

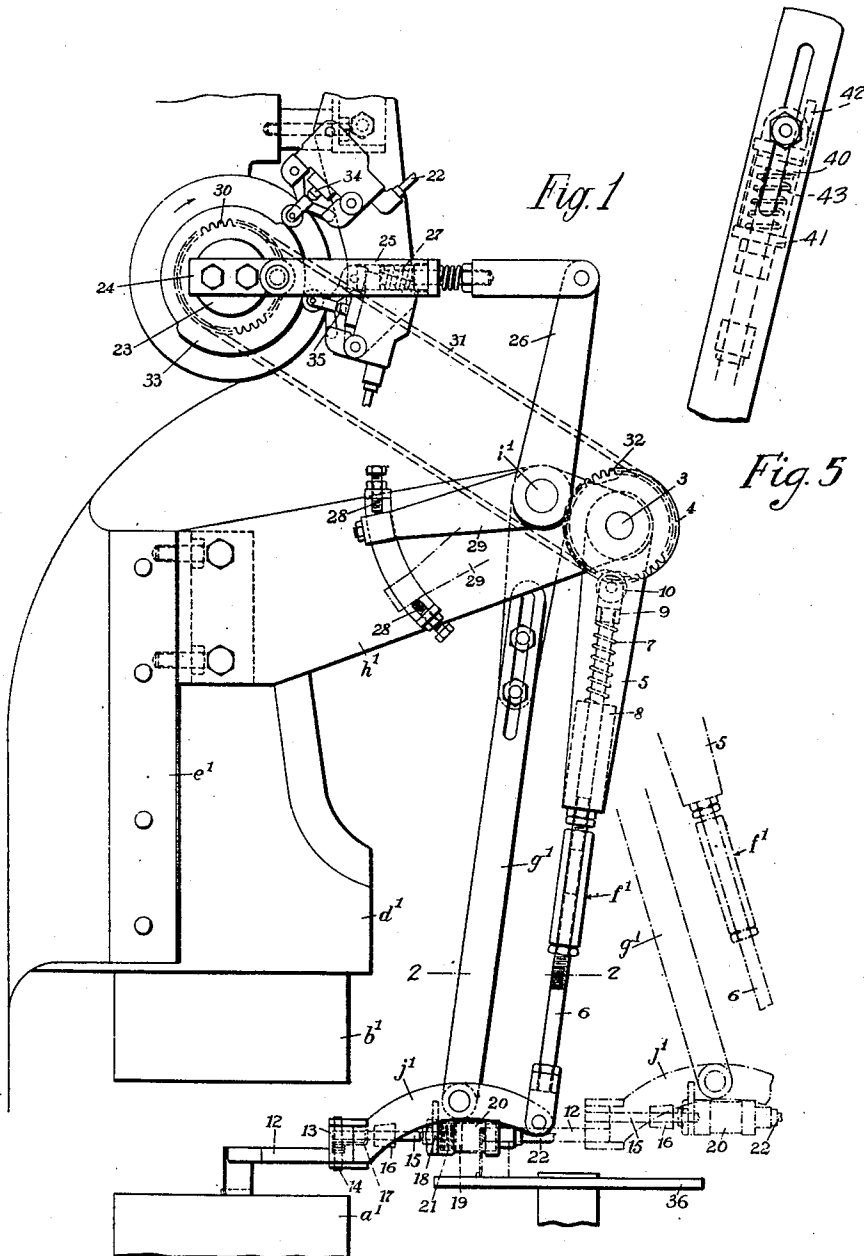
Oct. 29, 1957

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MEANS FOR TRANSFERRING WORK PIECES TO OR
FROM A CUTTING OR SHAPING PRESS

2,811,266

Filed Nov. 6, 1953

2 Sheets-Sheet 1



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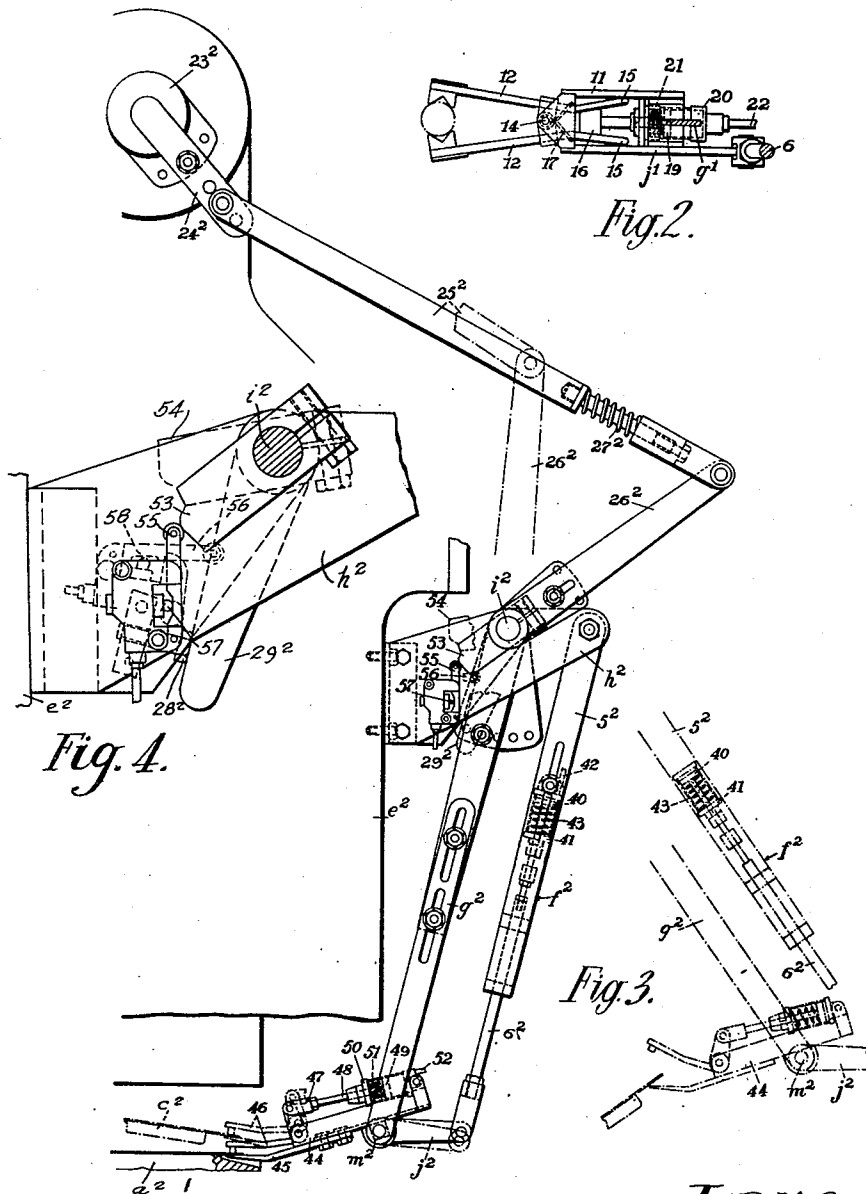
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MEANS FOR TRANSFERRING WORK PIECES TO OR FROM A CUTTING OR SHAPING PRESS

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2 Claims. (Cl. 214—147)

This invention has for its object to provide in a convenient form, means for transferring work pieces to or from a cutting or shaping press.

A transfer means in accordance with the invention comprises in combination supporting means for attachment to the press, an oscillatory arm resembling a parallel motion linkage, and consisting in part of two links pivoted to and depending from the supporting means, and a third link pivoted to and interconnecting the lower ends of the first mentioned links, and a work-piece carrier attached to the third link, one of the first mentioned links comprising a pair of relatively movable parts, and having combined therewith means for effecting relative movements of said parts, and thereby imparting angular movements to the third link and the work-piece carrier.

In the accompanying sheets of explanatory drawings:

Figure 1 is a side elevation of transfer means in accordance with the invention for feeding work pieces to a press.

Figure 2 is a sectional plan taken on the line 2—2 of Figure 1.

Figure 3 is a view similar to Figure 1 illustrating a modified form of the invention for removing work pieces from a press.

Figure 4 is a part sectional fragmentary view illustrating to a large scale parts of the transfer means shown in Figure 3.

Figure 5 is a fragmentary view illustrating to a larger scale pneumatically operable means shown in Figure 3.

In carrying the invention into effect as shown in Figures 1 and 2 for removing work pieces from the press, there is employed an oscillatory arm comprising a pair of parallel links f^1 , g^1 which are arranged and interconnected so that the oscillatory arm has a form substantially similar to a parallel-motion linkage. At their lower ends of the links f^1 , g^1 are pivotally connected to, and interconnected by, a short arcuate link j^1 , the upper end of the link f^1 being freely attached to a horizontal spindle 3 rotatably supported by brackets as h^1 on the stationary frame e^1 of the press, and the upper end of the link g^1 being adjustably or otherwise secured to another horizontal spindle i^1 pivotally supported by the brackets.

The link f^1 is slightly extensible under the control of a cam 4 on the spindle 3, and for this purpose is composed of a pair of relatively slidable parts 5, 6 interconnected by a compression spring 7, the latter being situated between abutments 8, 9 on the link parts. The cam 4 is adapted to co-operate with a roller 10 on the adjacent end of the link part 6, and serves in conjunction with the spring 7 for varying the length of the link f^1 , and thereby imparting pivotal movement to the arcuate link j^1 about its connection with the link g^1 , this movement of the arcuate link being utilized in the manner hereinafter described. If desired, the link part 6 may be composed, as shown, of a plurality of coaxial members adjustably secured together.

At its lower end the part 6 of the extensible link f^1 is

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situated between and pivotally connected to both the arcuate link j^1 and another similar arcuate link 11, the two arcuate links being secured together in parallel relationship, and serving as a mounting for a work-piece carrier. This carrier comprises a pair of grippers 12 respectively secured to and extending from one side of pivotal supporting blocks 13 which are carried by a common pivot pin 14 on the mounting above mentioned. Also respectively secured to and extending from the opposite side of the pivotal supporting blocks 13 are two gripper-actuating arms 15 which over the greater parts of their lengths are mutually inclined (see Figure 2), and between which is arranged a movable wedge piece 16, the arms being held in contact with opposite sides of the wedge piece by a spring 17, and being operable under the control of the wedge piece for actuating the grippers 12. The wedge piece 16 is connected by a rod 18 to an actuating piston 19 in a cylinder 20, the piston being movable in one direction by a spring 21, and in the opposite direction by compressed air admitted to the cylinder through a pipe 22.

Actuation of the oscillatory arm is effected from a rotary shaft 23 of the press through a crank pin 24 which is connected by a link 25 to a radial arm 26 secured on the pivotal spindle i^1 above mentioned. The link 25 is composed of two slidably interconnected parts having associated with them a pair of compression springs 27 which allow endwise relative movements of the link parts, and thereby permit a dwell between successive movements of the oscillatory arm without interfering with the rotary motion of the shaft 23. To provide the required dwell between successive movements of the oscillatory arm, the extent of the motion of this arm is limited by contact of adjustable stops 28 on one of the brackets h^1 with opposite sides of a second radial arm 29 secured on the pivot spindle i^1 .

The shaft 23 also serves to drive the spindle 3 carrying the above mentioned cam 4. For this purpose there is secured on the shaft 23 a sprocket wheel 30 which is connected by a chain 31 to another sprocket wheel 32 on the rotary spindle 3.

Also secured on the shaft 23 is a cam 33 which is adapted to actuate a spring-loaded valve 34 for controlling the flow of compressed air to and from the cylinder 20 containing the gripper-actuating piston 19. The cam 33 also serves to actuate another valve 35 for controlling the supply of compressed air to any convenient pneumatic mechanism (not shown) whereby intermittent rotary motion is imparted to a table 36 from which work pieces are successively fed by the grippers 12 to the stationary tool a^1 of the press.

The mode of action is as follows:

During the upward movement of the movable tool b^1 of the press the oscillatory arm above described is swung inwardly (with a work piece between the grippers 12) until the radial arm 29 on the pivot spindle i^1 is arrested by contact with the upper stop 28, whereupon the cam 4 permits shortening of the link f^1 under the action of the spring 7, and this causes the arcuate link j^1 to pivot about its connection with the link g^1 for lowering the work piece carried by the grippers 12 on to the stationary tool a^1 of the press, it being understood that the work piece is gripped between the grippers under the action of compressed air admitted to the cylinder 20. The oscillatory arm and associated parts now occupy the positions shown in full lines in Figure 1. Immediately thereafter the valve 34, is actuated to release the compressed air from the cylinder, whereupon the piston 18 serves under the pressure of the spring 21 to move the wedge piece 16 in the direction for permitting the grippers 12 to separate under the action of the spring 17, and thereby release the work piece. The cam 4 now

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serves by its action on the roller 10 to extend the link f^1 , and this causes the arcuate link j^1 to pivot in the opposite direction about its connection with the link g^1 for raising the outer ends of the grippers 12 clear of the work piece deposited thereby on the stationary tool a^1 . The oscillatory arm is then swung outwardly until the radial arm 29 on the pivot spindle i^1 is arrested by contact with the lower stop 28, whereupon the cam 4 again permits shortening of the link f^1 as above described for lowering the separated grippers into positions at opposite sides of another work piece on the table 36, and the various parts occupy the positions shown in chain-dotted lines in Figure 1. The valve 34 is now actuated for admitting compressed air to the cylinder 20, whereupon the piston 18 moves the wedge piece 16 in the opposite direction for causing the grippers 12 to grip the work piece situated between them. At this stage the cam 4 again serves to extend the link f^1 to raise the work piece gripped thereby clear of the table, and the above described sequence of operations is repeated.

Work pieces fed to the press in the manner above described are, after being subjected to the action of the press, removed by any convenient means, such as an air blast, or by arranging the press in an inclined position so that the treated work pieces can fall away by gravity.

Another form of the invention for removing work pieces from a press is illustrated in Figures 3 and 4, in which parts similar or analogous to those previously described are indicated by the same reference characters suffixed by 2 instead of 1. In this example the oscillatory arm comprises a pair of parallel links as f^2 , and another pair of parallel links as g^2 , the two pairs of links being arranged and interconnected so that the oscillatory arm has a form substantially similar to a parallel-motion linkage. At their lower ends the links f^2 , g^2 are pivotally connected to, and interconnected by, short horizontal links as j^2 , the latter being secured on, and pivotally connected to the links g^2 by, a transverse pivotal rod m^2 . The upper ends of the links f^2 are pivotally attached to brackets as h^2 on the stationary frame e^2 of the press, and the upper ends of the links g^2 are adjustably secured to a transverse spindle i^2 pivotally supported by the brackets.

Each link f^2 is slightly extensible, and for this purpose is composed of a pair of relatively slidable parts 52, 62, which are interconnected by pneumatically operable means comprising a piston 40 slidable in a cylinder 41, the piston being adjustably secured to the link part 62, and the cylinder being adjustably secured to the link part 52. The piston 40 is movable in the direction for lengthening the extensible link f^2 by compressed air admitted to the cylinder 41 through a pipe 42, and in the opposite direction by a spring 43.

On the pivotal rod m^2 is mounted a work-piece carrier comprising a body part 44, and a pair of grippers 45, 46, the gripper 45 being secured to the body part, and being situated beneath the gripper 46 which is pivoted on the body part. The pivotal gripper 46 is connected through the medium of a lug 47 on its pivoted end, and a rod 48, to a piston 49 which is slidable in a cylinder 50 on the body part 44, the piston being movable in one direction by a spring 51, and in the opposite direction by compressed air admitted to the cylinder through a pipe 52.

Actuation of the oscillatory arm is effected from a rotary shaft 23² of the press through a crank pin 24² which is connected by a link 25² to a radial arm 26² adjustably secured to the pivot spindle i^2 . The link 25² is composed of two slidable interconnected parts having between their adjacent ends a compression spring 27² which allows endwise relative movement of the link parts, and thereby permits the oscillatory arm to dwell at the inner end of each inward movement of the arm without interfering with the rotary motion of the shaft 23². To provide this dwell, the extent to which the oscillatory arm

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can be swung inwardly is limited by contact of an adjustable stop 28² (Figure 4) on one of the brackets h^2 with one side of a second radial arm 29² secured on the pivot spindle i^2 .

Also secured on the pivot spindle i^2 are two cams 53, 54 which are adapted respectively to impart movement to pivotal actuating members 55, 56 of spring-loaded valves 57, 58. The valve 57 serves to control the supply of compressed air to cylinder 50 for causing the piston 49 to bring the pivotal gripper 46 into action. Compressed air supplied through the valve 56 also has access through a bleeder valve (not shown) to the cylinders 41 for causing the pistons 40 to lengthen the links f^2 , and thereby move the short horizontal links j^2 angularly about their pivotal connections with the links g^2 for the purpose hereinafter described. The valve 58 serves to control the release of compressed air from the cylinder 50, and also from the cylinders 41 through the bleeder valve above mentioned.

The mode of action is as follows:

During the upward movement of the movable tool b^2 of the press the oscillatory arm above described is swung inwardly to a position in which the grippers 45, 46 can engage a finished work piece as c^2 on the stationary tool a^2 of the press, the arm being brought to rest in this position by contact of the radial arm 29² on the pivot spindle i^2 with the stop 28². The valve 57 is now actuated to supply compressed air to the cylinder 50 for moving the piston 49, and thereby bringing the pivotal gripper 46 into action for gripping the work piece c^2 between it and the other gripper 45. The various parts now occupy the positions shown in full lines in Figure 3. After the work piece is gripped as above described, the pistons 40 are actuated, by the compressed air flowing into the cylinders 41 through the bleeder valve, to lengthen the extensible links f^2 , and thereby cause the short horizontal links j^2 to be moved angularly about their pivotal connections with the links g^2 . This angular movement of the links j^2 causes the grippers 45, 46 to raise the work piece c^2 clear of stationary tool a^2 into the position shown in chain-dotted lines at the left hand side of Figure 3.

The oscillatory arm is now swung outwardly to the position shown in chain-dotted lines at the right hand side of Figure 3. Towards the end of this movement the valve 58 is actuated for releasing compressed air from the cylinders 50, 41. Consequently the piston 49 is moved by the associated spring 51 in the direction for retracting the pivotal gripper 46, and thereby permitting discharge of the work piece c^2 at a position clear of the press. Also the pistons 40 are moved by the associated springs 43 in the direction for restoring the extensible links f^2 to their initial length. The above described sequence of operations is then repeated.

In the foregoing examples, actuation of the oscillatory arm is effected by a normal moving part of the press. Alternatively fluid or electromagnetically operable means, or an electric motor, under the control of a moving part of the press may be used. Also any other subordinate constructional details may be varied to suit requirements.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. Means for transferring work pieces to or from a cutting or shaping press, comprising in combination supporting means for attachment to the press, an oscillatory arm consisting in part of two links pivoted to and depending from the supporting means, and a third link pivoted to and interconnecting the lower ends of the first mentioned links, and a work-piece carrier attached to the third link, one of the first mentioned links comprising a pair of relatively movable parts, and having combined therewith means comprising a rotary cam and a spring acting on one of the link parts for effecting relative movements of said parts, and thereby imparting angular movements to the third link and the work-piece carrier.

2. Means for transferring work pieces to or from a cutting or shaping press, comprising in combination sup-

porting means for attachment to the press, an oscillatory arm consisting in part of two links pivoted to and depending from the supporting means, and a third link pivoted to and interconnecting the lower ends of the first mentioned links, a work-piece carrier attached to the third link, 5 crank-operable mechanism including at least one spring for imparting oscillatory movement to the arm, and at least one adjustable stop for limiting the extent of motion of the arm in one direction, one of the first mentioned links of the arm comprising a pair of relatively movable 10 parts, and having combined therewith means for effecting relative movements of said parts, and thereby imparting angular movements to the third link of the arm and the work-piece carrier.

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