Nov. 11, 1958 M. H. NIELSEN 2,859,647

ARTICLE FEEDING MECHANISM

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Fig. 1.

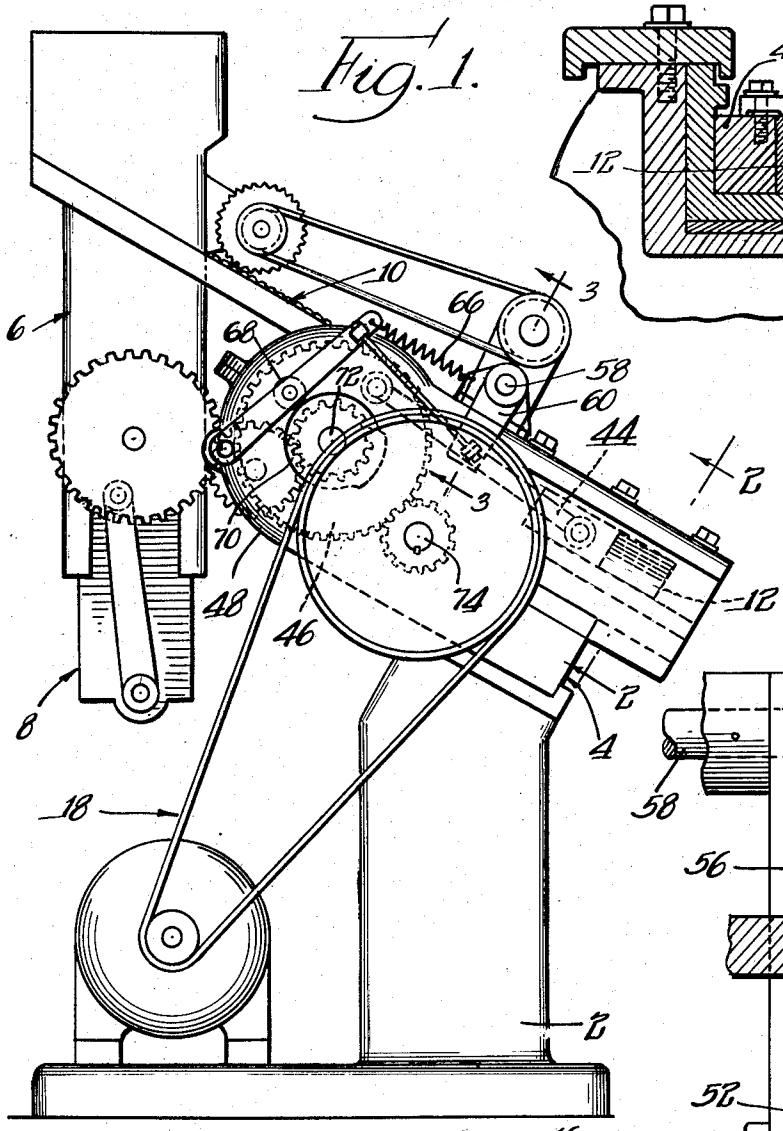


Fig. 2.

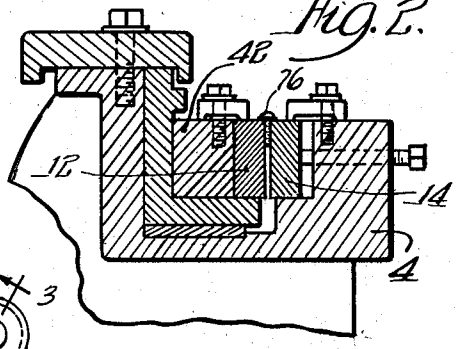


Fig. 3.

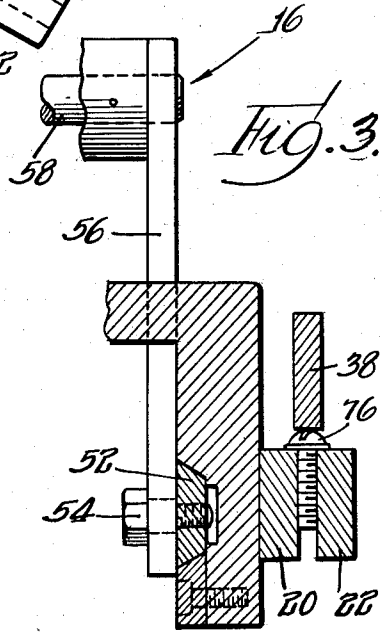
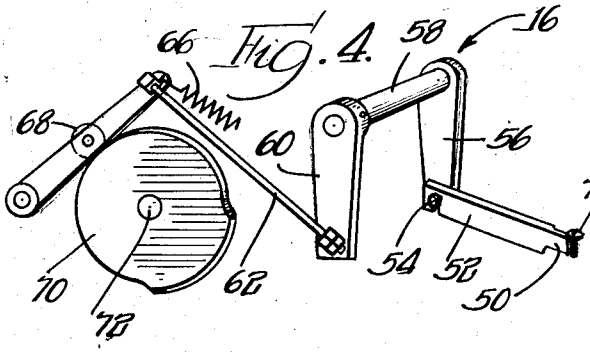


Fig. 4.



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Fig. 9

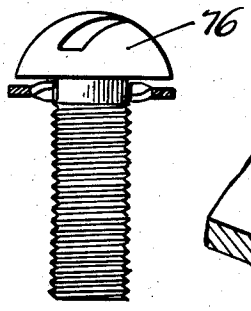


Fig. 5.

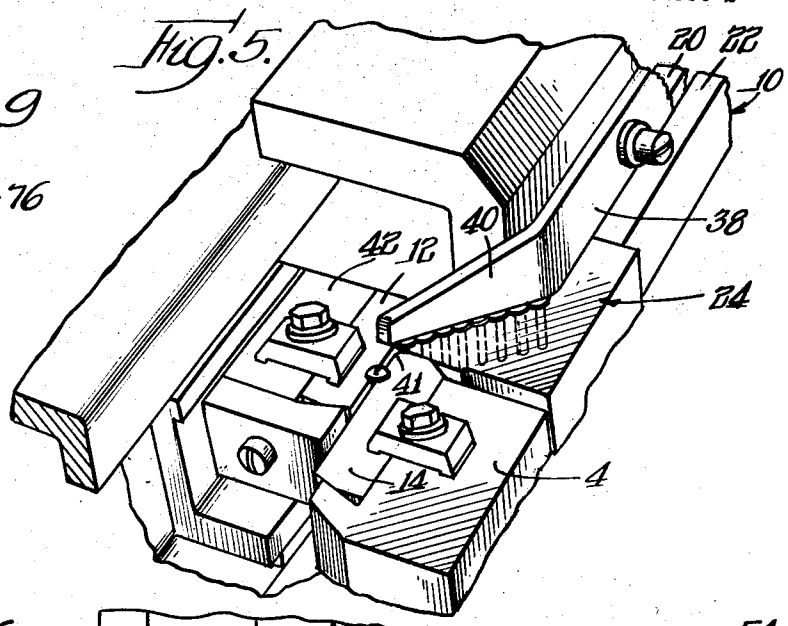


Fig. 6.

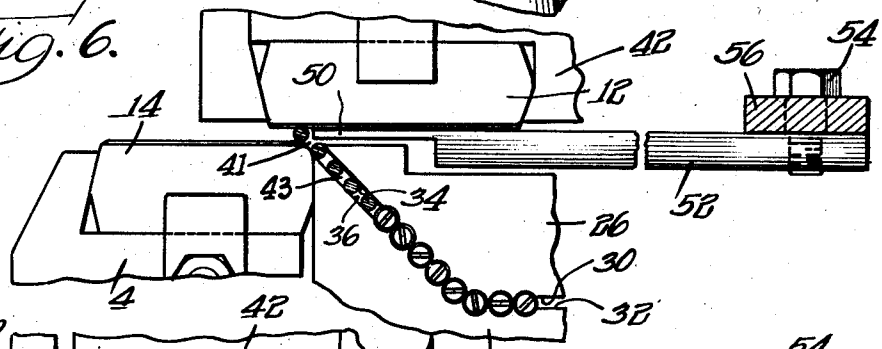


Fig. 7.

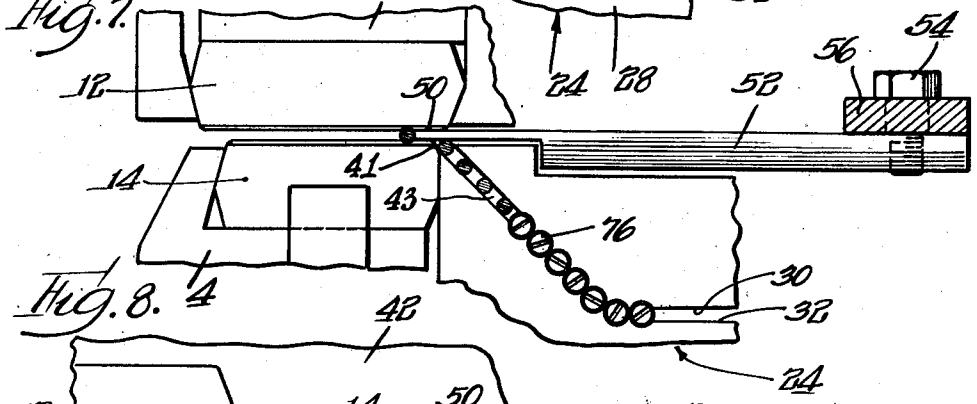
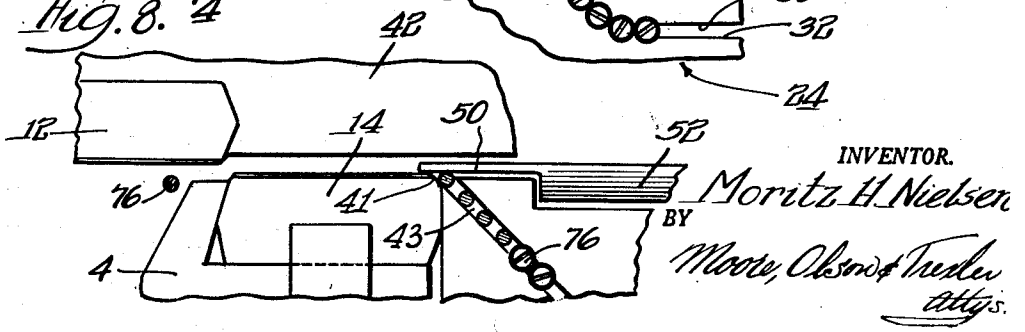


Fig. 8.



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ARTICLE FEEDING MECHANISM

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Continuation of application Serial No. 79,837, March 5, 1949, which is a division of application Serial No. 64,844, December 11, 1948, now Patent No. 2,642,592, dated June 23, 1953. This application May 12, 1954, Serial No. 429,420

2 Claims. (Cl. 80—8)

This invention relates to an article feeding mechanism, and more particularly to a mechanism for feeding assembled screw and washer units to a thread rolling mechanism.

Prior thread rolling mechanisms with which I am familiar have employed a reciprocating transfer mechanism to feed a screw or assembled screw and washer unit from the bottom end of a feed chute to a thread rolling mechanism or dies. Such transfer mechanisms are relatively inefficient in operation when considered from the standpoint of the number of screws or assembled units actually delivered to the thread rolling mechanism in a given period of time. This inefficiency results from the fact that the transfer mechanism is reciprocatory in nature and it must therefore make two movements in order to deliver each screw or unit, one movement being a backward movement and the other being a forward movement, and it must also have finite periods of rest between successive forward and backward strokes. These transfer mechanisms frequently fail to pick up a screw from the bottom of the feed chute and thus frequently complete a cycle of movement without delivering a screw to the thread rolling mechanism.

In the case of the smaller sizes of screws, and the smaller assembled units, this failure to pick up a screw at the bottom of the chute increases to such a proportion that the thread rolling machines of which they form a part become completely unsatisfactory for the fabrication of such smaller screws and assembled units.

It is accordingly an object of this invention to provide a mechanism for feeding screws, and more particularly screw and washer assembly units, from a feed chute or means to a thread rolling mechanism at higher rates than heretofore possible and which will make possible the elimination of prior transfer mechanisms, while also making it possible to utilize thread rolling machines for the automatic high speed production of the smaller sizes of screws and smaller assembly units.

In the prior thread rolling machines to which reference has been made heretofore, the assembled screws and washers have been delivered to the thread rolling dies and to a starting mechanism associated therewith by a transfer mechanism or blade operating at right angles to the feed chute and pushing the leading unit at the bottom of the chute from the chute into a position in front of the starter mechanism, the blade while so moving acting as a gate restraining the succeeding line of units in the feed chute.

In some of the prior art with which I am familiar, the feed chute is oriented at right angles to the path of the die mechanism. As a result, the starting mechanism would tend to push some of the blanks back up into the chute if they were not properly positioned by the transfer mechanism and restrained against such retrograde movement by the transfer mechanism.

The present invention contemplates the provision in such a thread rolling machine of means by which screws

or screw and washer assembly units may be delivered directly to the starter mechanism and means by which the starter mechanism is utilized to control the feeding of the units into the thread rolling mechanism so that the processing of a screw or assembly unit on each operation of the thread rolling dies is thereby assured.

It is an object of this invention to provide, in a thread rolling machine of the foregoing character, a mechanism serving both as a gate to release screw blanks from a feed chute and as a starter for forcing the blanks into rolling engagement with the dies.

A further object of this invention is to provide a thread rolling machine wherein a supply chute converges upon the path of thread rolling at an acute angle for control of screw blanks by a combination gate and starter mechanism.

Yet another object of this invention is to provide a thread rolling machine of the foregoing character wherein the feed chute at its lower end is defined in part by the fixed thread rolling die, facilitating direct feeding from the chute to the dies and leading to a minimum length of stroke of the combination gate and starter member with accompanying high speed of operation and low vibration.

More specifically it is an object of this invention to provide a thread rolling machine as comprehended by the last two preceding objects wherein the fixed thread rolling die forming a part of the feed chute is relieved or bevelled further to facilitate entry of the screw blanks between the thread rolling dies.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a view in vertical elevation of a thread rolling machine embodying the present invention;

Fig. 2 is a fragmentary view in section taken along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view in section taken along the line 3—3 of Fig. 1;

Fig. 4 is a diagrammatic view in perspective of part of the machine;

Fig. 5 is a detailed perspective view of a thread rolling mechanism and the screw and washer feeding mechanism;

Figs. 6 to 8 are diagrammatic plan views illustrating the operation of the feeding mechanism and the thread rolling mechanism;

Fig. 9 is a view in elevation and partly in section of a screw and washer assembly produced by the machine of Figs. 1 to 8.

This application is a continuation of my copending application for Article Feeding Mechanism, Serial No. 79,837, filed March 5, 1949, now abandoned, such copending application in turn being a division of my application entitled Method and Machine for Assembling Washers With Fasteners, Serial No. 64,844, filed December 11, 1948, issued June 23, 1953, as U. S. Patent No. 2,642,592.

As shown in Fig. 1, the machine in which the present invention is embodied may comprise a screw thread rolling machine of standard type, such as shown in Wilcox Patents No. 1,584,263 of May 11, 1926 and No. 1,798,919 of March 31, 1931.

The standard type of thread rolling machine above referred to comprises a main base or pedestal 2; an auxiliary base or body 4 secured to or formed integrally with the base 2 and inclined at an angle of approximately 30 degrees to the horizontal; a hopper 6 for receiving a mass of screw blanks; a screw blank feeding mechanism 8 for discharging blanks from the hopper 6; a screw feeding chute 10; a pair of thread rolling dies 12 and 14,

Figs. 1, 2, and 5 to 8; a combination gate and a starter mechanism **16** and driving mechanism **18**.

As shown in the Wilcox Patents No. 1,584,263 and 1,798,919, the screw blanks are transferred from the bottom end of the feed chute to the thread rolling dies by a laterally reciprocating transfer blade and screw head engaging clamping finger which carries the screw to a position in advance of the starter mechanism, which is normally positioned to expose the transverse slot along which the screw is carried by the transfer blade, the starter finger then moving forwardly to push the shank of the screw blank into position between the dies as the movable die begins its forward movement.

In order to provide a continuous supply of screws to the thread rolling dies and to make it possible for this type of machine to handle smaller sizes of screws, and also the smaller sizes of screw and washer assembly units, applicant provides a screw feeding mechanism by which the screws or the assembled screw and washer units are fed by gravity continuously from the feed chute **10** to the thread rolling dies **12** and **14** and the drive for the starter mechanism is modified to utilize the starter finger as a gate controlling the feeding of the screws one by one into the thread rolling dies.

As shown in Fig. 5, the conventional feed chute **10** includes the spaced chute bars **20** and **22**. In place of the transfer mechanism of the assembly machine, applicant provides screw feeding means or mechanism **24**, as best seen in Figs. 5 to 8, comprising a pair of guide blocks **26** and **28** having their confronting faces **30** and **32** forming a chute in extension of the chute **10**, and having their confronting faces **34** and **36** extending at obtuse angles to their confronting faces **30** and **32** so as to form a guideway extending at an obtuse angle to the longitudinal plane of the chute **10** and delivering screws or assembled screw blanks and washers by gravity directly to the thread rolling dies **12** and **14** under control of the combination gate and starter mechanism **16**. The feed means **24** also comprises a cover bar **38** secured in the usual manner to the thread rolling machine and extending longitudinally over the chute **10** and the guideway formed by the confronting faces of the chute blocks **26** and **28**. The lower end **40** of the cover bar **38** is bent at an obtuse angle so as to overlie the guideway formed by the confronting faces **34** and **36** of the chute blocks.

The thread rolling die **12** is the usual reciprocating die of the thread rolling machine and is carried by the usual slide **42** operatively connected by the pitman **44**, Fig. 1, to the face of a continuously rotating gear **46** enclosed within the housing **48**.

The die **14** is a modified stationary die of a standard thread rolling machine and is mounted in the usual manner on the auxiliary base or body **4**.

More specifically the die **14** is provided with a bevelled or relieved surface or corner **41** forming a continuation of the adjacent side surface or face **36** of the guideway or feed chute continuation or termination **43** between the faces **34** and **36**. This construction aids in guiding the screw blanks into the space between the dies, and shortens the stroke of the combination gate and starter mechanism, thus allowing faster operation while minimizing vibration.

The starter mechanism **16** includes the usual starting finger **50**, the starter finger being formed at the forward end of a slide bar **52**, Figs. 4 and 6 to 8, having at its rear end a stud **54** secured to an arm **56** in turn secured to a driving shaft **58**. The shaft **58** is oscillated by a lever **60** secured to the outer end of the shaft, the lever being swung through a rod **62** secured at its forward end to the lever and its other end to a lever **64** urged in a clockwise direction by a spring **66** anchored at one end to the outer end of the lever and the other end to a fixed support. The lever **64** is provided intermediately with a cam roller **68**, which is held in engagement with an actuating cam **70** on the shaft **72**, the shaft **72** being driven by suitable gears on the main drive shaft **74** of the standard thread rolling machine.

In the standard thread rolling machine, the cam which drives the lever **64** is so formed that its portion of greatest radius extends throughout substantially three-quarters of its circumference so that the starter finger rests in its rearmost position during three quarters of a revolution and during substantially the entire reciprocation of the reciprocatory die **12**.

I have found that the transfer mechanism may be eliminated and screws continuously supplied in a constant stream to the thread roller by inserting the guide blocks **26** and **28** between the chute **10** and the thread rolling and starting mechanisms if that standard cam is replaced by a cam such that the portion of smaller radius extends through substantially three-quarters of the circumference of the cam. The starter finger is thus normally positioned to cover the end of the guideway formed by the confronting faces **34** and **36** of the guide block, as shown in Fig. 7, and moves rearwardly as the die **12** begins its forward movement so as to uncover the chute and allow the foremost screw in the chute to gravitate into position between the reciprocating and stationary die, all as shown in Fig. 6, and thereupon move forwardly to force the screw into position between the dies so that it is carried forwardly and rotated by the engagement of the shank of the screw with the die faces. The starter finger remains in that forward position while the reciprocating die completes its forward movement, as shown in Fig. 8, and drops the screw, on which the shank has been rolled, into a suitable receiving pan, not shown. The starter finger thereafter remains in the forward position until the die **12** has completed its return or backward movement and begins its next forward movement.

As shown in my parent application, Serial No. 64,844, now Patent No. 2,642,592, previously mentioned, the standard thread rolling machine may be provided with additional and substitute or auxiliary mechanisms for converting the thread rolling machine into a machine for assembling screw blanks and washers and thereafter rolling the thread on the shank of the screw blank beneath the washer to provide a permanently assembled screw and washer unit **76**, as shown in Fig. 9.

It is thus to be understood that by means of this invention both screws and screw and washer assembly units, even in the smallest sizes, may be fed continuously in an unbroken stream to the thread rolling dies and the starting mechanism enabled to perform an additional function, namely, to control, in the manner of an escapement, the successive delivery of screws, or screw and washer assembly units, to the thread rolling dies.

It will be seen from the foregoing description that I have provided a mechanism for feeding screws and screw and washer assembly units from a feed chute or means to the thread rolling mechanism at higher rates than heretofore possible and which will make possible the elimination of those transfer mechanisms, while also making it possible to utilize thread rolling machines for the automatic high speed production of the smaller sizes of screws and smaller assembly units, and the means by which the assembled units may be delivered directly to the starter mechanism and means by which the starter mechanism is utilized to control the feeding of the units into the thread rolling mechanism so that the processing of a screw or assembly unit on each operation of the thread rolling dies is thereby assured.

The use of the combination gate and starter mechanism provides a materially simpler machine than heretofore known. The use of the fixed die, particularly with the relieved surface, as a part of the feed chute facilitates feeding of blanks to the dies, and shortens the stroke of the gate and starter member, thereby leading to more rapid operation with minimum vibration.

The invention is to be understood as including all

that which falls within the spirit and scope of the appended claims.

I claim:

1. In a thread-rolling machine stationary and reciprocable die members, screw blank feeding means including a chute having a portion thereof inclined downwardly to the point of screw blank reception between said die members adjacent the corner of the stationary die member and providing a continuous and uninterrupted passage at all times for maintaining the screw blanks in contiguous position under direct gravity feed directly to the die members, the side of said chute adjacent the side of said stationary die terminating short of the delivery end thereof and the side of said die extending in accordance with said chute and forming a continuation of said terminating side of the chute to its delivery end, the working surface of said die starting at the end of said chute at said corner of said die, a single combined gate and starter member reciprocable across the delivery end of said chute and providing the sole control of movement of screw blanks therefrom, and means for reciprocating said gate and starter member in timed relation to the relative reciprocation of said die members for releasing the lowermost screw blank from the next contiguous screw blank directly at the start of the working surface of said stationary die member and for forcing the released screw blank into thread-rolling position between said die members.

2. In a thread-rolling machine, stationary and reciprocable die members each having thread forming working surfaces, screw blank feeding means including a chute having a portion thereof inclined downwardly to the point of screw blank reception between said die members and extending at an angle to the working surfaces of said die members and providing a continuous

and uninterrupted passage at all times for maintaining the screw blanks in contiguous position under direct gravity feed directly to the die members, the side of said chute adjacent said stationary die terminating short of the delivery end thereof and the corner of said die including its thread forming working surface being beveled in accordance with said angle of said chute and forming a continuation thereof to its delivery end, the working surface of said die starting at the delivery end of said chute at the beveled end thereof of said die, said die member at the delivery end of said chute being so relieved to provide a continuation of the adjacent side surface of the chute for positioning a delivered screw blank substantially at the working surface of the die member, a single combined gate and starter member reciprocable across the delivery end of said chute and providing the sole control of movement of screw blanks therefrom, and means for reciprocating said gate and starter member in timed relation to the relative reciprocation of said die members for releasing the lowermost screw blank from the next contiguous screw blank directly at the start of the working surface of said stationary die member and for forcing the released screw blank into thread rolling position between said die members.

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