

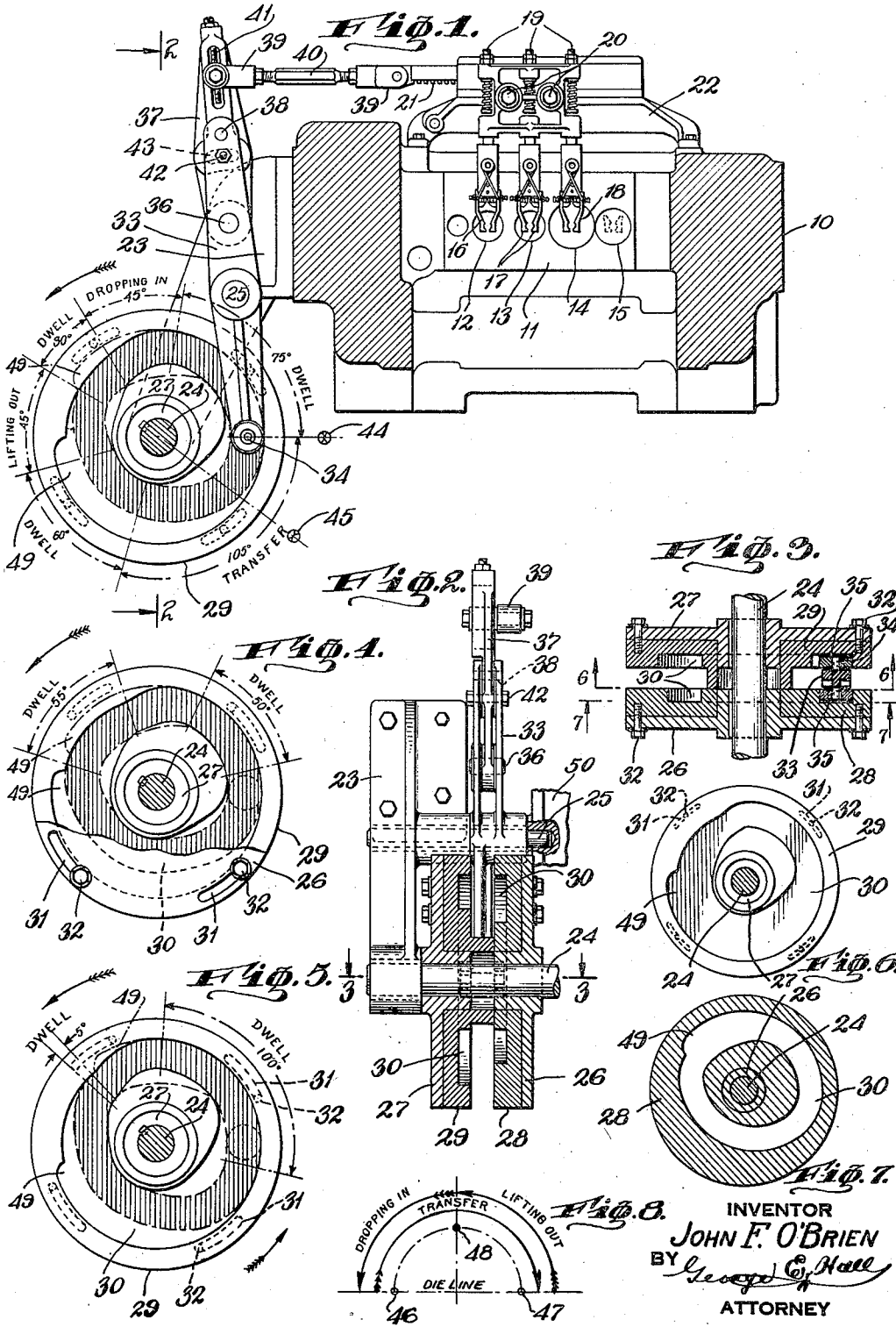
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TRANSFER MECHANISM

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TRANSFER MECHANISM

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This invention relates to new and useful improvements in transfer mechanisms. While adapted for use with any transfer mechanism of the general type herein shown, it is particularly adapted for use with such transfer mechanism as is shown in Wilcox Patent No. 1,982,460, issued November 27, 1934. In the upsetting machine therein shown there are four dies and three sets of transfer fingers for simultaneously transferring a blank by each set of fingers from one die to another die, actuated through two crank shafts that receive motion from a reciprocating rack. The transfer fingers move in timed relation with other parts, such as cut-off mechanism, punches or the like. The reciprocation of the rack rotates the crank shafts, which in turn move each pair of fingers in an arcuate path from one die to another die, and while traveling in one direction carry the blanks from one die to the next die and travel in the reverse direction for a new blank. The first of said dies, for convenience, will be referred to as the receiving die and the latter as the delivery die. In the operation of the transfer fingers it is desirable that their movement be variable, that is, either delayed or advanced when in predetermined positions, as the character of the blank and other considerations may dictate. In some cases it is desirable to delay movement of the fingers and in other cases to advance such movement. It is one of the principal objects of this invention to provide means whereby such action and movement may be conveniently and positively attained.

To these, and other ends, this invention consists in the transfer mechanism, having certain details of construction and combinations of parts as will be hereinafter described and more particularly pointed out in the claims.

Referring to the drawing, in which like numerals of reference indicate like parts in the several figures:

Figure 1 is a cross sectional view of an upsetting, heading machine or the like, with this improved mechanism associated therewith;

Figure 2 is an end view of the transfer mechanism, the parts in section being shown generally upon line 2—2 of Figure 1;

Figure 3 is a cross sectional view of the cams, taken generally upon line 3—3 of Figure 2;

Figures 4 and 5 are views of the cams in two of their relative positions;

Figure 6 is a view of one cam, the part in section being shown on lines 6—6 of Figure 3;

Figure 7 is a sectional view of the other cam, taken generally on line 7—7 of Figure 3; and

Figure 8 is a diagrammatic view showing the path of motion of the transfer fingers.

In the drawing, 10 indicates the body of a header, upsetting machine or the like; 11 a die block in which is mounted a plurality of dies 12, 13, 14 and 15. The three sets of fingers severally designated 16, 17 and 18 are movably mounted upon the shafts 19 which are actuated 10 by the two crank shafts 20 and the reciprocating rack 21. The rack, finger shafts and associated parts are supported upon a fixed platform 22 or the like.

The above described mechanism is shown and 15 described in detail in the above mentioned Letters Patent No. 1,982,460, to which reference is hereby made. The mechanism of said patent is shown merely for the purpose of illustration, as other similar mechanism may be utilized 20 equally as well.

Fixed to the body 10 is a bracket 23, in which are the shafts 24 and 25. Upon the shaft 24 are fixed two cam plates 26 and 27. Journaled upon the hub of plate 26 is a cam 28, and upon 25 the hub of plate 27 a cam 29, each cam having a cam groove 30 in the inner faces thereof. For convenience the cam 28 is referred to as the inside cam and 29 the outside cam. Each of the cams is adjustable about the shaft 24 and 30 secured in their adjusted positions by screws 32 which project through arcuate slots 31 in the cam plate and are threaded into the adjacent cam.

On the shaft 25 is a rock lever 33 having a 35 journal pin 34, which projects on opposite sides of one end of the lever and carrying the rolls 35, one roll within the groove 30 of cam 28 and the other in the groove of cam 29.

An extension lever 37 is connected with the 40 rock lever 33 by a stud 36 and a shear pin 38, this pin being sufficiently strong to maintain the levers 33 and 37 fixed in relation to each other under normal conditions, but weak enough to break under an abnormal strain. When this pin 45 is thus ruptured the extension lever 37 is free to pivot on stud 36 without deriving motion from the lever 33.

A bolt 42 or the like, projects through the spaced arms of the fulcrumed end of the lever 50 33 and an arcuate slot 43 in the extension lever 37, which prevents any tendency of the lever arms spreading apart when the pin 38 is being sheared.

An adjustable connection is made between the 55

rack 21 and lever 37 by means of the yoke blocks 39 and intermediate turn buckle mechanism 40. One yoke block is connected with the lever 37 by an adjusting screw 41. Movement is imparted to the rack 21 from the cam mechanism through the rock lever 33 in a well known manner.

The shaft 24 is usually rotating continuously in the direction of the arrows in Figures 1, 4 and 5, and the header gate or ram (not shown) carrying the punches, reciprocates toward and away from the die block 11.

In Figure 1 the line 44 indicates the position of the cams when the gate or ram is most distant from the die block, and the line 45 the start of the transfer motion of the fingers.

The diagrammatic view, Figure 3, is designed to illustrate the path of movement of one pair of fingers, the other pairs of fingers moving through a similar path.

The legend "die line" indicates the line that extends through the center of the dies 12, 13 and 14, the numerals 46 the receiving die, 47 the delivery die, and the half circle in broken lines represents the path of the blank as it travels from the receiving die to the delivery die. An intermediate point in such transfer path being designated 48.

When there are a plurality of dies in excess of two the delivery die becomes the receiving die in the movement of the next pair of fingers. That portion of the movement of the fingers from the delivery die to the intermediate point 48 is designated as "lifting out", that is, the pairs of fingers are moving away from the delivery die and traveling toward the receiving die, and the remainder of such movement is designated as "dropping in", that is, the pairs of fingers are approaching the receiving die.

To accommodate varying classes of work and workpieces, it is desirable that the transfer fingers may be either delayed or advanced in their motion at either or both of the receiving or delivery dies and at an intermediate point therebetween.

In the form of mechanism herein shown the cams and parts are arranged so that the transfer movement of the fingers requires approximately 105° of the rotation of the shaft 24, with a dwell of approximately 60°, which allows sufficient time for the punches to push the blank into the die. The fingers during their lifting out movement travel through approximately 45° of the rotation of the shaft 24. The arrangement of the cams and parts as shown is such that these several degree requirements, namely, 105° transfer, 60° dwell, and 45° lifting out, may be advanced or retarded approximately 12½°. All of the degrees indicated, of course, may be varied, whether more or less, as desired.

The transfer fingers may dwell at the intermediate position indicated by 48, in Figure 3, varying from approximately 5° to approximately 55°, during which time the gate or ram, with the punches thereon, moves away from the die block 11. Movement of the fingers from this point to the receiving die 46, termed "dropping in" is approximately 45°, which also may be advanced or retarded approximately 12½°. Therefore, the dwell of the fingers at or near the intermediate point 48 from approximately 5° to approximately 55° and the dropping in thereof is independent of the timing of the transfer of approximately 105°, dwell of approximately 60°, and the lifting out of approximately 55°. The remainder of the

dwell to complete the 360° of rotation of the shaft 24 will vary approximately 50° to approximately 100°, according to the relative position of the cams 28 and 29.

Timing of the fingers 16, 17 and 18 is varied by shifting the relative axial position of the cams 28 and 29 with each other, the movement of the lever 33 being derived from the cams through the cam rolls 35. Three of the relative positions of these cams is shown in Figures 1, 4, 5, 6 and 7. In Figures 1, 4 and 5 the shaded portions represent the cam groove in the inside cam 28 arranged to overlie the outside cam 29. In Figure 1 the cams are illustrated in their relative positions when the gate or ram is in approximately its rearmost position. From this position the fingers transfer the blank for 105° of the rotation of the cams and carry the blank from the receiving to the delivery die where they dwell for 60°, then are lifted out for approximately 45°, then dwell substantially at the intermediate point 48 for approximately 30°, then pass through the dropping-in portion of their path toward the receiving die for approximately 45° with a dwell in register with the receiving die for approximately 75°. With the cam as thus positioned the dwell at the receiving die is approximately 75° and at the delivery die approximately 60°.

As shown in Figure 4 the cams have been adjusted so that the cam 39 is moved about the axis of the shaft 24 clockwise approximately 12½°, and the cam 28 counterclockwise 12½°, which results in a change of movement of the fingers by advancing the transfer and lifting out and retarding the dropping in of the fingers with the dwells 50° and 55° respectively, instead of 75° and 60° respectively, as with the cams positioned as in Figure 1.

As shown in Figure 5 the cams have been again adjusted about the axis of the shaft 24, the cam 29 counter-clockwise approximately 12½°, and the cam 28 approximately 12½° clockwise. With the cams so positioned the movement of the fingers is retarded during the transfer and lifting out, and advanced during the dropping in travel. This variability in movement of the fingers is advantageous where the fingers transfer blanks of various lengths and also with partially extruded blanks.

During transfer of an extruded blank the fingers usually grasp the smaller diameter thereof, therefore, the fingers should be moved away from the blank at the delivery die in time to clear the next larger diameter of the blank as it is pushed into the die. Likewise, when the blank is reduced or extruded in the receiving die, it is desirable to delay the engagement of the transfer fingers with the blank as it is ejected from the die until the portion having the larger diameter has been ejected from the die sufficiently to permit the fingers to engage the blank at its smaller diameter. Under such circumstances the cams are adjusted to retard the fingers while the work is ejected from the receiving die and advanced after the blank is at the delivery die. Another desirable path of movement of the fingers, depending upon the character of the work, is to present the same in front of the opening in the receiving die as the blank is ejected therefrom and grasped by the fingers, and then transferring it to the delivery die. In such cases the fingers remain a greater length of time at the delivery die to enable the punches to project the blank into the die before the fingers are disengaged therefrom. Such result is obtained when the

cams are positioned substantially as shown in Figure 4. During some portions of the rotation of the cams, the cam rolls 35 are controlled by the cam groove in both of the cams and during other portions by the cam groove in only one cam, at which time the cam roll associated with the non-operating cam projects into a clearance portion 49 of the cam groove therein.

This mechanism will operate equally as well with tools other than dies.

Changes, additions and modifications can be made in the herein described mechanism without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping a blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station; and means for adjustably controlling the movement of such transfer means that its speed of approach at or near the delivery station may be accelerated or retarded.

2. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping a blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station; and means for adjustably so controlling the movement of such transfer means that its speed of approach at or near the receiving station may be accelerated or retarded.

3. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping a blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station, and means for so controlling the movement of said grasping means that the point of contact thereof with the blank may be varied to accommodate blanks of varying lengths and sizes and the portion thereof then projecting from the die.

4. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping the smaller diameter of an extruded blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station; and means for so controlling the movement of said grasping means that it will only engage the blank at the receiving station after all of the portion of the blank having a larger diameter has been ejected from the die.

5. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping the smaller diameter of an extruded blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station; means for so controlling the movement of the said grasping means that it will only engage the blank at the receiving station after all of the portion of the blank having a larger diameter has been ejected from the die and will be disengaged therefrom before said larger diameter portion is projected into the path of such grasping means.

6. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping a blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station; and means for controlling

the movement of such transfer means that its speed of approach at or near the delivery station may be accelerated or retarded, said means comprising in part companion cams, and mechanism actuated by the cams, in part by one cam and in part by the other cam during the travel of said grasping means from one of said stations to the other of said stations.

7. The combination with mechanism having a receiving station, a spaced delivery station and a die at each station; of means for grasping a blank as it is ejected from the die at the receiving station and carrying it through a defined path to the delivery station; and means for controlling the movement of such transfer means that its speed of approach at or near the delivery station may be accelerated or retarded, said means comprising in part companion cams, and mechanism having parts thereon that project into the path of both of said cams and independently actuated at different times during the travel of said grasping means from one of said stations to the other of said stations.

8. The combination with mechanism having a receiving station and a spaced delivery station; of mechanism for transferring successive independent blanks of variable length from one station to the other station in a predetermined cycle, comprising in part an actuating arm, a rotatable shaft, a pair of spaced cams on the shaft having faces engaged by said arm; and means for adjusting the position of the cams whereby to vary the relative movement of the transfer mechanism at one or more places in its cycle of operations.

9. The combination with mechanism having a receiving station and a spaced delivery station; of mechanism for transferring successive independent blanks of variable length from one station to the other station in a predetermined cycle through a defined path at an accelerated or retarded speed, comprising in part a rotatable shaft, spaced members on the shaft, and an axially adjustable cam carried by each of said members; and a movable arm actuated by the cams.

10. The combination with mechanism having a receiving station and a spaced delivery station; of mechanism for transferring successive independent blanks of variable length from one station to the other station in a predetermined cycle through a defined path at an accelerated or retarded speed, comprising in part a rotatable shaft; an actuating arm; a pair of spaced members on said shaft; and an axially rotatable cam carried by each of said members, having a cam groove, that receives a part of said arm; and means for adjusting said cams on said members and relative to each other whereby to vary the movement of said arm.

11. In a device of the character described for use with a transfer mechanism having a receiving station; a spaced delivery station; and a movable arm through which independent blanks of various lengths are transferred from one station to the other station in a predetermined cycle through a defined path at an accelerated or retarded speed, including a rotatable shaft opposed cams carried by the shaft, each having a groove with an offset clearance portion adapted to receive a portion of said arm; and means whereby said cams may be adjusted about their common axes whereby to vary the relative position of the clearance portions of said cams with respect to each other.

12. The combination with transfer mechanism; of a reciprocating member imparting movement thereto; a rock member having an operative connection with said reciprocating member; 5 means to actuate the aforesaid members whereby independent blanks of variable length may be transferred successively from one station to another station in a predetermined cycle, comprising in part a rotatable shaft, a pair of spaced cams on the shaft having faces engaged by said rock member; and means for adjusting the relative positions of said cams whereby to vary the relative speed of the transfer mechanism during 5 one or more portions of its cycle.

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