March 23, 1937. R. L. WILCOX 2,074,680

UPSETTING MACHINE.

Filed May 7, 1936 4 Sheets-Sheet 1

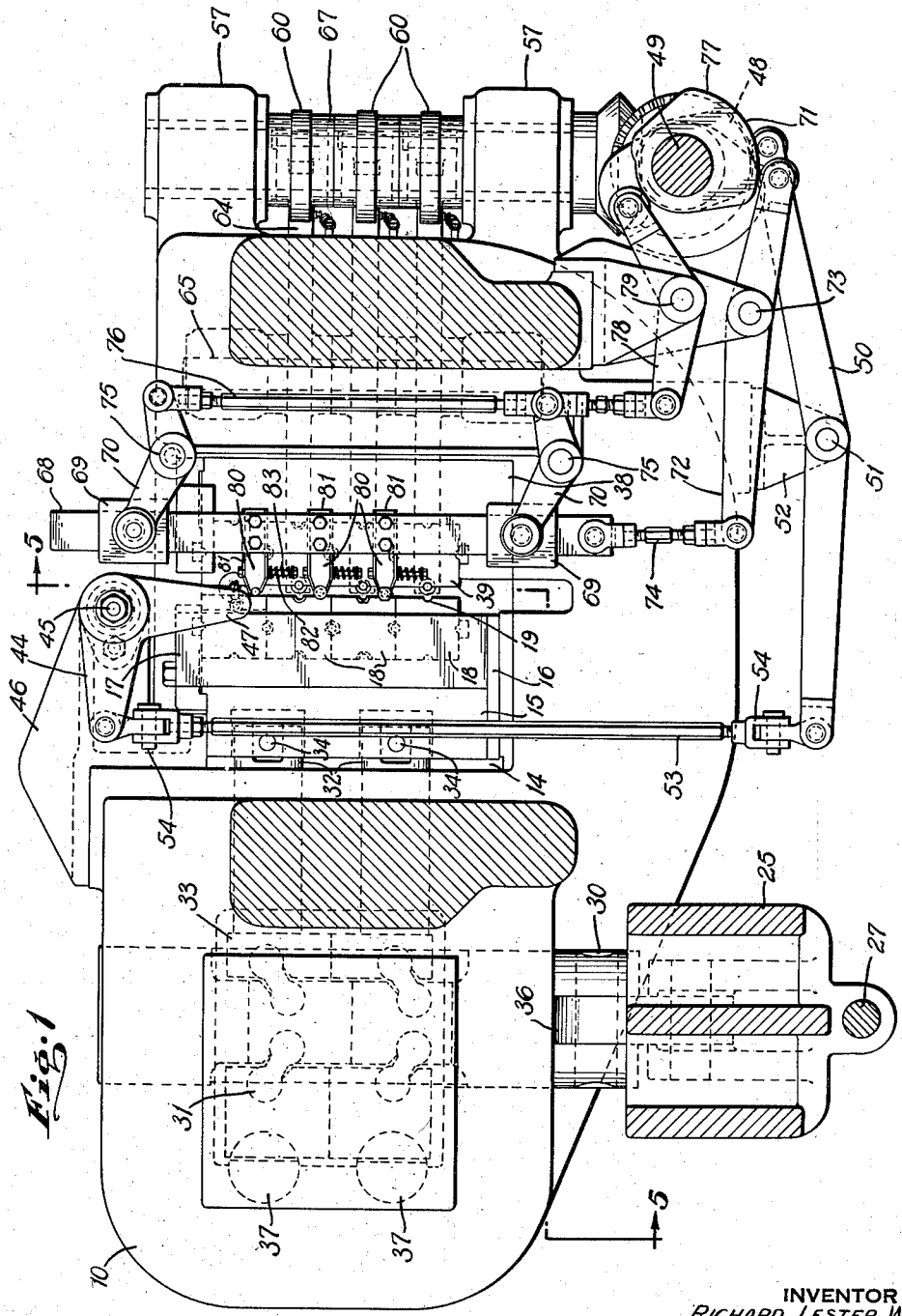


Fig. 1

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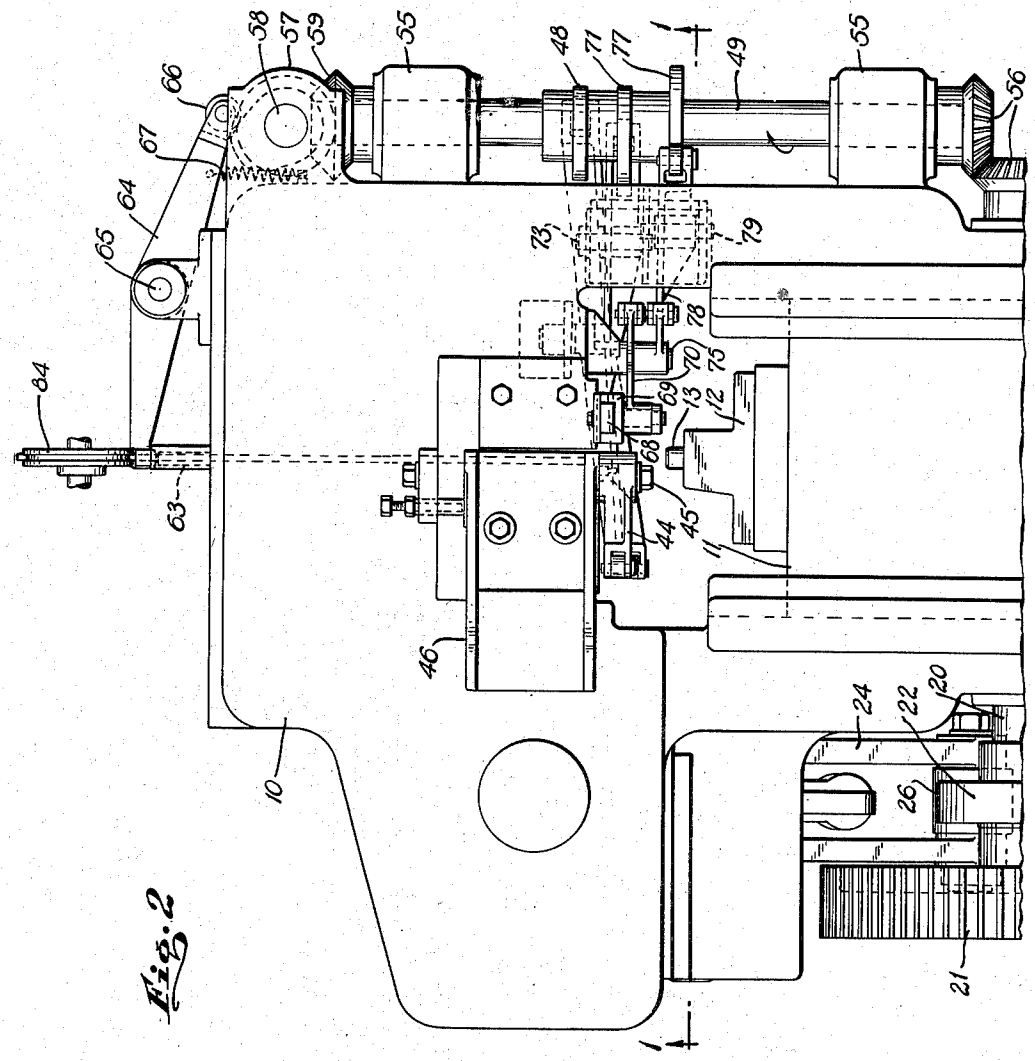


Fig. 2

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Fig. 6

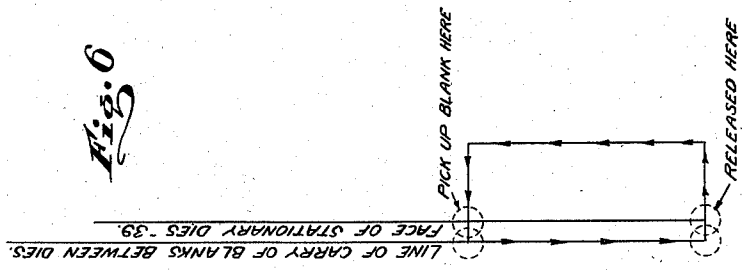


Fig. 4

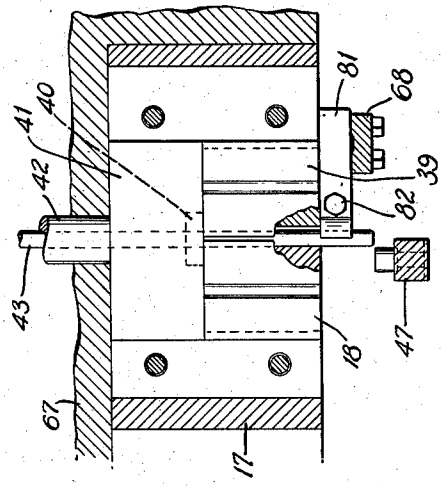
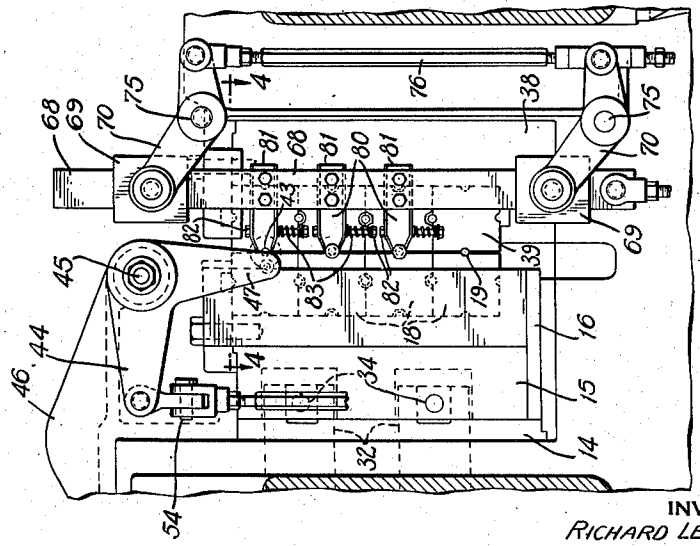


Fig. 3



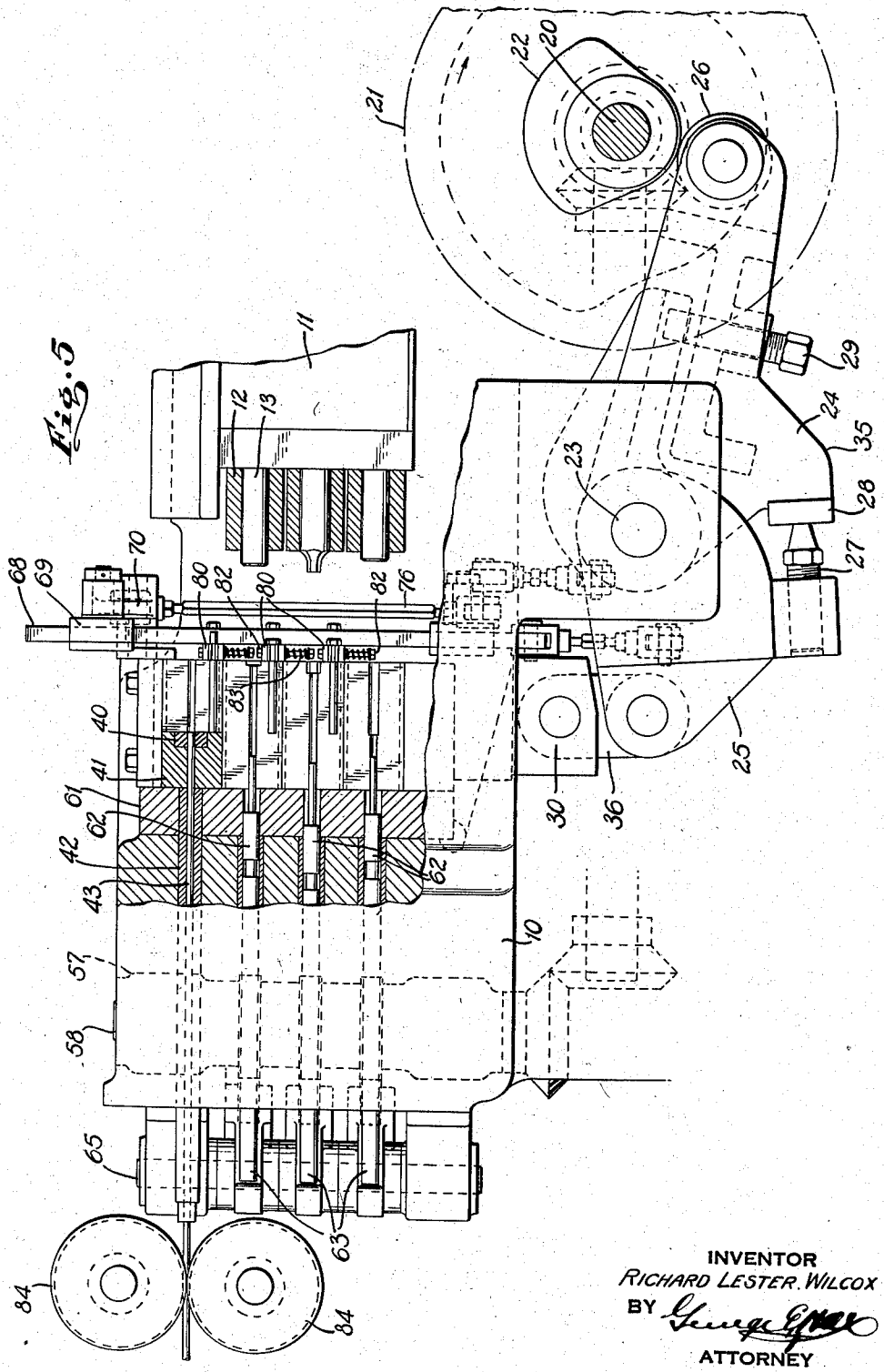
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UPSETTING MACHINE

Filed May 7, 1936 4 Sheets-Sheet 4

Fig. 5



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Patented Mar. 23, 1937

2,074,680

UNITED STATES PATENT OFFICE

2,074,680

UPSETTING MACHINE

Richard Lester Wilcox, Waterbury, Conn., assignor to The Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., a corporation of Connecticut

Application May 7, 1936, Serial No. 78,363

21 Claims. (Cl. 10—12)

This invention relates to new and useful improvements in upsetting machines or the like.

It is the object of this invention, among other things, to provide mechanism of this character, comprising in part, dies having a plurality of blank receiving recesses, means for cutting off a portion of a rod length or the like and automatically carrying such portion, now a blank, successively from one set of die recesses to the next succeeding set of die recess and all so arranged that at each working stroke of the punches an operation is performed on each of the blanks. In the carry movement the blanks travel with a portion thereof between the dies.

The above and other advantageous results, which will appear from the following description and the drawings forming part of this application, are accomplished in this invention.

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

In the drawings, which illustrate one form of this invention, and wherein like characters of reference indicate like parts in the several figures:

Figure 1 is a fragmentary portion of an upsetting machine looking toward the face of the dies, the parts in section being taken generally upon line 1—1 of Figure 2.

Figure 2 is a plan view of that portion of the machine adjacent to the punch and dies;

Figure 3 is a view of the parts as shown generally in Figure 1 adjacent to the dies;

Figure 4 is a view of the dies and adjacent parts, the parts in section, other than the dies, being taken generally upon line 4—4 of Figure 3;

Figure 5 is a fragmentary side elevation of the machine, the parts in section being taken generally upon line 5—5 of Figure 1; and

Figure 6 is a diagrammatic view illustrating the path of movement of each of the sets of transfer figures.

In the form of the present invention disclosed herein there are a plurality of pairs of dies (shown herein as four in number), with recesses therein, and so arranged that a blank is held in the cooperating recesses of each pair of dies. These blanks, after being operated on, are ejected from the dies a distance sufficient to enable transfer fingers to grasp them adjacent to the upset portion.

The fingers, in front of and adjacent to the face of the dies, now move toward the blanks, and snap over and hold the same rigid, further movement of the fingers stripping the blanks from the stationary dies and releasing them from the dies between the opposing faces thereof, and while so positioned travel therebetween to the next succeeding recesses. Thus the blank is successively presented to stations or die stages.

In the embodiment of the invention disclosed herein, 10 designates the body of the machine, which may be of any conventional form, and movably mounted thereon is a gate 11 having a punch holder 12 thereon, carrying a plurality of punches 13, there being one of these punches for each operation on the blank.

Within a pocket 14 in the body member is a movable die holder 15, which rides upon a suitable liner plate 16, and secured therein by a clamp 17 or the like, are a plurality of dies 18. These dies are of the conventional form, having longitudinal recesses 19 in the side walls thereof, the size and shape of which depend upon the size and shape of the rod and the upset portion of the blank at the station where the dies are located.

Fixed in the pocket 14 is a stationary die holder 38, in which is mounted a plurality of dies 39, corresponding in number and structure with the dies 18.

The dies 39, shown herein, are of conventional form and with this machine it is merely necessary to assemble a plurality of such dies. Obviously, however, two dies may be substituted for the plurality of sets of dies, each having cooperating recesses in the meeting faces thereof, or instead of four dies, as shown herein, a single die, or two dies might be joined in a single die, or any other convenient arrangement might be utilized as may seem desirable.

While it is preferable that the die holder 38 should be stationary if desired, it may be movable like the die holder 15.

Journaled in the body member 10, or suitable parts associatd therewith, is a shaft 20 that is driven by a spur gear 21, which is actuated by any convenient power source, and upon which is a cam 22.

A rock lever 35 has two parts which are severally designated 24 and 25 and both journaled on a stationary stud 23. The former of these parts carries a cam roll 26, which rides on the face of the cam 22 and the other part carries a breaker pin 27, which abuts against a breaker plate 28 in the lever part 24. The lever parts are held by the screw 29 so as to make a unitary structure,

substantially as shown in Figure 5, with the breaker pin 27 against the breaker plate 28.

Mounted to reciprocate within the body member 10 is a slide 30, connected by a link 36 with the rock lever part 25, and with which is associated a toggle mechanism 31 of a well known type.

Movable in the body 10 at an angle to the slide 30 are the two plungers 32, which at one end engage the toggle plate 33 and at the other end are each connected with the movable die holder 15 by the pins 34.

The movement of the slide 30 actuates the toggle mechanism and through the plungers 32 the die holder 15 is moved toward and away from the fixed dies. In their inner position, the dies 18 and 39 are in contact with each other.

A variation of the gripping pressure of the dies 18 and the position of the movable die holder 15 is obtained through the wedges 37 in a manner well known in the art.

Within the die holder 41 in rear of the die 18 is a cut off die 40, and concentric therewith is a quill 42, through which the rod 43 is fed by any one of many devices well known in the art. One of such devices being the conventional feed rolls or rollers 84 which may be actuated in any suitable manner.

The position of the cut off die relative to the upper die 39 is such that the opening in the cut off die is not in register with the recess in the die 39, but somewhat nearer to the movable dies when in their out position as shown in Figure 1.

Stop means limit the inward movement of the rod 43, and comprises in part a rock member 44, mounted upon a stud 45 in a fixed bracket 46. The rock member 44 is actuated from a cam 48 on a shaft 49 through a rock lever 50 journaled at 51 in a fixed bracket 52, through a connecting rod 53, having a universal joint coupling 54 at each end, of any well known construction. The shaft 49 is journaled in parts 55 connected with the body member 10 and driven from the shaft 20 through gears 56.

The arm 47 of the rock member 44 moves into and out of line with the feed of the rod 43, and when in line therewith limits the extent of movement thereof.

Connected with the body member 10 is a shaft 58 which is journaled in the parts 57 and rotated through the gears 59 from the shaft 49. On this shaft are a plurality of knockout cams 60.

Projecting through a backing plate 61 and in the same plane as the recesses in the three lower dies 18 and 39 are the knockout pins 62, which are moved in one direction by knockout rods 63. These knockout rods 63 are intermittently actuated in timed relation with other parts through the knockout levers 64, which are fulcrumed upon pins 65 in a fixed part and carry the cam rolls 66 which ride and are held against the face of the cams 60 by the springs 67.

The numeral 68 designates the transfer slide, which is mounted in guide blocks 69 pivotally connected with rock levers 70. A reciprocating movement is imparted to this slide by a cam 71 on the shaft 49 through a rock lever 72 fulcrumed on a fixed bracket at 73, and having an adjustable connection with the slide by the turn-buckle 74. The rock levers 70 are fulcrumed on a fixed part at 75 and are operatively connected with each other by an adjustable connection 76. These rock levers 70 derive motion from a cam 77 on the shaft 49, through a rock lever 78 fulcrumed at 79 to a fixed bracket.

Fixed to the transfer slides 68 are a plurality of blocks 80, in this case three in number, which project laterally upon one side thereof and have associated therewith spring fingers 81 which are held in closed position against the sides of the blocks by studs 82 and springs 83 in a well known manner. These fingers are movable close to and across the face of the dies, traveling in a path substantially as outlined in Figure 6, through the action of the slide 68 which reciprocates by the action of the cam 71 and moves laterally through the action of the rock lever 70. The parts are so actuated that during the lateral movement of the fingers there is no reciprocation of the slide 68.

There are four stations in the mechanism illustrated, number one being that station where the new blank is received; number two the station next adjacent and where the first upsetting operation is performed; and numbers three and four being the stations next in the series and in the order named, where the second and third upsetting operations respectively are performed.

In operation the rod 43 is fed by the rolls 84, of conventional form, through the quill 42 and cut-off die 40 until it engages the movable stop, then in line therewith and while the dies are separated with an open space therebetween, substantially as shown in Figure 1.

The moving dies now travel toward the fixed dies and the die adjacent to that portion of the rod projecting in front of the face of the cut-off die severs such portion, after which the feed stop swings laterally out of line with the rod. The cut-off portion of the rod, now a blank, is projected by the die, with which it is in contact, into the recess in the opposite die 39, this being station one. The dies are now closed with a blank at station one only. The punches now advance toward the dies and return without action, as there is no punch in line with station one. As the punches return, that is, move away from the dies, the movable dies draw away slightly from the fixed dies and release their grip on the blank which is grasped by a pair of the fingers. The dies now open to their fullest extent and the fingers carry the blank away from the fixed die into the open space between the dies and then into register with the dies at station two. The rod 43 is again fed forward against the stop as above described and the next succeeding movement of the movable dies toward the fixed dies severs a new blank, which is carried to station one, with the former blank at station two. When so positioned, the punches advance as before and the punch opposite station two engages the blank thereat and pushes the same into the dies. When the blank has entered a sufficient distance to be supported by the dies the fingers are withdrawn from the blank and the continued movement of the punch forces this blank farther into the die and until the inner end thereof engages the knockout pin, at which time the outer end projects beyond the front face of the die. The punches continue their movement and the outer end of the blank at station two is upset while the new blank is at station one. The punches again return, the movable dies release their grip upon the blanks at stations one and two by being moved away slightly from the fixed dies. The knockout pin at station two now partially ejects the blank at that station and fingers grasp the blank thereat and also at station one. When so

grasped, the movable dies draw away from the fixed dies to their fullest extent as before and the fingers carry the upset blank from station two to station three and the most recent cut-off blank from station one to station two. Thereafter, all of the operations are continued as before. A new blank being presented at station one the blank formerly at station one being presented at station two and the blank at station two being presented at station three. The punches then advance, pushing the blanks into the dies at stations two and three, the fingers are now withdrawn, upsetting operations are performed upon the blanks at stations two and three in the manner above described. The dies are again separated slightly, the knockout pins partially eject the blanks at stations two and three, which are then grasped by pairs of fingers and when the dies are opened to their fullest extent all of the three blanks are advanced one station, that is, the blank at station three to station four, the blank at station two to station three and the blank at station one to station two. The dies are then closed and upsetting operations performed at stations two, three and four, by the punches in the manner above described. The initial upsetting operation is performed at station two and continued at stations three and four. Thereafter, all of the above operations are continued, a new blank being cut from the rod and a blank completed at each forward movement of the punches. If perchance a blank should become lodged between the dies in an incorrect position, the breaker plate **28** will be fractured by the breaker pin **27** and disconnect the parts of the two-part rock lever **35**. This will stop the movement of the slide **30** and the movable die holder **15**.

As shown in the drawings, the blanks are received by the upper dies and step by step transferred downward to the dies therebelow but the path of movement of the blanks may be varied, that is, move in an upward path instead of downward, as herein shown, or even horizontal. This may be accomplished by rearranging the parts so that the rod is fed into the lower dies instead of the upper dies, or by merely changing the relative position of the machine.

The embodiment of the invention herein discloses a vertical open space between the dies. This is desirable because dirt and scale will drop by gravity through such open space and prevent an accumulation thereof. The invention, however, is not limited to such a structure, as the mechanism will operate if the open space is in a horizontal plane and the dirt and scale, if any, released by other well known means.

While it will be apparent that the illustrated embodiment of the invention herein disclosed is well calculated to adequately fulfill the objects and advantages primarily stated, it is to be understood that the invention is susceptible to variation, modification and changes within the spirit and scope of the subjoined claims.

Having described the invention, what I claim is:

1. The combination with relatively movable upsetting dies having a plurality of die stages, of feeding rollers adapted to feed bar or rod stock endwise to said dies, means whereby said stock is cut off to form work pieces, transfer fingers adapted to grip a work piece when said dies are in their closed position and to transfer said work piece from one to another of said die stages when said dies are in their open position, and an ejector adapted to eject said work piece from said last mentioned die stage.

2. In a blank feeding and transfer mechanism the combination with a movable and a stationary gripping die having a plurality of die stages, of feeding rollers adapted to feed a work piece endwise to said dies, said dies being adapted to cut off and grip said work piece, transfer fingers, and means actuating said fingers independently to grip said work piece after said dies are closed, said means being also adapted to cause said fingers to transfer said work piece sidewise from one die stage to a subsequent die stage when said dies are in their open position.

3. In a blank feeding and transfer mechanism the combination with a movable and a stationary gripping die, of feeding rollers adapted to feed a work piece endwise to said dies in their open position, said dies being adapted to cut off and grip said work piece, transfer fingers, means actuating said fingers to grip said work piece after said dies are closed, said means being also adapted to cause said fingers to transfer said work piece from one die stage to a subsequent die stage when said dies are in their open position, and an ejector device adapted to eject said work piece from said subsequent die stage simultaneously with movement of the movable gripping die.

4. The combination of a stationary and a movable clamping die having a plurality of die stages, feeding rollers adapted to feed bar or rod stock in between said dies, one of said dies having a cut-off means associated therewith adapted to cut off said stock to form a work piece, and mutually pivoted, independently controlled transfer fingers adapted to grip said work piece and to transfer said work piece from one to another of said die stages when said dies are in their open position simultaneously with the feeding of stock in between said dies.

5. In a blank feeding and transfer mechanism the combination with a movable and a stationary gripping die having a plurality of die stages, of feeding rollers adapted to feed a work piece to one of said die stages while said dies are in their open position, blank gripping and carrying fingers, and means actuating said fingers to grip said work piece when said dies are in gripping position, said means being also adapted to cause said fingers to transfer said work piece from one die stage to a subsequent die stage when said dies are in their open position, and to release said blank and return to said first mentioned position when said dies are in their closed position.

6. In a blank feeding and transfer mechanism the combination with a movable and a stationary gripping die having a plurality of die stages, of feeding rollers adapted to feed a work piece endwise to said dies while in their open position, said dies being adapted to cut off said work piece, blank gripping and carrying fingers, means actuating said fingers to grip said work piece when said dies are closed and to transfer said work piece from one die stage to a subsequent die stage when said dies are in their open position, said means causing said fingers to release said work piece upon closing of said dies, and an ejector mechanism adapted to eject said work piece from said subsequent die stage upon the opening of said dies.

7. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein, which constitute

blank receiving recesses, the blank receiving recesses being disposed in a substantially vertical plane, one of said dies being movable between open and closed positions, means for feeding bar or rod stock, means whereby the stock is cut off to form work blanks, means whereby the blanks are transferred to the blank receiving recess adjacent the bottom of said dies, and transfer fingers adapted to transfer said blanks from the blank receiving recess adjacent the bottom of the dies to blank receiving recesses thereabove.

8. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, the blank receiving recesses being disposed in a substantially vertical plane, one of said dies being movable between open and closed positions, means for feeding bar or rod stock at a point remote from the plane in which the blank receiving recesses are disposed, means whereby the stock is cut off to form work blanks, means whereby the blanks are transferred to the blank receiving recess adjacent the bottom of said dies, and transfer fingers adapted to transfer said blanks from the blank receiving recess adjacent the bottom of the dies to blank receiving recesses thereabove.

9. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, the blank receiving recesses being disposed in a substantially vertical plane, one of said dies being movable between open and closed positions, of means for feeding bar or rod stock, means whereby the stock is cut off to form work blanks, means whereby the work blanks are transferred to the lower one of said blank receiving recesses, and transfer fingers adapted to transfer work blanks from said lower blank receiving recess to blank receiving recesses thereabove, the transfer fingers comprising a pair of fingers supported at a point vertically above the upper blank receiving recess, the fingers extending generally parallel to the plane in which the blank receiving recesses are disposed and being reciprocably movable in said plane to effect transfer of work blanks from one blank receiving recess to another.

10. The combination with relatively movable upsetting dies having a plurality of die stages, of feeding means adapted to feed bar or rod stock endwise to said dies when in their open position, and transfer fingers adapted to grip said stock when said dies are in their closed position and to transfer said stock sidewise from one to another of said die stages when said dies are in their open position.

11. The combination with relatively movable upsetting dies having a plurality of die stages, of feeding means adapted to feed bar or rod stock to said dies, means whereby said stock is cut off to form work pieces, and transfer fingers adapted to grip a work piece when said dies are in their closed position and to transfer said work piece from one to another of said die stages when said dies are in their open position.

12. The combination with relatively movable upsetting dies having a plurality of die stages, of means for intermittently feeding bar or rod stock to said dies, means whereby said stock is cut off to form work pieces, and transfer fingers adapted to grip a work piece when said dies are in their closed position and to transfer said work piece from one to another of said die stages when said dies are in their open position.

13. In an upsetting machine, a heading tool, relatively movable gripping dies having a plurality of die stages, said dies opening and closing for each stroke of said heading tool, means for feeding bar or rod stock to one of said die stages intermittently and corresponding to every other stroke of said heading tool, means whereby said stock is cut off to form work pieces, and transfer fingers adapted to transfer said work pieces between said die stages.

14. The combination with relatively movable gripping dies having a plurality of work stations, the dies being movable between open and closed positions, of feeding means adapted to feed rod or bar stock to a point remote from said stations, means whereby said stock is cut off to form work pieces, one of said dies being adapted to transfer said work pieces from said remote point to one of said stations, and transfer fingers adapted to grip said stock when the dies are in their closed position and to transfer said stock to another of said die stages when said dies are in their open position.

15. The combination with a pair of relatively movable gripping dies having a plurality of work stations, the dies being movable between open and closed positions, of a cut-off die remote from said work stations, feeding means adapted to feed rod or bar stock to said cut-off die, one of said gripping dies being adapted to receive a cut off portion of said stock and transfer it to one of said work stations, and transfer fingers adapted to grip said stock when the dies are in their closed position and to transfer said stock to another of said die stages when said dies are in their open position.

16. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, means for feeding bar or rod stock to one of the blank receiving recesses, means whereby the stock is cut off to form work blanks, transfer fingers supported at a point remote from the recess to which the work blanks are fed, said fingers being movable between spaced points and being adapted to transfer work blanks from one recess to another when the dies are in the open position, the fingers being movable relative to said work blanks when the dies are in the closed position, portions of the fingers adjacent the ends thereof being adapted to grip a blank in the recess to which the blanks are fed when the fingers are at one of said spaced points, said portions of the fingers being adapted to grip a blank in a recess adjacent to the recess to which the blanks are fed when the fingers are moved to the other of said spaced points.

17. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, means for feeding bar or rod stock to one of the blank receiving recesses, means whereby the stock is cut off to form work blanks, transfer fingers supported at a point remote from the recess to which the work blanks are fed, said fingers being movable between spaced points and being adapted to transfer work blanks from one recess to another when the dies are in the open position, the fingers being movable relative to said work blanks when the dies are in the closed position, portions of the fingers adjacent the ends thereof being

adapted to grip a blank in the recess to which the blanks are fed when the fingers are at one of said spaced points, said portions of the fingers being adapted to grip a blank in a recess adjacent to the recess to which the blanks are fed when the fingers are moved to the other of said spaced points, the transfer fingers being substantially at said last named position when work blank material is fed to the dies.

18. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, means for feeding bar or rod stock to one of the blank receiving recesses, means whereby the stock is cut off to form work blanks when the dies are moved from the open to the closed position, transfer fingers supported at a point remote from the recess to which the work blanks are fed, said fingers being movable between spaced points and being adapted to transfer work blanks from one recess to another when the dies are in the open position, the fingers being movable relative to said work blanks when the dies are in the closed position, portions of the fingers adjacent the ends thereof being adapted to grip a blank in the recess to which the blanks are fed when the fingers are at one of said spaced points, said portions of the fingers being adapted to grip a blank in a recess adjacent to the recess to which the blanks are fed when the fingers are moved to the other of said spaced points.

19. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, feeding means for feeding bar or rod stock to a point spaced from said blank receiving recesses, means whereby the stock is cut off to form work blanks, means to transfer work blanks from said spaced point to one of the blank receiving recesses, transfer fingers supported at a point remote from the recess to which the blanks are transferred from the cut off means, the transfer fingers being movable between spaced points and being adapted to transfer work blanks from one recess to another, portions of the fingers adjacent the ends thereof being adapted to grip a blank in the recess to which the blanks are fed when the fingers are at one of said spaced points, said portions of the fingers being adapted to grip a blank in an adjacent recess when the fingers are at the other of said spaced points.

20. The combination with relatively movable dies having a plurality of complementary opposed cooperating recesses therein which constitute blank receiving recesses, feeding means for feeding bar or rod stock to a point spaced from said blank receiving recesses, means whereby the stock is cut off to form work blanks, one of said dies being adapted to receive a cut off portion of said stock and transfer it to one of said blank receiving recesses, transfer fingers supported at a point remote from the recess to which the blanks are transferred from the cut off means, the transfer fingers being movable between spaced points and being adapted to transfer work blanks from one recess to another, portions of the fingers adjacent the ends thereof being adapted to grip a blank in the recess to which the blanks are fed when the fingers are at one of said spaced points, said portions of the fingers being adapted to grip a blank in an adjacent recess when the fingers are at the other of said spaced points.

21. In a machine of the class described, relatively movable dies having a plurality of die stages, one of said dies being movable between open and closed positions, means for feeding bar or rod stock to one of said die stages when the dies are in the open position, means whereby the stock is cut off to form work pieces and transfer fingers adapted to transfer said work pieces between said die stages, the stock feeding means being intermittently operable, the ratio of the times which the feeding means is operative when the dies are in the open position to the total number of times the dies are in the open position being as one is to the number of die stages in said dies.

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