broad V-formation, as will be seen from Figure 2, its extreme lower end or apex, formed by the lower opposed edges of the two inclined bottom members 12 being also inclined in the transverse direction of the hopper as clearly illustrated in Figure 1, the inclination of the said lower end corresponding to the inclined upper edge of the plate 5. The lower edges of the two inclined bottom members 12 of the hopper 1 are separated from one another by a narrow slot just sufficiently wide to receive the reciprocating plate 5, the upper edge of the latter lying just within the slot, at the bottom of the hopper, when the plate is at the bottom of its stroke, as shown in Figure 7, the said lower edges of the bottom members 12 being bent down into flanges 13 which embrace

the sides of the plate. The said plate 5 is arranged as it is moved upwards by the crank 6 to pass centrally through the hopper 1, so that it assumes the position shown in Figure 4 when at the top of its stroke, the plate then moving downwards until it is approximately level with the bottom of the hopper when the upward movement is repeated. The guide faces of the upper ends of the standards 2 extend slightly through the sides of the hopper which are fashioned to receive them, and carried by the upper end of one of the said standards is an integral downwardly-inclined arm 14 which is formed with an open-ended axial passage 15 which constitutes the feed-passage. The upper open end of this feed-passage is arranged to come level with the lower end of the groove 11 in the inclined upper edge of the plate 5 when the latter is at the top of its stroke. The lower end of the feed passage 15 terminates in a passage 16 at right-angles thereto which is formed in the enlarged end of the arm 14, the said passage 16 having an aperture 17 in its walls, near its lower end which is disposed below the end of the feed passage 15 and upon the opposite side of the said passage 16, as shown, the said aperture being sufficiently large to allow of a roller passing endwise therethrough. Slidably mounted within this passage 16 is a carrier member or slide 18 having a transverse passage 19 therethrough sufficiently long to receive one roller at a time when arranged axially therein. This passage 19 is arranged to come immediately opposite and in alignment with the end of the feed passage 15, and after receiving one of the rollers from the latter is adapted to be moved opposite the aperture 17 through which the roller may fall, the passage 19 being inclined to the horizontal. For this purpose a reciprocating movement is imparted to the carrier member 18. This movement is automatically effected so that it is in synchronism with the movement of the plate 5, the upward movement of the carrier member being obtained through the medium of a bell-crank lever fulcrumed at 20 to the adjacent standard 2. The one arm 21 of the said lever is slotted at 22 to receive a trunnion 23 fixed to the side of the carrier member and working within a slot in the side of the passage 16. The other arm 24 of the bell-crank lever extends downwards, and carries a roller 25 at its extremity which is adapted to be engaged by the inclined cam-end 26 of a plate 27 bolted to the lower end of the plate 5, so that as the plate 5 moves upwards the arm 24, which normally lies in a substantially vertical plane, is forced outwards, thereby causing the arm 21 of the bell-crank to move upwards, the latter turning about its fulcrum 20. The carrier member 18 is thus moved upwards within the passage 16 until the transverse passage 19 therein lies in alignment with the feed passage 15. The plate 5 now commences its downward stroke, the cam-plate 27 likewise moving downwards away from the arm 24 of the bell-crank. As soon as this downward movement takes place the carrier member 18 is caused to be moved downwards by means of a coiled compression spring 28. This spring is disposed upon a pin 29 at the upper end of the carrier member or slide, the one end of the said spring bearing against the end of the latter whilst its other end bears against the upper end of an arm or bracket 30 fixed to the outer end of the arm or extension 14, the said upper end of the arm 30 being bent over at right-angles and having a hole therein through which the rod 29 passes. The spring 28 is caused to move the carrier member 18 downwards until the passage 19 is brought opposite the aperture 17, when further downward movement is prevented by stop-nuts 31 upon the end of the rod 29 which then engage against the end of the arm 30.

The taper rollers 32 are placed within the hopper or container 1. When the plate 5 is at the bottom of its stroke its grooved upper edge lies substantially level with the bottom of the hopper, and as the said plate moves upwards a number of the rollers lodge within the groove 11 in the inclined upper edge of the plate and are carried by the latter towards the top of the hopper. When the plate 5 reaches the top of its stroke the lower end of the groove 11 lies opposite the feed-passage 15, as above stated, when one or more of the rollers 32 are caused by gravity to enter the said passage endwise. At the moment when the plate 5 is at the top of its stroke the passage 19 in the carrier member or slide 18 is opposite the feed passage 15, and consequently one of the rollers is caused to enter the said passage 19, as illustrated in Figure 4. The plate 5 now commences to move downwards whilst the carrier member 18 is likewise moved downwards by the spring 28 at the same time, moving the roller contained within the passage 19 opposite the aperture 17 through which the said roller then falls. More rollers are again brought to the top of the hopper as the plate 5 again moves upwards when another roller enters the feed passage to replace the roller which has been removed. At this instant the passage 19 is again brought opposite the feed-passage by the cam-operated bell-crank and receives another roller, which is brought opposite the aperture 17 through which it falls, as above described. This process is repeated as long as any rollers remain in the hopper, the rollers being fed one at a time through the aperture 17 at intermittent intervals. Should any roller not lie lengthwise within the groove in the plate 5 as the

latter reaches the top of its stroke it cannot enter the feed passage 15, which is of a diameter only slightly larger than the largest diameter of the rollers, so that it is again carried down with the plate on its succeeding down-stroke, when a fresh set of rollers, which may lie correctly within the groove, are again brought opposite the feed passage on the following up-stroke. Should the roller be prevented from entering the feed passage for this reason the regular intermittent feed of the rollers through the aperture 17 is not interrupted, owing to the number of rollers always contained within the feed passage, only one of which is removed at a time.

Where the rollers are to be fed on to a grading machine, as in the present instance, it is desirable that all of the rollers should be fed on to the machine with their larger ends facing the same direction. This result is obtained in the following manner:—As the rollers 32 are fed intermittently through the aperture 17 they are arranged to fall on to a rotating feed-wheel of a particular construction, being guided on to the latter by a suitably shaped guide-plate 33 attached to the outer end of the arm 14. This feed-wheel comprises two flanges 34 which are separated by a deep annular parallel-sided groove or channel 35 of a width slightly less than the diameter of the largest ends of the rollers, the outer peripheral portions of the opposed faces of the two flanges, being bevelled or inclined, as shown. This feed-wheel is disposed immediately beneath and adjacent to the aperture 17 and is fixed upon a shaft 36 mounted within a bearing carried by one of the standards 2, near its upper end. The shaft 36 carries a pulley 37 whereby it is rotated, the said pulley being driven from a wheel 38 upon the one end of the crank-shaft 10 through the medium of the belt 39, so that the feed-wheel comprising the separated flanges 34 is rotated during the whole of the time the machine is in operation. Arranged adjacent the said feed wheel is a chute 40 which conveys the rollers 32 to the grading machine, the one end of the chute, which is formed with a lead 41, being arranged to project between the flanges 34 of the feed-wheel, as clearly shown in Figure 6.

Referring particularly to Figure 6: As the rollers are fed through the aperture 17 they are caused by the guide-plate 33 to fall upon the top of the feed-wheel between the flanges 34, and since their smaller ends can pass between the latter they hang vertically, supported by their larger ends, which cannot pass between the flanges, with their smaller ends downwards, as illustrated in full lines in the aforesaid figure. The feed-wheel is arranged to rotate in a direction towards the chute 40 which is arranged as shown, and when the said wheel has passed through a portion of a revolution (less than one quarter) the smaller end of the roller 32, which latter is carried round with the wheel, is caused to strike against the lead 41 of the chute 40 which projects between the flanges 34 as previously stated. This position is shown by dotted lines at 32^a, Figure 6. The said smaller end is thus arrested whilst its larger end moves on until the said roller lies lengthwise upon the chute 40, with its larger end presented downwards. The roller then slides down the chute by gravity to the grading machine. The whole of the rollers are fed through the aperture 17 on to the said wheel in a similar manner and consequently they are all fed on to the chute with their larger ends facing the same direction.

By arranging the chute 40 a little distance below the position illustrated in Figure 6, so that the smaller ends of the rollers do not come into contact with the lead-end of the chute 40, each roller hangs vertically with its smaller end downwards during the whole time it is supported by the wheel, that is during approximately a quarter of a revolution of the latter, as shown in Figure 8. The roller then leaves the wheel, its smaller end engaging or striking the chute 40, which owing to its inclination causes the roller to pass down the said chute with its smaller end foremost, instead of its larger end being presented foremost as in the previous arrangement. It will thus be seen that the rollers may be delivered with their larger ends facing either direction, as desired.

Although the improved feed mechanism is particularly adapted for automatically delivering taper rollers, it may be used for delivering parallel-sided rollers; or it may be employed for delivering or feeding headed or other screws, rivets, or other analogous articles, the mechanism being modified accordingly.

Having fully described my invention, what I desire to claim and secure by Letters Patent is:—

1. Automatic feed mechanism comprising a hopper for the articles to be delivered, an inclined feed chute, a reciprocating member movable vertically within the hopper and having an inclined upper edge provided with a groove for holding the articles, the said reciprocating member being adapted to raise the said articles opposite to the feed chute and to cause them to pass therethrough, a transfer slide movable transversely across the lower end of the feed chute, said slide having a passage adapted to receive an article from the chute, a guide for the transfer slide having a delivery opening out of alinement with the feed chute, a spring acting upon the transfer slide to move the same until the receiving passage

in the slide is opposite to the delivery opening in the guide, a cam carried by the reciprocating member in the hopper, and a bell-crank lever having one arm connected to the transfer slide and the other arm adapted to be engaged by the cam, whereby the said transfer slide is moved against the action of the spring to bring the receiving passage therein into register with the feed chute.

2. Automatic feed mechanism for taper bearing rollers comprising a hopper for the said rollers, means for causing the rollers to pass one at a time through a discharge aperture, a wheel disposed beneath the discharge aperture and having separated flanges adapted to receive the rollers between them, so that the latter are supported between the flanges by their larger ends which are disposed uppermost, and a chute disposed beneath the wheel so as to receive the rollers from the latter, so that the said rollers pass down the chute with their larger ends all facing the same direction.

3. Automatic feed mechanism for taper rollers comprising a hopper for the articles to be delivered, an inclined feed passage, a reciprocating member having an inclined upper edge provided with a groove for holding the rollers, the said member being adapted to raise the latter opposite the feed passage and cause them to pass therethrough, a cam carried by the reciprocating member, a sliding member operated by the cam and disposed at the lower end of the feed passage, the said sliding member being adapted to receive one roller at a time and to cause same to pass through a discharge opening, a wheel disposed beneath the discharge opening and having separated flanges adapted to receive the rollers between them, so that the latter are supported between the flanges by their larger ends which are disposed uppermost, and a chute disposed beneath the wheel so as to receive the rollers from the latter, so that the said rollers pass down the chute with their larger ends all facing the same direction.

In testimony whereof I have hereunto set my hand.

LLEWELLYN MILFORD ELLIS.