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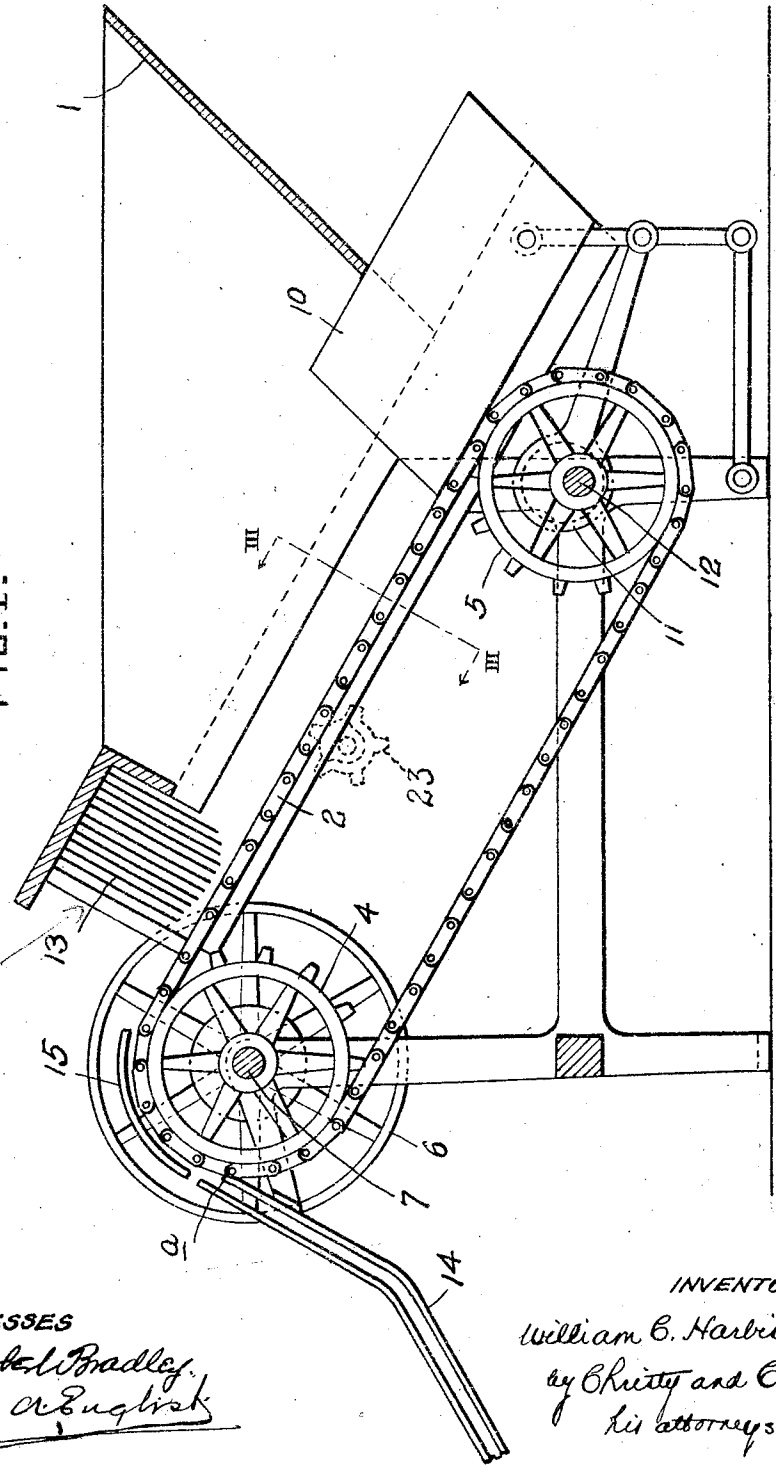
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FEED MECHANISM FOR BOLTS

Filed May 5, 1924 3 Sheets-Sheet 1

Power Stp

FIG. 1.



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FEED MECHANISM FOR BOLTS

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FIG. V.

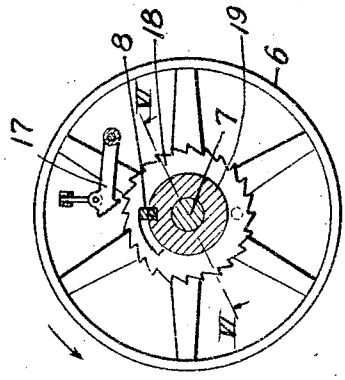


FIG. VI.

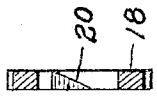


FIG. III.

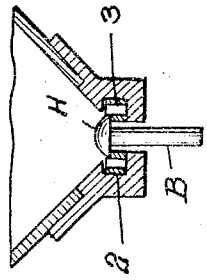


FIG. IV.

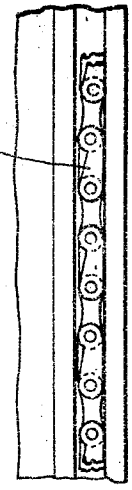
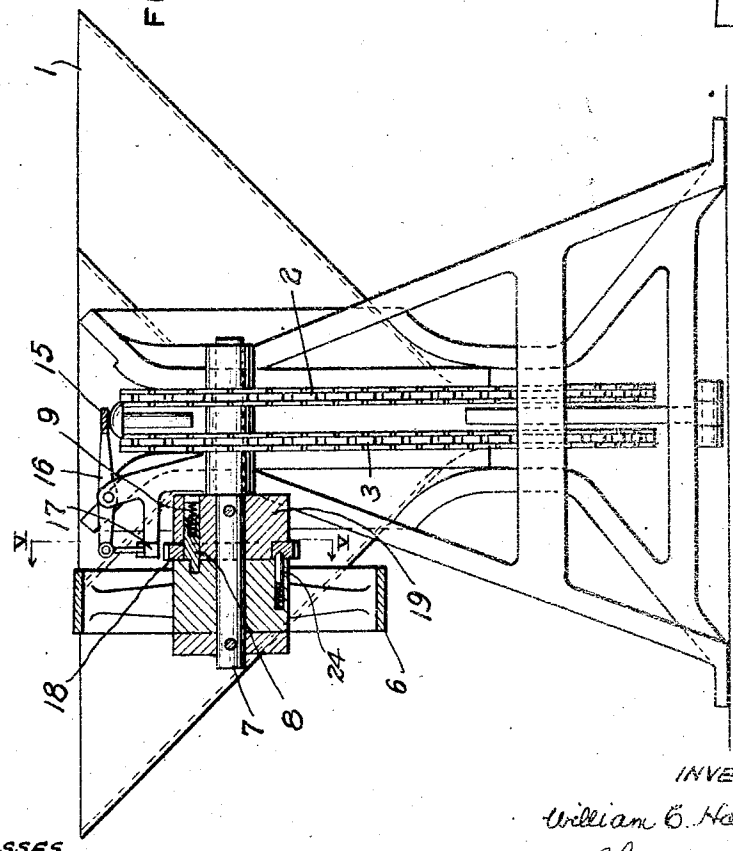


FIG. II.



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FEED MECHANISM FOR BOLTS

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FIG. VIII.

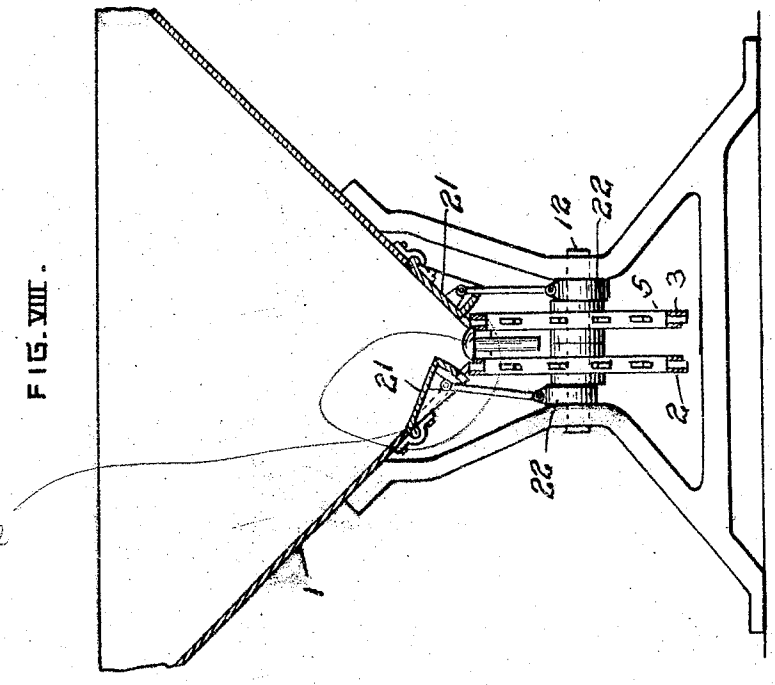
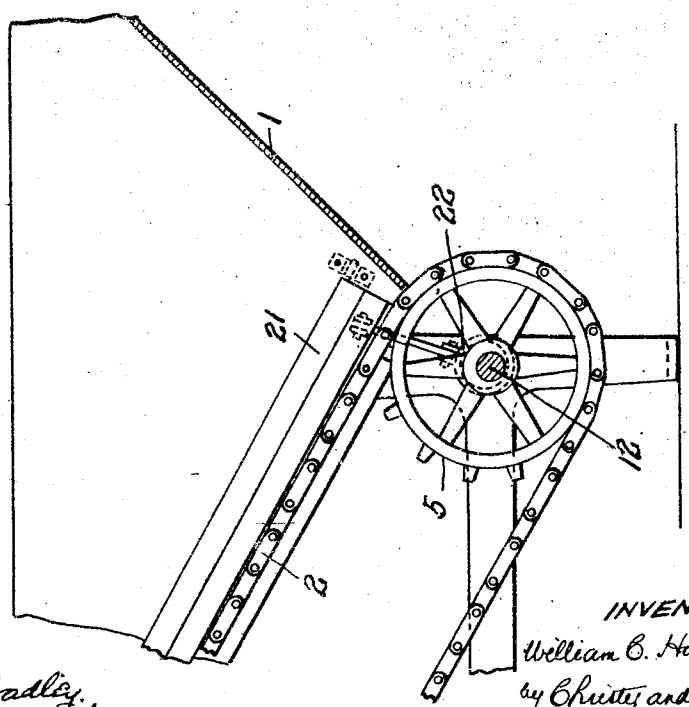


FIG. VII.



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Patented Aug. 25, 1925. 1,550,803

UNITED STATES PATENT OFFICE.

WILLIAM C. HARBISON, OF BUTLER, PENNSYLVANIA.

FEED MECHANISM FOR BOLTS.

Application filed May 5, 1924. Serial No. 711,071.

To all whom it may concern:

Be it known that I, WILLIAM C. HARBISON, residing at Butler, in the county of Butler and State of Pennsylvania, a citizen of the United States, have invented or discovered a certain new and useful Improvement in Feed Mechanism for Bolts, of which improvement the following is a specification.

My invention relates to feed mechanism for bolts, in which bolts dumped in a mass into a hopper may be fed one by one and uniformly positioned to a nut applying machine or for other ends.

I have developed it specifically for feeding bolts to the nut and bolt assembling machine which is described in an application for Letters Patent of the United States filed by James Craig and Charles C. Thompson, March 1, 1924—Serial No. 696,189.

The mechanism in which my invention so developed is embodied, is illustrated in the accompanying drawings. Fig. I is a view of the apparatus in vertical and longitudinal section. Fig. II is a view in end elevation as seen from the left, Fig. I, with certain parts shown in vertical section. Fig. III is a fragmentary view in transverse section, on the plane indicated by dotted line III—III, Fig. I. Fig. IV is a fragmentary view, showing in side elevation a certain sprocket chain in place in the hopper. Fig. V is a view in section, on the plane indicated at V—V, Fig. II. Fig. VI is a view in diametrical section of a certain clutch-shifting ring, the plane of section being indicated in Fig. V by the line VI—VI. Figs. VII and VIII are fragementary views in longitudinal and transverse section of the mechanism, illustrating a modification in detail.

This mechanism includes a hopper 1 in whose inclined bottom is formed a slot. The slot is defined by and between the parallel reaches of sprocket chains 2 and 3, which advantageously travel in guide ways formed for them in hopper walls, as is clearly illustrated in Figs. III and IV. The width of the slots as defined by the chains 2 and 3 is such that the shank B of a bolt may freely pass through, but the head H of a bolt may not pass.

The chains 2 and 3 are carried side by side by sprocket wheels, one chain with the wheels 4 and 5 which carry it being shown in Fig. I. The grouping of these parts in the assembly will be plainly understood on comparing Figs. I and II. These sprocket wheels are mounted in pairs, each pair on a common shaft, and while one shaft turns idly the other, preferably the upper, is mechanically driven, as from a belt wheel 6. A clutch device is arranged in the line of mechanical power transmission from the belt wheel 6 to this upper shaft 7. The belt-wheel 6 turns upon shaft 7 as its axle. To the shaft 7 is keyed a block 19, and from block 19 a bolt 8 extends, and normally enters a hole formed to receive it in the hub of belt-wheel 6, and at a sufficient distance from the center of turning. The bolt 8 is extensible and retractible to and from engagement in the hole in the hub of belt-wheel 6, and is normally held extended under the expansive force of a spring 9. So long as bolt 8 continues in its extended position, shown in Fig. II, rotation of belt-wheel 6 will effect the normal travel of chains 2 and 3.

As best shown in Fig. IV, the alternate links of the chains 2 and 3 are provided with notches, and as between the two chains the notches are arranged in opposite pairs. These notches are provided in order to engage from beneath the heads of the bolts which come to the position illustrated in Fig. III and so more effectively to impel them up the incline. Careful consideration of Fig. IV will make plain the fact that it preferably is those alternate links of the chains which stand closer on opposite sides of the slot which are notched, with the end in view which has been indicated, and ordinarily with the chain so constructed it is every second pair of links which positively engages the bolt head. Thus the bolts are fed at regular intervals.

An agitator in the form of a plunger 10, reciprocable within the hopper and in the direction of the length of the slot and at the lower end of the slot, may be driven by means of a cam 11 borne by the shaft 12 of the lower pair of sprocket wheels. When a mass of bolts is dumped into the hopper and overlies the slot, this plunger being reciprocated, will so agitate the mass as to cause the bolts which immediately overlie the slot gradually to swing to the position shown in Fig. III, with shanks suspended through the

slot. In that position they are picked up and advanced along the slot upwardly by the notched chains 2 and 3.

At the upper end of the slot and overhanging the slot and preferably remote at a small interval from the upper surface of the chain, means are provided for preventing the escape of bolts from the hopper, except only the succession of bolts, which borne by the chains as shown in Fig. III, is carried out in orderly manner. Such restraining means may conveniently take the form of a stiff wire brush 13.

Beyond the hopper and in position to receive the bolts carried by the chains in the manner described is a runway 14 for the bolts, and a runway which it will be understood may lead to such a machine as that of the Craig and Thompson application alluded to above. Of course the runway may lead to such place of delivery as may be provided. Careful consideration of the structure as shown in Figs. I and II will make plain the fact that the upper curves of the upper pair of sprocket wheels, faced as they are with the chains 2 and 3, constitute an intermediate reach of transfer mechanism, between the slot in the hopper properly so called and the runway for the bolts 14. Therefore, without undue violence to language, the hopper may be said to continue to the point *a*, where transfer is effected, by gravity, of the bolts from the chains 2 and 3 to the runway 14.

Means may be provided to restrain the chains 2 and 3 from sagging laterally from the guideways in which, as particularly shown in Fig. III, they travel. Such means may take the form of sprocket wheels, such as that indicated in dotted lines at 23, Fig. I. These sprocket wheels will be carried idly upon stub shafts journalled in common foundation with hopper 1, and may be provided to engage the chain on either side of the slot, and at such intervals as may be found desirable.

The operation of the apparatus as thus far described will be understood with the briefest possible description. The apparatus is put in motion by the turning of the belt wheel 6 while the locking bolt 8 is in position. Then, a quantity of bolts having been dumped into the hopper, the bolts dumped in gradually come automatically one by one to position in the slot, their movement being expedited by reciprocation by plunger 10, and in some degree by travel of the chains 2 and 3. As the operation progresses the bolts brought to the position indicated in Fig. III are advanced from right to left as viewed in Fig. I and up-hill, out of the hopper, around the upper curve of the sprocket wheels, where they easily slide by gravity to the runway 14. As this operation progresses the brush 13 prevents escape of the confusedly lying mass of bolts, allowing only the ordered escape of bolts which have been picked up by the chains and are carried in the position shown in Fig. III.

The rate at which the advancing chains 2, 3 will cause bolts to emerge from the hopper, is indeterminate, and since in this there is an element of chance, it is desirable that the chains be driven at such a rate as to deliver the bolts to the runway 14 at an average rate exceeding the rate of demand. It will follow, then, that at times the runway will be overcrowded. My invention further includes automatically operative means for stopping the chains 2, 3 when the runway 14 is so overcrowded, and for causing the chains to move again as soon as the congestion is relieved.

As the line of bolts advancing in the runway is closed and as the bolts crowding from behind press one upon another, the beveled rims of the bolt heads overlap and individual bolts are thus raised outward from the slot in which their shanks extend. Opposite the space between the upper sprocket wheels, and at a sufficient distance to allow free passage of bolts in the normal position shown in Fig. II, but no more, is arranged a block 15 carried on a beam 16. The beam is free to swing in accord with outward movement of the block 15. Comparing Figs. I and II, it will be observed that the crowding of the heads of the successive bolts in the manner indicated will effect movement of the block 15 outwardly, away from the rotating sprocket wheels and the consequent swinging of beam 16.

Block 19 is encircled by an annulus 18 recessed on its inner face to form a circumferentially extending slot, through which bolt 8 passes. The arrangement of these parts will be understood on comparing Figs. II, V, and VI. The annulus in its slotted portion is provided with a surface 20, inclined to the axis of turning, and this surface engages a suitably disposed shoulder upon bolt 8. Fig. V shows that annulus 18 has a limited range of turning in clockwise direction upon block 19, and it will be understood that as it turns, the engagement of surface 20 with the shoulder alluded to upon bolt 8 effects longitudinal shifting of the bolt. This shifting will be understood to be a shifting from left to right, as viewed in Fig. II, and against the tension of spring 9. Annulus 18, as best shown in Fig. V, is provided on its outer surface with ratchet teeth. Beam 16 which at one end carries, as has been said, block 18, carries at its opposite end a pawl 17 and, referring particularly to Fig. V, the swinging of beam 16 causes pawl 17 to engage the ratchet of annulus 18. Engagement of this pawl with the ratchet wheel 18 will cause it to stop, as already explained, the engagement of the cam

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221-13

surface 20 of the now stationary annulus with the correspondingly inclined surface formed upon the still revolving bolt 8 will effect withdrawal of the bolt 8 against the spring tension from its locking position, in engagement with the hub of the belt wheel 6. Thus the locking engagement is broken. Further turning of the belt wheel 6 then will have no effect to drive the machine, and the machine will stop. When the difficulty has been overcome and the conditions of normal feed are re-established, the pawl and ratchet engagement may be broken and the locking bolt 8 may be brought again to its locking position, and the feed of bolts may then be resumed. A round-ended spring-backed pin 24 is provided, to hold annulus 18 yieldingly in its set position, ready to function in the manner described.

It remains to speak of the alternative form illustrated in Figs. VII and VIII. This concerns the means for agitating the mass of bolts within the hopper. Instead of the single plunger 10 which reciprocates longitudinally of the slot I here show two laterally swinging agitators 21 arranged longitudinally, one on either side of the slot. These swinging transverse agitators are pivoted at their upper edges on lines parallel to the length of the slot and swung in reciprocatory manner, and are preferably swung alternately, by means of cams 22 borne by the shaft 12 of the lower pair of sprocket wheels. These swinging plates 21 may extend the whole length of the slot or through as much of the extent of the slot as may be found desirable. Preferably they extend the full length of the slot. Manifestly they by their reciprocation break up any bridging of the slot by masses of bolts, such as might otherwise occur. They keep the bolts stirred throughout the whole length of the slot.

I claim as my invention:

1. A mechanism for feeding bolts, including a hopper having in its bottom an inclined slot defined by and formed between a pair of synchronously moving sprocket chains, the chains being provided with symmetrically arranged pairs of bolt-head engaging notches.

2. In a mechanism for feeding bolts the combination with a hopper having in its bottom an inclined slot, means for moving bolts upwardly along said slot, means cooperating with the bolt-moving means at the upper end of said slot and restraining the escape of bolts from the hopper, and means for agitating a mass of bolts within the hopper.

3. In a bolt feeding apparatus the combination with a hopper having formed in its bottom an inclined slot, and a bolt runway extending from the hopper at the delivery end of said slot, mechanically driven means for causing bolts to advance one by one along said slot to said runway, and means adjacent the runway and adapted to be moved by a plurality of bolts overlapping in the runway, for interrupting the mechanical drive for said moving means.

4. In a bolt feeding apparatus a combination with a hopper having in its bottom an inclined slot, a pair of sprocket wheels arranged adjacent the upper end of said slot, a pair of sprocket chains borne by said sprocket wheels and defining between them the said slot, means for effecting rotation of said sprocket wheels, such rotating-effecting means including a make-and-break device, a movable abutment arranged opposite the slot, said movable abutment being operatively connected to the said make-and-break device in the line of transmission of power to the said sprocket wheels for rotation thereof.

5. In bolt-feeding apparatus the combination of a hopper having an inclined slotted bottom, a rotatable shaft, a pair of sprocket wheels borne by and rotatable with said shaft and arranged adjacent the upper end of said slot, a pair of sprocket chains borne by said sprocket wheels and defining between them said slot, a block keyed to said shaft, a power-transmitting wheel mounted for turning upon said shaft as an axle and mounted adjacent said block, an annulus rotatable upon said block and provided with ratchet teeth, a bolt borne by said block and adapted to be shifted longitudinally to and from engagement with said power-transmitting wheel, means for driving said bolt to such engagement on the rotation of said annulus upon the block, and a swinging beam bearing upon one arm a block adapted to be engaged by the overlaid heads of bolts borne by said chains, and bearing upon the other arm a pawl adapted as the beam swings alternately to engage and to release the ratchet upon said annulus.

In testimony whereof I have hereunto set my hand.

WILLIAM C. HARBISON.