Oct. 14, 1941. A. NOVICK ET AL 2,259,320

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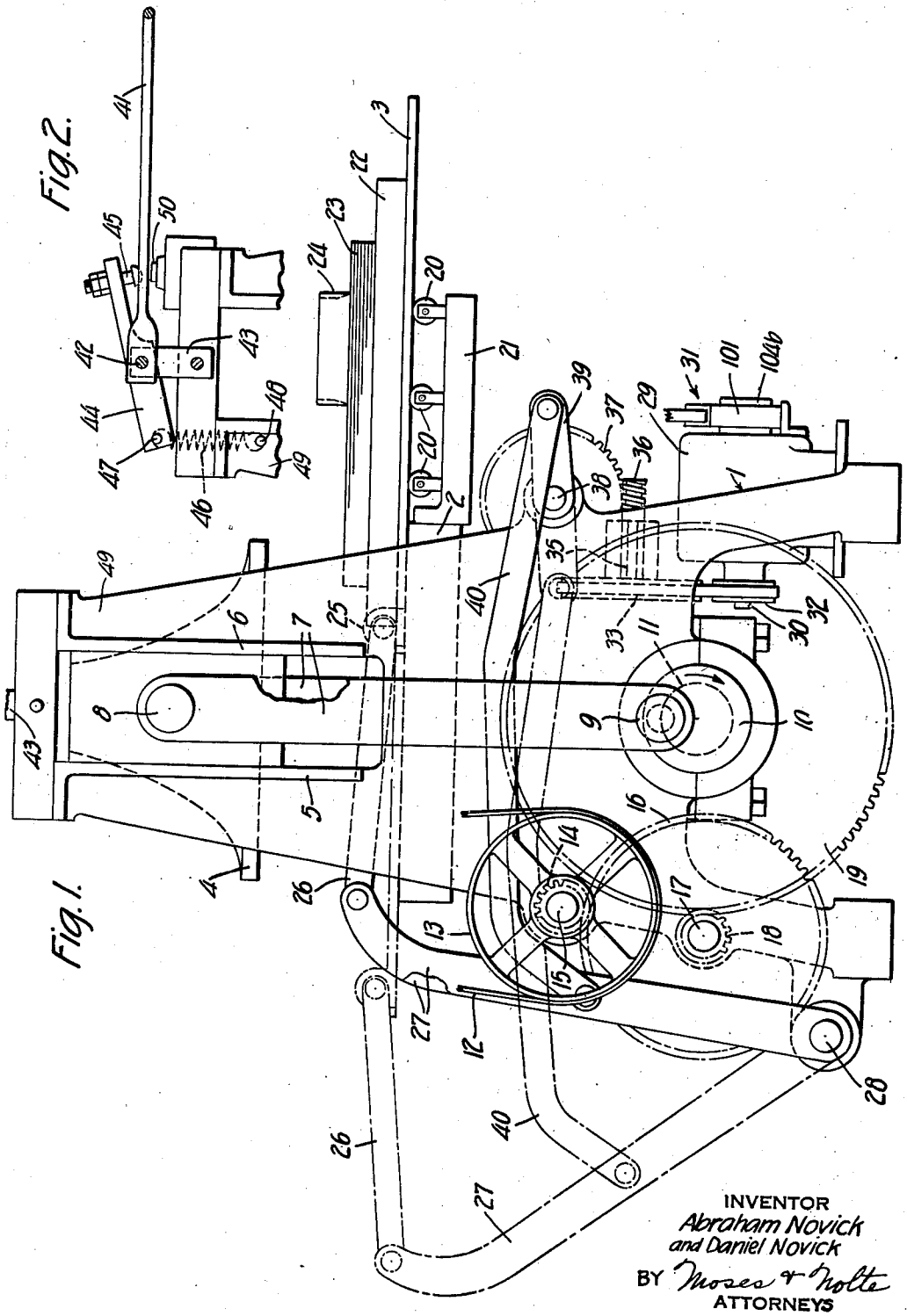

Fig. 1.



Fig. 2.

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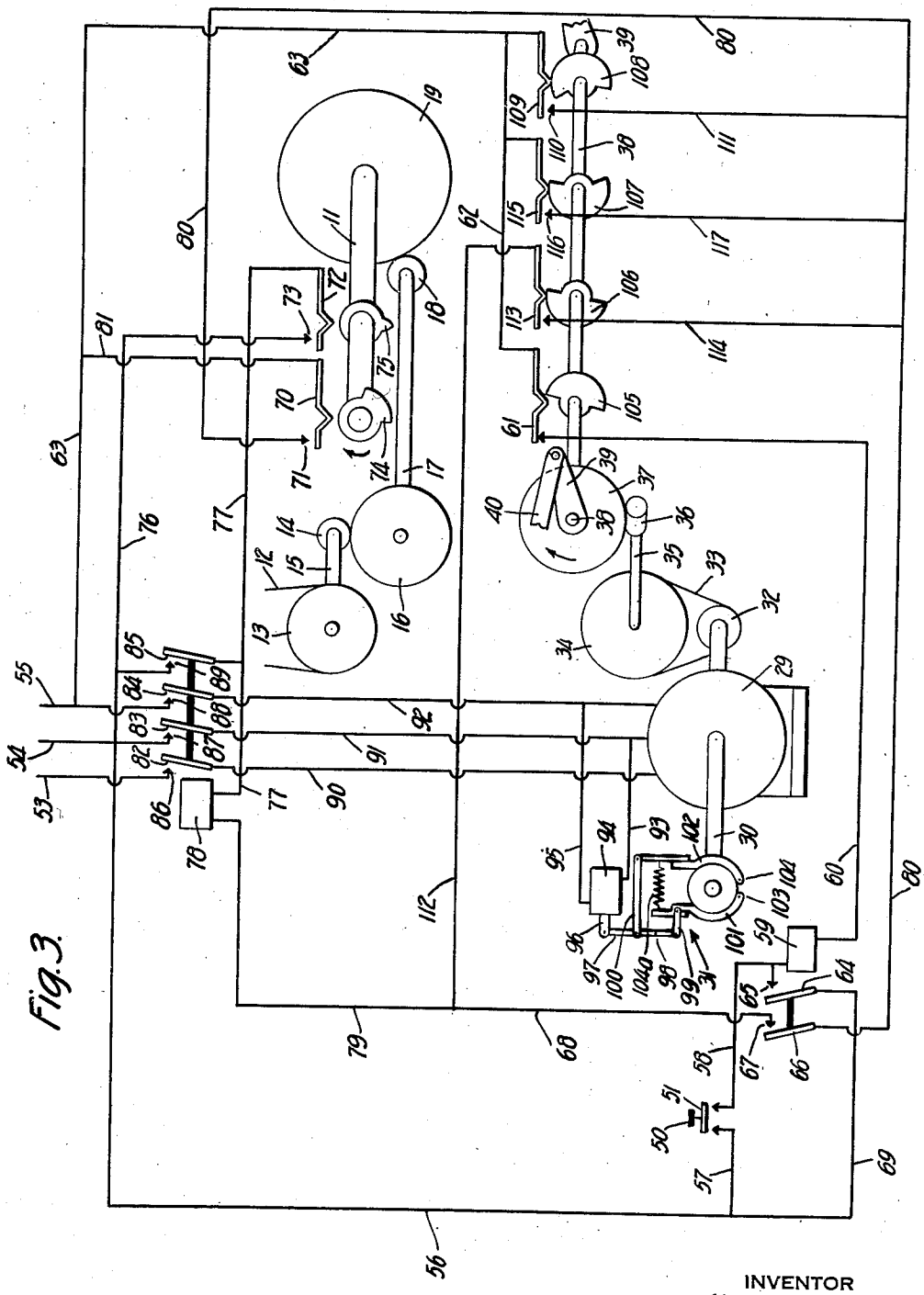

Fig. 3

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Patented Oct. 14, 1941

2,259,320

# UNITED STATES PATENT OFFICE

2,259,320

## DIE PRESS

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Application October 18, 1939, Serial No. 299,929

14 Claims. (Cl. 164—21)

This invention relates to machines for die cutting paper or other sheet material arranged in stack form, by forcing a die through the stack.

In accordance with a common practice of the prior art provision is made of a machine known as a standard die press which comprises a continuously reciprocating plunger head or ram driven from a shaft which is equipped with a heavy fly-wheel. The operator places the stack of sheet material upon a cutting board, places the die in a desired position upon the stack, and then, while the head is in the upper range of its movement, thrusts the board with the supported stack and die under the head so that the die will be driven through the stack by the head upon the next descent of the head. The operator then withdraws the board with the supported stack and die from beneath the head, as the head moves upward away from the stack, and before the head has had time to descend a second time. The operation is repeated after a short period, depending upon the time required by the operator to remove and dispose of the cut blanks and to effect a fresh arrangement of board, stack and die.

This procedure is laborious for the operator, and requires skillful timing on his part. He must be careful to get the die under the head at the right moment. He must also be careful to have the die fully under the head, for the die is likely to be broken if it is only partly under. There is another disadvantage to this operation, and that is the element of danger for the operator. He must be extremely cautious that his fingers do not become caught under the cutting head.

As an alternative to the above practice it has been proposed to dispense with the continuous operation of the plunger head and to effect a mechanical organization whereby the operator, when he has produced the desired arrangement of cutting board, stack and die, may initiate a mechanically controlled cycle of operations in which the board is first carried inward to locate the die under the head, the die is then caused to descend and return, and the board is withdrawn. A mechanical organization of this kind has clear advantages over the standard die press in that it obviates the stated drawbacks, but it also lacks certain advantages of the standard die press, principally because of the discontinuous operation of the plunger head.

In the standard die press the inertia of the constantly running fly-wheel contributes substantially to the rapid movement of the plunger head toward the die and to the driving of the die through the stack. This reduces the peak power load and enables the operating parts to be made of relatively light and inexpensive construction. The fly-wheel, moreover, is constantly coupled with the plunger head so that there is no need for a heavy duty clutch for initiating and effecting operation of the plunger head, nor of a powerful brake for arresting the plunger head at the conclusion of an operation.

It is an object of the present invention to provide a mechanism which combines all of the advantages of both of the prior structures referred to, and which does not have any of the disadvantages of either of them.

To this end, it is a feature of the invention that provision is made of fly-wheel mechanism for constantly operating a plunger head, in combination with a mechanically operated cutting board actuating mechanism adapted to be rendered operative manually at the will of the operator, and arranged when so rendered operative to carry out a single cycle of cutter board operations in mechanically synchronized relation with the cycle of operations of the plunger head. The mode of operation is such that the cutter board carriage or table is caused to advance and to locate the die squarely beneath the plunger head while the plunger head is in the upper range of its movement, then to dwell until the plunger head has descended to drive the die through the stack and has again started upward, and finally to return to the starting or normal position where it will remain until the operator is ready to initiate a repetition of the cycle.

In a practical and advantageous embodiment of the invention, and as illustrated herein, electrical means are provided for effecting and controlling movements of a cutter board carriage, such means comprising an electric motor and an appropriate switch mechanism for controlling the motor. The switch mechanism comprises a manually operable switch which is not, itself, capable of setting the motor into operation, but which so alters the motor control circuit that other switch mechanism operated in timed relation with the plunger head may be effective to produce the described, timed cycle of operations of the clutter board carriage.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification:

Fig. 1 is a fragmentary view in side elevation, partly broken away, illustrating a machine embodying the invention;

Fig. 2 is a fragmentary view, in section, of the upper part of the machine showing the switch and its actuating mechanism; and

Fig. 3 is a diagrammatic view illustrating a mechanical and electrical means for controlling the operation of the cutter board carriage operating motor.

The illustrated machine, which includes sub-

stantially the structure of a standard die-press, comprises a frame 1. The frame 1 supports a press bed 2 upon which a table 3 is slidingly supported. A plunger head 4 is mounted for vertical reciprocation between suitable frame-carried guides 5 and 6, and is reciprocated in the guideways by links 7. The links 7 are pivotally connected at their upper ends to the plunger head 4 through pins 8. The lower end of each link is journaled upon an eccentric pin 9 which is carried by a driving disc 10 fast with a driving shaft 11.

The shaft 11 is constantly driven from a belt 12 through suitable transmission mechanism comprising a pulley 13 and a gear 14, both fast upon a shaft 15. The gear 14 drives a larger gear 16 fast upon a shaft 17. The shaft 17 also has fast upon it a smaller gear 18 which drives a large gear 19. The gear 19 may be made of massive construction to serve as a fly-wheel for storing energy and for stabilizing the rotation of the shaft 11. The belt 12 is operated continuously and at substantially constant speed, and as a consequence the plunger head 4 is reciprocated continuously. The described plunger head operating mechanism is hereinafter referred to as the plunger head driver, or simply as the driver.

The table 3, in the position shown in Fig. 1, rests in part upon supporting rollers 20 which are carried by an extension frame 21 affixed to the cutter bed 2. This is the loading and unloading position. The table 3 is designed to serve as a carriage for a cutter board 22 which rests loosely on the table.

In the loading position, as illustrated in Fig. 1, a sheet stack 23 is placed upon the cutter board 22 and a hollow die 24 is placed in a selected position upon the stack 23. It is the function of the cutter board carriage to support the cutter board in this loading position, to carry the cutter board into position to locate the die 24 squarely under the plunger head 4 so that the die will be driven through the stack upon descent of the plunger head, and then to return the cutter board, the stack and the die to the initial position while the plunger head is in the upper range of its movement and before it can descend a second time.

The table or carriage 3 is provided with ears 25 through which it is pivotally connected to the right hand ends of links 26. The left-hand ends of the links 26 are pivotally connected to rocker arms 27 which are fast upon a rock shaft 28. As the arms 27 move toward the left the table 3 is drawn toward the left from the position illustrated in Fig. 1 to the die cutting position, and as the arms move toward the right the table is returned to the position of Fig. 1.

A motor 29 is provided for operating the arms 27, this motor being normally idle and inoperative and having its shaft 30 normally held against rotation by a brake mechanism 31. When the motor 29 is rendered operative and is set into operation the motor shaft 30 acts through a pulley 32 fast on the shaft 30 and a belt 33 to drive a pulley 34 which is fast upon a shaft 35. The shaft 35 has fast upon it a worm 36 which meshes with and drives a worm gear 37 fast upon a shaft 38. The shaft 38 has fast upon it cranks 39 each of which is connected through a link 40 to one of the arms 27. As illustrated in Figure 1, the table 3 is at the right-hand limit of its movement. A half revolution of the worm gear 37 will carry the table to its left-hand limit of movement, while a further half revolution will return the table 3 to its illustrated position.

When the operator wishes to start the table in, that is, toward the left as illustrated in Figure 1, he presses an arm 41, Fig. 2, downward. The arm 41 is affixed to a rock shaft 42, which is pivotally mounted in the frame brackets 43. A lever 44, which is also fast upon the rock shaft 42, carries at one end an adjustable switch operating pin 45. The tail of the lever is normally drawn downward to hold the pin 45 and the arm 41 in raised position as illustrated in Figure 2, by means of a tension spring 46, which spring is connected at one end to a pin 47 carried by the tail of the lever and at the opposite end to a pin 48 carried by a frame member 49. When the arm 41 is depressed the pin 45 presses against a switch operating button 50 to move a contact member 51 into switch-closing position. The arm 41 may be released as soon as the switch member 51 has made contact, whereupon the switch member 51 will be restored to the open position illustrated in Figure 2.

The closing of the switch member 52 does not necessarily set the motor 29 into immediate operation, but the closing of this switch member is a condition precedent to the starting of the motor for carrying out a single complete cycle of the table 3 through operation of the motor 29, and it is effective to cause such a cycle to ensue.

The motor 29 may be of any suitable type, but is illustrated as a three-phase motor adapted to receive its current supply from three line conductors 53, 54 and 55.

Upon the closing of the switch member 51, a circuit is established from the conductor 54 to the conductor 55. The conductor 54 is connected through conductors 56 and 57 with the switch member 51, and the switch member 51 is in turn connected through a conductor 58 with an electromagnet 59. The electromagnet 59 is connected through a conductor 60 with a switch member 61 and thence through conductors 62 and 63 with the line conductor 55. The effect of closing this circuit is to energize the electromagnet 59, which pulls a stick switch member 64 into engagement with a contact 65 of conductor 58, and also pulls a switch member 66 into engagement with a contact 67 of a conductor 68. As soon as the switch member 64 engages the contact 65, a path from the conductor 56 to the electromagnet 59 in parallel with the switch member 51 is established through a conductor 69, the switch member 64, the contact 65 and a portion of the conductor 58. This new circuit is self-maintained so that the contact 51 is not required to be held for any substantial length of time in the closed position.

The effect of the establishment and maintenance of the described circuit is to maintain the switch member 66 in engagement with the contact member 67. This does not immediately complete any circuit, but it does make the completion of a circuit dependent upon the closing of a switch member 70 against a contact 71 and the closing of a switch member 72 against a contact 73. The switch members 70 and 72 are spring members which normally occupy the open positions illustrated in Figure 2, but which are adapted to be pressed to circuit closing positions by cams 74 and 75, respectively, both of which are fast upon the constantly rotating shaft 11 and are, therefore, constantly operated by the driver. The switch members 70 and 72 are moved to closed positions simultaneously by

the cams 74 and 75. The switch member 72 is held engaged only for an instant, but the switch member 70 is held engaged for a longer period for a purpose which will be made clear presently.

The closing of the switch members 70 and 72 establishes a circuit from 54 to 55 as follows: From 54 through a conductor 76, contact 73, switch member 72, conductor 77, electromagnet 78, conductors 79 and 68, contact 67, switch member 66, conductor 80, contact 71, switch member 70, conductor 81 and conductor 63 to line conductor 55.

The energization of the electromagnet 78 closes the switch members 82, 83, 84 and 85 upon contact 86, 87, 88 and 89, respectively.

The engagement between switch member 72 and contact 73 is maintained for only an instant, so that the circuit just described is not maintained. The closure of the switch member 85 upon the contact 89 establishes in its place a circuit for maintaining the electromagnet 78 energized. This circuit comprises the conductor 54, conductor 76, contact 89, switch member 85, conductor 77, electromagnet 78, conductors 79 and 68, contact 67, switch 66, conductor 80, contact 71, switch member 70, and conductors 81 and 63 to line conductor 55.

The closing of the switch members 82, 83 and 84 connects conductors 90, 91 and 92, respectively, to the line conductors 53, 54 and 55. The conductors 90, 91 and 92 are connected to the three-phase winding of the motor 29, and set the motor into operation. At the same time a circuit is established from conductor 91 through a conductor 93, an electromagnet 94, and a conductor 95 to conductor 92. The electromagnet armature 96 is connected to a lever 97 fulcrumed at 98. The lever is connected through links 99 and 100 to brake shoes 101 and 102 which are pivotally mounted at 103 and 104, respectively. A spring 104*a* normally draws the shoes 101 and 102 toward one another and against a brake drum 104*b* fast on the motor shaft 30. Both shoes are moved away from the drum 104*b* by the lever 97 upon energization of the electromagnet 94.

The rotation of the motor is effective through rotation of the worm wheel 37, as previously described, to move the table 3 toward the left. The worm wheel 37 is fast upon the shaft 38, and this shaft also has fast upon it four switch controlling cams 105, 106, 107 and 108. At the starting of the motor as just described, the switches controlled by the cams 106, 107 and 108 are held open, but as already described the switch member 61 controlled by the cam 105 is in a closed position.

The period of contact or closure of the switch member 70 under the influence of the cam 74 on the shaft 11 is of limited duration. Before the switch member 70 is permitted to move to open position, however, the high part of the cam 108 travels out of engagement with a switch member 109 which it controls, permitting the switch member to engage a contact 110 of a conductor 111. This insures that a circuit will be maintained through the electromagnet 78 even after the switch member 70 has been permitted to move to its open position. A circuit through the relay 78 is now established and comprises line conductor 54, conductor 76, contact 89, switch member 85, conductor 77, electromagnet 78, conductors 79 and 68, contact 67, switch member 66, conductors 80 and 111, contact 110, switch member 109 and conductor 63 back to line conductor 55. The closed periods of the switch members 70 and 109 are overlapped somewhat, but the construction and arrangement are such that the cams 74 and 108 are caused to produce a combined closing period of the switch members 70 and 109 for 180° of revolution of the shaft 38, or, in other words, until the table 3 has been moved to its extreme leftward position as illustrated in dot and dash lines in Figure 1. At that point the high part of the cam 108 will engage the switch member 109 and move it out of engagement with the contact 110, thereby breaking the circuit just described.

The ratio of rotation of the shaft 11 to the shaft 38 is such, when both shafts are operating, that the cam 74 will not have attained a position to reestablish engagement of the switch member 70 with the contact 71 at the time when engagement of the switch member 109 with the contact 110 is broken. Disengagement of the switch member 109 from the contact 110, therefore, terminates energization of the electromagnet 78 and permits the switch members 82, 83, 84 and 85 to return to the open condition illustrated in Figure 2.

Simultaneously with the breaking of the circuit through switch member 109 the circuit of the stick relay 59 through switch member 61 is broken by cam 105. The switch members 64 and 66, therefore, move to open position at the same time. The motor having been energized for a portion of a cycle of the plunger head is now deenergized for the remainder of the cycle of the plunger head 4, or until the plunger head has descended and has again reached the point in its upward movement at which energization of the motor first occurred. During this time the shaft 38 stands idle, and hence the switch controlling cams which it carries stand idle substantially 180° away from the positions in which they are illustrated in Figure 2. The shaft 11 during this idle period of the shaft 38 continues to rotate, however, and when it has traveled through 360° from the position in which the switch members 70 and 72 were first closed, it causes the switch members 70 and 72 to be moved again to closed positions. While such closure would normally have no effect with the cams on the shaft 38 in the illustrated position of Figure 2, unless the arm 41 had been previously swung to close the switch member 66, it does have the effect of again starting the motor when the cams on shaft 38 are in the positions which they occupy at the end of the first half cycle of the table 3. Thus, the closing of the switch members 70 and 72 establishes a circuit through the electromagnet 78. This circuit comprises line conductor 54, conductor 76, contact 73, switch member 72, conductor 77, electromagnet 78, conductor 79, a conductor 112, a switch member 113 (controlled by the cam 106), a conductor 114, conductor 80, contact 71, switch member 70 and conductors 81 and 63 back to line member 55.

As before, the switch member 72 remains effective for only an instant, but the engagement of switch member 85 with contact 89 through energization of the electromagnet 78 serves to replace conductor 76, contact 73 and switch member 72, and to maintain the flow of current through the relay 78. As a result of the second phase of operations thus far described the line conductors 53, 54 and 55 are again connected to

the motor, the brake is released, and the motor is started into operation.

At the time when the motor is thus started for a second time, a switch member 115 controlled by the cam 107 is held open by the cam. A short time afterward, however, and before the cam 74 has permitted the switch member 70 to open, the cam 107 permits the switch member 115 to engage a contact 116 of a conductor 117. This establishes a circuit from line conductor 54 through conductor 76, contact 89, switch member 85, conductor 77, relay 78, conductors 79 and 112, switch member 113, conductors 114, 80 and 117, contact 116, switch member 115, and conductors 62 and 63 back to line conductor 55. These connections are then maintained until the second operation of the motor 29 has carried the shaft 38 through 180°, whereupon the cams 106 and 107 simultaneously move the switch members 113 and 115 to open position, and the operation of the motor is arrested with the table and all of the motor operated parts in their initial positions, namely, the positions in which they are illustrated in Figures 1 and 2.

The shaft 11 will continue to turn and periodically to close the switch members 70 and 72, but in the illustrated condition of the parts this can have no effect because there is no way of completing a circuit through the electromagnet 78 without first energizing the electromagnet 59 through closing of the contact member 51.

The principle of operation of the electrical control mechanism can now be more clearly expressed by means of a brief recapitulation. The motor operating switch 82—83—84 is controlled by the electromagnet 78. The electromagnet 78 is included in a first circuit comprising four sections which are series connectioned to one another. The first of these sections comprises the driver operated switch 70 and the motor operated switches 109 and 115, all connected in parallel with one another. The second section comprises the switch 66 which is adapted to be closed by the electromagnet 59 upon closing of the manual switch 51 and which, therefore, may be regarded as a manually responsive switch. The second section also includes in parallel with the switch 66 a motor operated switch 113.

The third section comprises the electromagnet 78 itself.

The fourth section comprises the motor operated switch 72 and a stick switch 85 in parallel with the switch 72, the stick switch being responsive to energization of the electromagnet 78.

In parallel with this first circuit means there is provided an auxiliary circuit means consisting of three sections which are connected in series with one another. The first of these sections comprises the motor operated switch 61 which must be closed in order for the auxiliary circuit means to be closed. The second section includes the electromagnet 59 for closing the switches 64 and 66 and for retaining them in a closed condition.

The third section includes the manual switch 51 and also the stick switch 64 in parallel with the manual switch 51. The sole purpose of the auxiliary circuit means is to close the switch 66 when the motor is in its normal idle condition, and to maintain it closed until it has been replaced by the closing of the motor operated switch 113. The closing of the switch 51, when the switch 61 stands closed as it does in the normal idle condition of the motor, is effective to close the switch 66 and to maintain the switch 66 closed until some time after the motor has been set into operation. When the switch 66 has thus been closed the operation of the switches 70 and 72 to closed positions by the driver operated cams 74 and 75 is not an idle operation, but serves at once to energize the electromagnet 78 and thereby to close the motor operating switch 82—83—84, and also the stick switch 85 which is in parallel with the driver operated switch 72.

Shortly after the rotation of the motor is initiated, the motor operated cam 108 turns to a position to cause the switch 109 to be closed so that it will be available to replace the switch 70 in the circuit upon movement of the cam 74 into position to permit the switch 70 to open. At the end of the first half cycle of motor operation the cam 106 is operated into position to cause the switch 113, in parallel with the switch 66, to be closed, so that the switch 66 is no longer necessary to the energization of the electromagnet 78, and hence is no longer necessary to the operation of the motor. Substantially simultaneously with the closing of the switch 113, the cam 105 is operated by the motor to a position to open the switch 61, so that the entire auxiliary circuit is deenergized and the switches 64 and 66 are caused to open through deenergization of the electromagnet 59. From this point onward neither the auxiliary circuit nor the switch 66 performs any function in the cycle which has been begun.

Simultaneously with the opening of the switch 61 and the closing of the switch 63, the cam 108 operates the switch 109 to open position. Since the switch 70 is not at this time closed, and the switch 115 has not yet been closed, the electromagnet 78 is open circuited because of the absence of any closed connection across the first section of the circuit means in which the electromagnet 78 is included. The second section of such circuit means is closed, however, because the switch 113 stands closed.

As soon, therefore, as the driver operated cams 74 and 75 again reach the positions for closing the switches 70 and 72, the circuit through the electromagnet 78 is again completed. This starts the second half cycle of operation. Before the switch 70 is permitted to open by the cam 74, the cam 107 will have been operated into position to cause the switch 115 to close. The operation of the motor will, therefore, be continued so long as the switches 115 and 113 remain closed. These switches are simultaneously opened by the cams 106 and 107 upon the completion of the second half cycle of motor operation, so that the motor operated parts all come to rest at the end of the second half revolution of the shaft 38, the parts being all restored to the positions in which they are illustrated in Figure 3. In these positions the switch 61 is closed, but the switches 113, 115 and 109 are open.

It is evident from what has been said that the table operating motor will remain idle until the switch member 51 is manually closed, and that even then it will continue idle until the cams 74 and 75 move the switch members 70 and 72 to closed position. This phase of the cams 74 and 75 occurs on the up stroke of the plunger head 4 in the neighborhood of 30° after the plunger head has reached its lowest position. The table is then given its full movement toward the left during the next ensuing half cycle (more or less) of the plunger head. The table then

rests in that position during the remainder of a complete cycle of the plunger head, and is again operated to restore it to its initial position during substantially the same phase of the ensuing cycle of the plunger head in which it was operated for the leftward movement. As soon as the table has been restored to its initial position, it is ready for a repetition of the described operation at any time that the operator may desire, and such repetition is brought about by the mere momentary actuation of the arm 41.

It is apparent that the mechanism as described relieves the operator of all manual labor in connection with the actuation of the table, that it also relieves him of the necessity for timing operation of the table relative to the plunger head, and that it obviates all hazard to the operator.

It is also apparent that these objects are attained without sacrificing the advantages which accrue from the continuous operation of the plunger head and its associated fly-wheel.

It is a further feature of the present invention that the cutter board 22 simply rests slidably upon the table 3 without attachment thereto of any kind. As a consequence of this arrangement, the operator is free to shift or turn the cutter board relative to the table 3, or to remove it from the machine. This is a point of substantial advantage since an operator who has a long stack 23 to deal with can very readily adjust the cutter board to a position to cause the die to come properly under the plunger head upon operation of the table to the die cutting position.

We have described what we believe to be the best embodiment of our invention. We do not wish, however, to be confined to the embodiment shown, but what we desire to cover by Letters Patent is set forth in the appended claims.

We claim:

1. A die press comprising, in combination, a plunger head, continuously operable rotary means for continuously reciprocating the plunger head, a sheet supporting table cooperative with said head, means for mechanically effecting a single complete operating cycle of the table which consists of moving the table from a position clear of the plunger head to a position beneath the plunger head and back to original position, said means being normally maintained inoperative, a manually operable control member for rendering the table moving means operative, and means for causing the operation of the table moving means to be controlled in its timing by the plunger head operating means.

2. A die press comprising, in combination, a plunger head, continuously operable rotary means for continuously reciprocating the plunger head, a sheet supporting table cooperative with said head, means for mechanically effecting a single complete operating cycle of the table which consists of moving the table from a position clear of the plunger head to a position beneath the plunger head and back to original position, said means being normally maintained inoperative, a manually operable control member for rendering the table moving means operative, and means for synchronizing the operating cycle of the table with the operation of the plunger head.

3. A die press comprising, in combination, a plunger head, continuously operable rotary means for continuously reciprocating the plunger head, a sheet supporting table cooperative with said head, means for mechanically effecting a single complete operating cycle of the table which consists of moving the table from a position clear of the plunger head to a position beneath the plunger head and back to original position, and means for controlling the production of a table operating cycle comprising two control devices, the first a manual control device for establishing a condition precedent to the initiation of a table operating cycle, and the second a mechanical control device operated cyclically by the plunger head operating means in timed relation with the operation of the plunger head for establishing a concurrent condition precedent to the initiation of a table operating cycle, and for thereby initiating the table operating cycle at a predetermined point in the cycle of the plunger head.

4. A die press comprising, in combination, a plunger head, continuously operable rotary means for continuously reciprocating the plunger head, a sheet supporting table cooperative with said head, means for mechanically effecting a single complete operating cycle of the table which consists of moving the table from a position clear of the plunger head to a position beneath the plunger head and back to original position, said means being normally maintained inoperative, a manually operable control member for rendering the table moving means operative, and means under the control of the plunger head operating means and effective after operation of the manually operable control member to initiate a table operating cycle at a predetermined point in the up stroke of the plunger head.

5. A die press comprising, in combination, a plunger head, continuously operable rotary means for continuously reciprocating the plunger head, a sheet supporting table cooperative with said head, means for mechanically effecting a single complete operating cycle of the table which consists of moving the table from a position clear of the plunger head to a position beneath the plunger head and back to original position, said means being normally maintained inoperative, a manually operable control member for rendering the table moving means operative, and means under the control of the plunger head operating means and effective after operation of the manually operable control member to initiate a table operating cycle at a predetermined point in the up stroke of the plunger head, said table operating means comprising means to cause the table first to be moved fully beneath the plunger head during a portion of a cycle of the plunger head, then to rest during the remainder of such plunger head cycle, then to be returned to the original position during a portion of the ensuing cycle of the plunger head, and finally to rest until after the next operation of the manually operable control member.

6. A die press comprising, in combination, a plunger head, a stack table, means for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table through a single prescribed cycle, said table operating means being normally maintained inoperative, manual means for rendering said table operating means operative, and means for synchronizing the operation of the table with the operation of the plunger head.

7. A die press comprising, in combination, a plunger head, a stack table, rotary means for

continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head and then in the opposite direction to return the stack to the original position, said table operating means comprising an electric motor, a control means for the motor comprising a rotary member operated by the motor, a first manually controlled switch to render the motor operable, a second switch means controlled by the plunger head operating means to start the motor at a definite point in the plunger head cycle, and a third switch means controlled by said motor operated rotary member to control the duration of an operation.

8. A die press comprising, in combination, a plunger head, a stack table, rotary means for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head and then in the opposite direction to return the stack to the original position, said table operating means comprising an electric motor, a control means for the motor comprising a rotary member operated by the motor, a first manually controlled switch to render the motor operable, a second switch means controlled by the plunger head operating means to start the motor at a definite point in the plunger head cycle, and a third switch means controlled by said motor operated rotary member to control the duration of an operation, said third switch means being effective to disable the motor at the end of the first half cycle of the table for the remainder of the current cycle of the plunger head, then in conjunction with the second switch means to start the motor again at the same point in the ensuing plunger head cycle at which the first half cycle of the table was started, and finally to disable the motor at the end of the second half cycle of the table.

9. A die press comprising, in combination, a plunger head, a stack table, a rotary driver for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head, said table operating means comprising a source of electrical energy, a table operating motor, a motor switch for controlling energization of the motor, a motor-switch-operating electromagnet, circuit means controlling the connection of the electromagnet to the source of electrical energy comprising a driver operated switch and a manually responsive switch, said switches being connected in series with the electromagnet and with one another, the last named switch arranged to be closed at the will of the operator when the motor is in the normal idle condition, so that the circuit means can be closed to energize the motor switch operating electromagnet by the closing of the driver operated switch, switch means in parallel with the manually responsive switch arranged to be operated to closed condition by the motor for replacing the manually responsive switch, motor operated means for disabling the manually responsive switch, and switch means in parallel with the driver operated switch and operated by the motor for controlling the continuation and termination of the motor operation.

10. A die press comprising, in combination, a plunger head, a stack table, a rotary driver for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head, then to rest, and then to travel in the opposite direction to return the stack to the original position, said table operating means comprising a source of electrical energy, a table operating motor, a motor switch for controlling energization of the motor, a motor-switch-operating electromagnet, circuit means controlling the connection of the electromagnet to the source of electrical energy comprising a driver operated switch and a manually responsive switch, said switches being connected in series with the electromagnet and with one another, the last named switch arranged to be closed at the will of the operator when the motor is in the normal idle condition, so that the circuit means can be closed to energize the motor switch operating electromagnet by the closing of the driver operated switch, switch means in parallel with the manually responsive switch, arranged to be operated to closed condition by the motor for replacing the manually responsive switch, motor operated means for disabling the manually responsive switch, switch means connected in parallel with the driver operated switch and operated by the motor for replacing the driver operated switch to continue the motor in operation for a first half cycle and then to open circuit the motor switch operating electromagnet, and for thereafter replacing the driver operated switch a second time to continue the motor in operation for a second half cycle and then to open circuit the motor switch operating electromagnet with all the motor operated parts in original conditions.

11. A die press comprising, in combination, a plunger head, a stack table, a rotary driver for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head, then to rest, and then to travel in the opposite direction to return the stack to the original position, said table operating means comprising a source of electrical energy, a table operating motor, a motor switch for controlling energization of the motor, a first circuit means including a driver operated switch, a switch adapted to be closed in response to manual control, and a motor-switch-operating electromagnet, all connected in series to one another; means for automatically maintaining the manually responsive switch in a closed condition so that the motor-switch-operating electromagnet will be energized and the motor switch will be closed upon closing of the driver operated switch, a motor operated switch in parallel with said manually responsive switch for replacing the manually responsive

switch after a predetermined period of operation of the motor, and additional motor operated switch means in parallel with the driver operated switch for causing the motor operation, once initiated, to be continued for a half cycle, then to be interrupted until the driver operated switch is closed a second time, then again to be continued for a second half cycle, and similarly to be interrupted with all the motor operated parts in their original conditions.

12. A die press comprising, in combination, a plunger head, a stack table, a rotary driver for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head, then to rest, and then to travel in the opposite direction to return the stack to the original position, said table operating means comprising a source of electrical energy, a table operating motor, a motor operating switch for controlling energization of the motor, a first circuit means comprising three successive sections connected in series, the first including a driver operated switch, and motor operated switch means connected in parallel; the second including a magnetically controlled switch and a second motor operated switch means in parallel therewith; and the third comprising a motor-switch-operating electromagnet; a second or auxiliary circuit means in parallel with the first circuit means comprising three successive sections connected in parallel, the first including a third motor operated switch means which remains closed at the conclusion of a complete motor cycle; the second including an auxiliary electromagnet for operating the magnetically controlled switch of the first circuit means; and the third including a manual switch, and a stick switch connected in parallel therewith and operated by the auxiliary electromagnet; and means operated by the motor for operating and timing the three motor operated switch means to cause the first motor operated switch means to close while the driver operated switch is closed, to cause the second motor operated switch means to close during the first half cycle of motor operation, to cause the first and third motor operated switch means to be opened at the conclusion of the first half cycle of motor operation, to cause the first motor operated switch means to close during a second closed period of the driver operated switch, and to open at the conclusion of a second half cycle of motor operation, and to cause the second motor operated switch means to open and the third to close during the second half cycle of the motor operation.

13. A die press comprising, in combination, a plunger head, a stack table, a rotary driver for continuously operating the plunger head in accordance with a prescribed cycle, means for mechanically operating the stack table at the will of the operator through a single prescribed cycle in which the table is caused to travel first in one direction to carry a stack from a loading position into a position under the plunger head, then to rest, and then to travel in the opposite direction to return the stack to the original position, said table operating means comprising a source of electrical energy, a table operating motor, a motor switch for controlling energization of the motor, a motor-switch-operating electromagnet; a first circuit means controlling the connection of the electromagnet to the source of electrical energy comprising a magnetically controlled switch, and a switch operated by the driver, said switches being connected in series with one another and with the motor-switch-operating electromagnet; auxiliary circuit means in parallel with the first circuit means comprising a first motor operated switch means, a manually operated switch normally biased to open position, and an auxiliary electromagnet for operating the magnetically controlled switch of the first circuit means, all in series with one another; an auxiliary stick switch connected in parallel with the manual switch and operated to closed position by the auxiliary electromagnet, whereby closing of the manual switch with the first motor operated switch means in closed condition is caused to energize the auxiliary electromagnet and to maintain such energization so long as the first motor operated switch means remains closed, and the auxiliary electromagnet is caused in turn to hold the magnetically controlled switch of the first circuit means closed for a like period to make the closing of the first circuit means and the starting of the motor dependent upon the closing of the driver operated switch; a second motor operated switch means connected in parallel with the driver operated switch for replacing the latter switch in the first circuit means to maintain the motor in operation for substantially a half cycle each time the latter switch performs its circuit closing function, a third motor operated switch means connected in parallel with the magnetically controlled switch of the first circuit means and arranged to be operated to closed position during a portion of the first half cycle of motor operation and all of the second half cycle, and effective when closed to render the closing of the first circuit means and the restarting of the motor independent of the auxiliary circuit means but again dependent upon the closing of the driver operated switch, whereby the second operation of the motor will be initiated upon a second closing of the driver operated switch and will be maintained for a half cycle, and means operated by the motor for controlling and operating the several motor operated switches to cause the complete cycle of operations to be carried out and the motor to be arrested with the parts in their original condition.

14. A die press comprising, in combination, a plunger head, plunger head operating means including a continuously rotary member for continuously reciprocating the plunger head, a stack supporting table cooperative with the plunger head to carry a stack of sheets to and from the die cutting position beneath the plunger head, means for operating the table at the will of the operator and in timed relation with the operation of the plunger head, comprising means controlled by the operation of the plunger head operating means to control the time at which the table is set into operation, means operated by the table operating means itself to control the duration of such operation, and manual control means for selecting the cycle of the plunger head in which an operation of the table will be begun.

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