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TRANSFER MECHANISM

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Fig. 2.

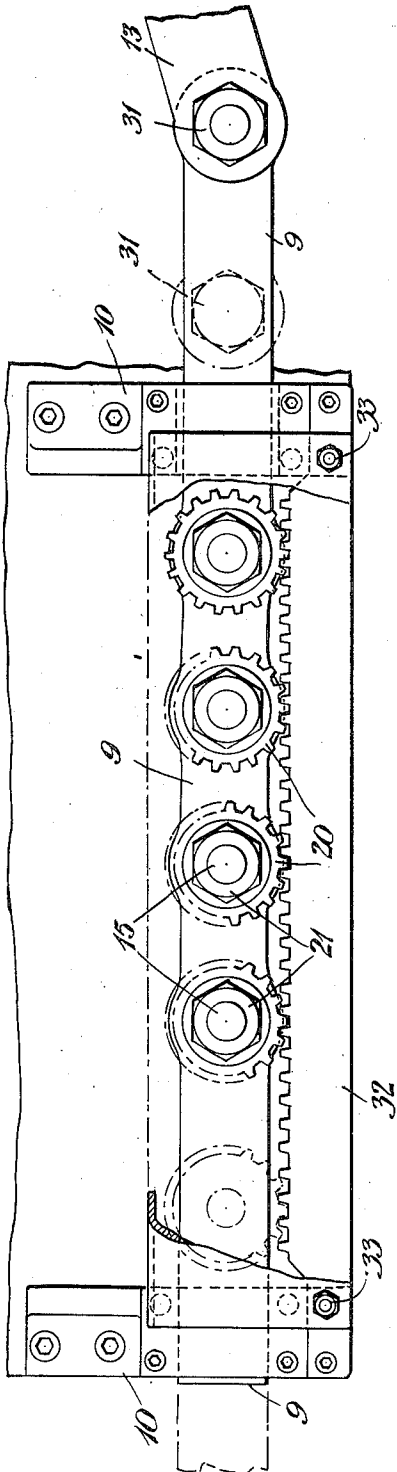


Fig. 3.

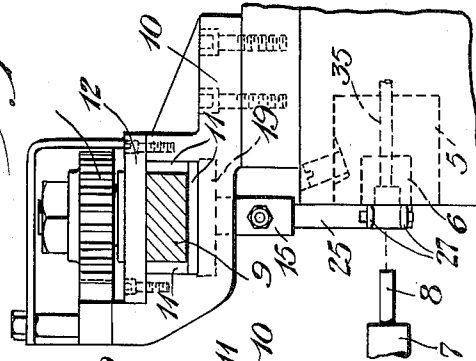
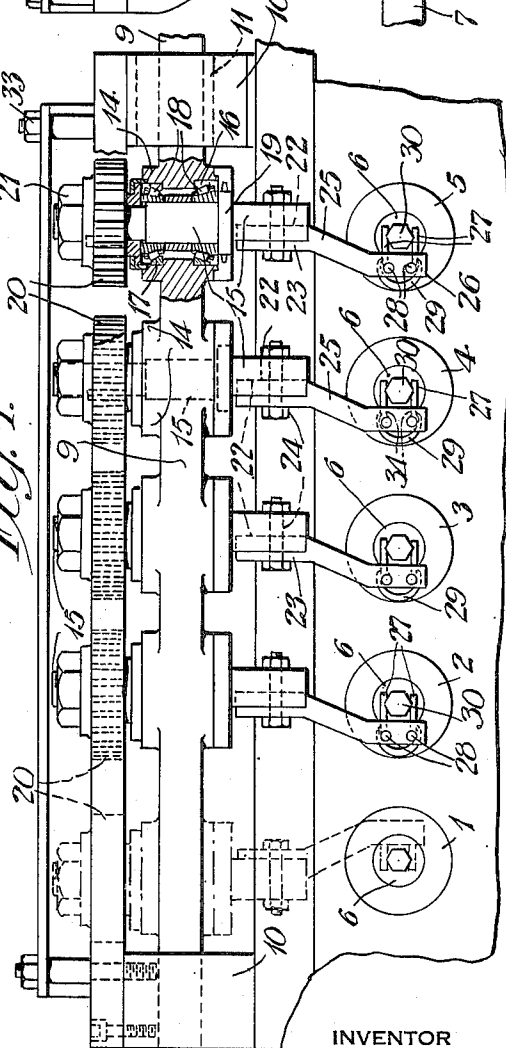


Fig. 1.



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TRANSFER MECHANISM

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2 Claims. (Cl. 10-162)

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This invention relates to transfer mechanism suitable for use in various types of machines and processes for transferring a blank upon which work is being performed from one station to another. For purposes of illustration, the invention is herein shown applied to a nut-forming machine in which a blank is successively fed to a plurality of stations and work performed on it at each station to form the center opening in the nut and suitably shape it into a hexagon or other desired form.

An object of the invention is to provide transfer mechanism of simple construction by means of which a blank is inverted as it is transferred from one station to another.

In a transfer mechanism previously designed for this purpose, the work holders are pivotally mounted in a support and are swung arcuately in a plane normal to the plane of the stations through an arc of substantially 180° to transfer the work from one station to the next and invert it at the same time.

Such an arrangement requires either moving the transfer mechanism vertically prior to the arcuate movement of the work holders and then lowering it at the end of the arcuate movement to bring the work holders in line with the dies, or delaying the movement of the work holders until the main slide which carries the punches has receded a sufficient distance to permit such arcuate movement without interference.

In the present invention I overcome these objections to the prior mechanism by providing a transfer mechanism consisting of a support which reciprocates parallel to the plane of the stations together with work holders rotatably mounted on their own axes in the support and means for rotating the work holders when the transfer mechanism is reciprocated.

Such a construction permits operation at a higher speed than devices heretofore used. The path of travel of the blank from one station to another is close to the face of the die, thus traveling in a shorter path and requiring a shorter stroke of the main slide to move the punches to a point where they will not interfere with the operation of the transfer mechanism. The transfer mechanism can start its movement at substantially the same time as, or even before, the main slide starts to recede and thus the operation of the machine can be accelerated.

This is made possible by providing work holders consisting of a pair of fingers to engage the blank, which fingers are arranged at the top and bottom of the blank in a horizontal machine, or in other words, extend parallel to the path of travel of the work holder and do not intersect the path of travel of the punch. As soon as the blank is held between the punch and die, due to forward motion of the main slide,

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these fingers, which are spring pressed toward each other, can be pulled off laterally without interference.

It is desirable to have the fingers close to the face of the die. If the centerline of the work holding spindle were in line with the center of the blank, the blank or fingers, when starting to turn, would strike the die. To avoid this the center of the vertical shaft is offset an amount substantially equal to or greater than half the diameter of the blank.

By revolving the fingers inwardly, as indicated by the drawing, the ends of the punches can be made shorter without interference than if they were revolved in the opposite direction. This direction of rotation also allows the member holding the fingers to swing out into the space between the ram and the face of the dies.

In the accompanying drawing I have illustrated one form of the invention, parts of a nut-making machine being illustrated only to the extent necessary for a full understanding of the transfer mechanism forming the subject matter of the present invention. In the drawing:

Fig. 1 is a front elevation of a portion of a nut-making machine showing the invention applied, parts being shown in section;

Fig. 2 is a plan view with a portion of the cover broken away to more clearly illustrate the mechanism for turning the work holders on their own axes; and

Fig. 3 is an end elevation.

Referring to the drawing, the reference numerals 1 to 5 designate a plurality of work stations, each of which is provided with a die 6 adapted to receive a blank upon which work is to be performed. A slide 7 (see Fig. 3) is mounted in the machine and carries a plurality of punches 8, one punch being arranged in alignment with each die and being suitably shaped to perform a desired operation on a blank in cooperation with its die. Suitable means (not shown) is provided for reciprocating the slide 7 and the movement of the transfer mechanism is so timed that a blank is moved from one station to the next between the reciprocations of the slide and punches. Suitable means (not shown) are also provided for feeding blanks to station 1 and removing them from station 5. These parts are all well known mechanisms of nut-making machines and a detailed description thereof is believed to be unnecessary.

The transfer mechanism consists of a bar or support 9 which is reciprocated in guides formed in the machine. As shown, a bracket 10 is mounted at each side of the machine and the surfaces of the bracket are provided with wear-resisting plates 11 within which the bar 9 moves. A wear-resisting plate 12 is secured to the bracket above the slide to form a guideway between it and the wear-resisting surfaces 11. The brackets 10

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may be fastened to or form extensions of a member which is pivoted in such a way that the whole transfer mechanism can be swung up and back out of the way to give access to the dies. A link 13 is connected to the end of the support 9 to transmit reciprocating motion to it from a suitable part of the mechanism of the machine. A plurality of work holders are carried by the support 9 and are rotatably mounted therein. As shown, the bar or support is provided with enlargements 14 having openings therein and these openings form bearings for the shafts 15 of the work holders. The work holders may be mounted in the bearings in any suitable manner. For purpose of illustration, I have shown a roller bearing support consisting of lower raceways 16 and upper raceways 17 between which roller bearings 18 are mounted. Immediately beneath the bearing portion 14, the shaft or stem of the work holder may be enlarged as at 19 to properly position it. Above the support each of the work holders is provided with a gear or pinion 20 which is keyed thereto and the entire assembled structure is retained in position by a nut 21 mounted on the threaded upper end of the shaft 15.

Beneath the bearing the shaft 15 is provided with a recess 22 and an arm or support 23 is secured thereto by suitable means, such as bolts 24. This arm extends downwardly to a point adjacent the horizontal plane of the stations. It is preferably provided with an offset portion 25 and a lower end 26 parallel to the axis of the shaft 15. The lower end 26 of the arm is provided with a pair of slots to receive the work engaging fingers 27, the fingers being pivoted at 28 and being provided with notches adjacent the pivot adapted to receive the ends of a substantially U-shaped spring 29. It will thus be apparent that the fingers are spring pressed toward each other to engage the blank 30. When not engaging a blank, their motion toward each other is limited by surfaces 34 of the slots.

The reciprocation of the support 9 is through a stroke equal to the distance between the stations plus twice the amount of offset between the centerlines of blank 30 and shaft 15. This is indicated in Fig. 2 of the drawing where the connection 31 between the support 9 and the link 13 is shown in full lines to indicate the position of the parts when the work holders are in the full line position shown in Fig. 1 adjacent stations 2 to 5 and the position of the connection is shown in dotted lines to illustrate the position of the transfer mechanism when it has moved to the left and the work holders have been turned to receive a blank at station 1, the work holders then being at stations 1 to 4 and each work holder being in the dotted line position shown at station 1 in Fig. 1 of the drawing.

Various means may be employed for turning each of the work holders on its own axis when the support 9 is reciprocated. One simple means herein shown is the provision of a stationary rack 32 secured at each of its ends as indicated at 33, with which the pinions 20 are in mesh. The size of the pinions is such that the work holders are turned approximately 180° when the support 9 is reciprocated its full stroke.

The operation of the device will be apparent from the foregoing description. A suitable blank is fed to station 1 by any feeding mechanism and this blank is received in the die 6. While the transfer mechanism is in the dotted line position, blanks in dies 1 to 4 are pushed out into the fingers 27 by plungers 35 (see Fig. 3) which are

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reciprocated by suitable means (not shown) to eject the blanks from the dies, as is conventional in mechanisms of this character. The transfer mechanism then carries them over to the full line position in front of dies 2 to 5, the blanks being inverted during the transfer. The blanks arrive in this position just in time to be engaged by the punches 8. As soon as they are firmly held between the punches and the dies the transfer mechanism starts its motion back to the dotted line position, the fingers 27 being snapped off the blanks or off the punches. The punches perform one step on blanks in stations 2 to 5. The blank is thus progressively fed through the various stations with one step of the shaping and forming of the blank performed at each station and finally delivered to station 5.

In moving from station 1 to station 2, the work holder rotates in a clock-wise direction. The lower end 26 of the work holder is thus swung outwardly and the work holding fingers swing inwardly toward the machine. The offset of the axis of shaft 15 with respect to the center of the die, together with the arrangement of fingers 27 parallel to the path of travel, and not intersecting the path of travel of the punch, permits the movement to be confined to a space close to the face of the dies, and thus permits operation of the machine with a shorter stroke of the punches than would otherwise be possible.

I claim:

1. Transfer mechanism comprising, in combination, a plurality of spaced dies, and means to transfer blanks from each of said dies to an adjacent die, said means comprising a reciprocable member, means connected thereto to reciprocate said member in a path parallel to the line of the dies, a plurality of work holder supports rotatably mounted in said member, work holders carried by each of said supports to engage a blank, and means carried by the reciprocable member and the work holder supports for rotating the work holder supports on their own axes when the reciprocating member is reciprocated, the work holders being turned inwardly toward the dies when rotated.

2. A transfer mechanism comprising, in combination, a plurality of spaced dies, and means to transfer blanks from each of said dies to an adjacent die, said means comprising a reciprocable member, means connected thereto to reciprocate said member in a path parallel to the line of the dies, a plurality of work holder supports rotatably mounted in said member, work holders carried by each of said supports to engage a blank, and means carried by the reciprocable member and the work holder supports for rotating the work holder supports on their own axes when the reciprocable member is reciprocated, the work holders being arranged parallel to the path of travel of the reciprocating member and consisting of upper and lower members adapted to engage a blank.

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