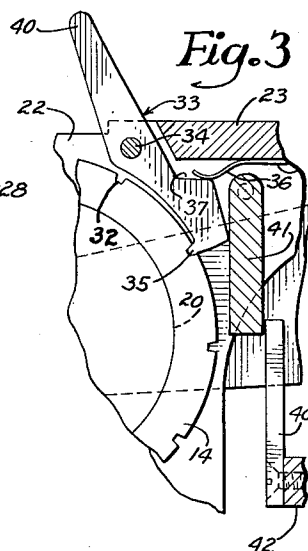
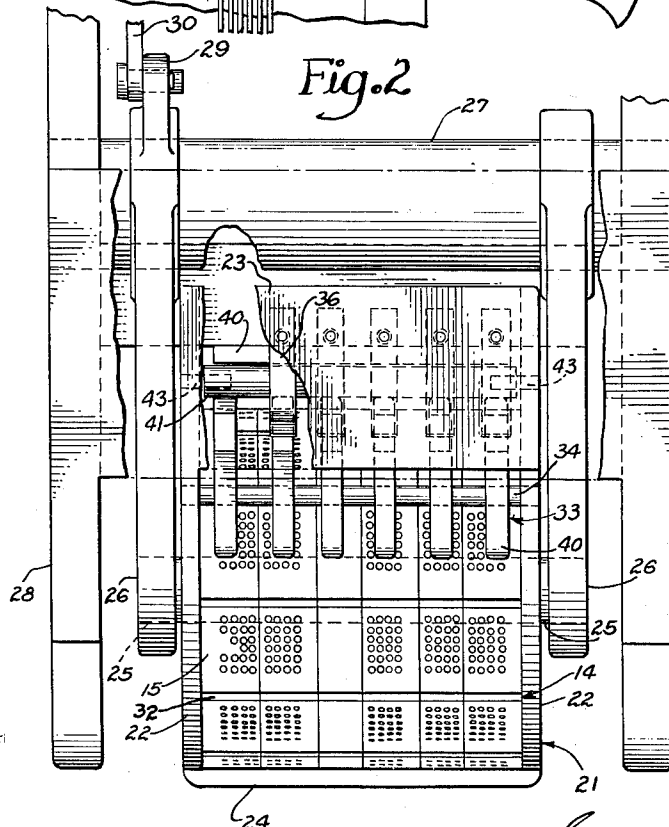
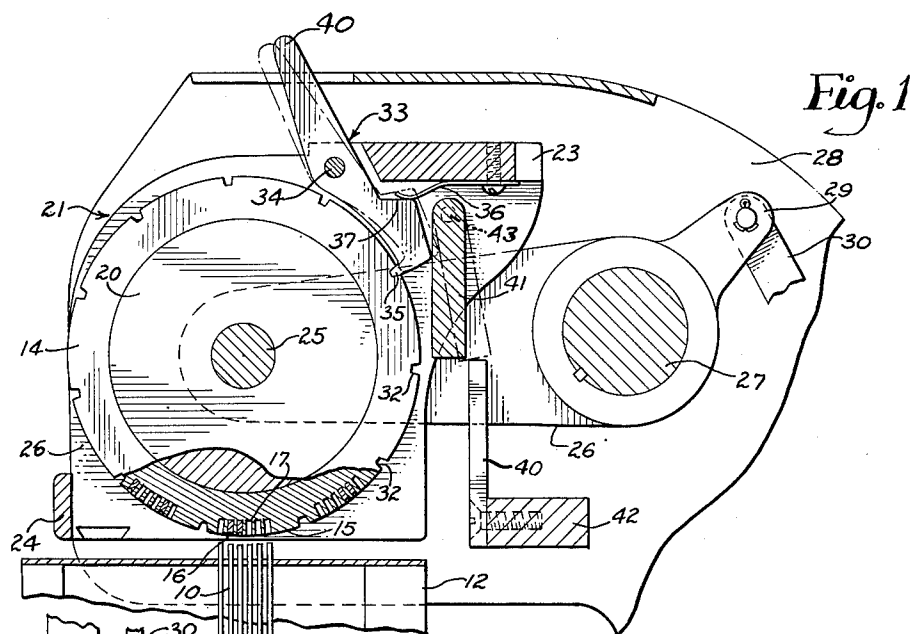


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LATCH MECHANISM FOR PERFORATOR MATRIX ELEMENTS

Filed Nov. 9, 1946

2 SHEETS—SHEET 1



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2,589,271

LATCH MECHANISM FOR PERFORATOR MATRIX ELEMENTS

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2 SHEETS—SHEET 2

Fig. 4

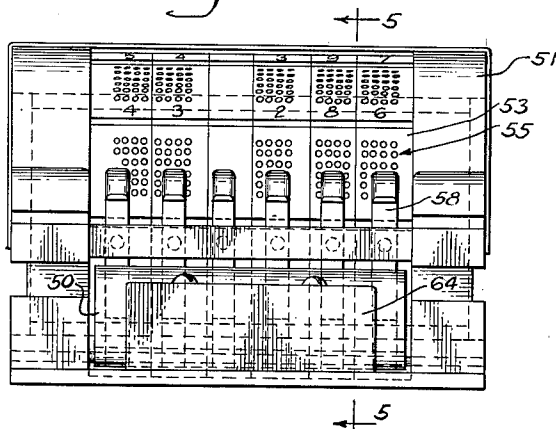
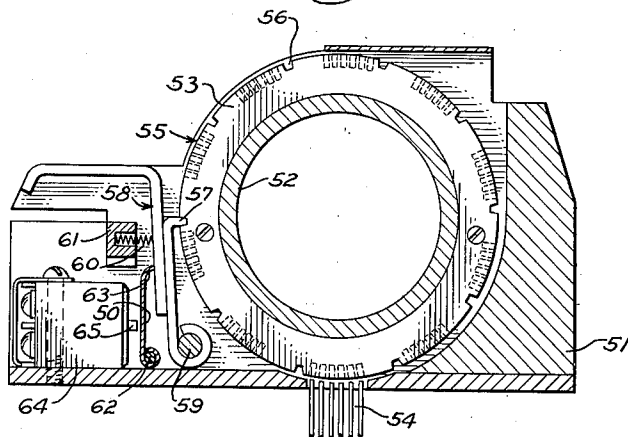


Fig. 5



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2,589,271

LATCH MECHANISM FOR PERFORATOR
MATRIX ELEMENTSNicholas S. Miller, Chicago, Ill., assignor, by
mesne assignments, to Cummins-Chicago Corp.,
a corporation of Illinois

Application November 9, 1946, Serial No. 709,043

11 Claims. (Cl. 164—114)

1

2

The invention relates to perforating machines, and more particularly to machines of the type having a plurality of groups of punches adapted to perforate numerals, letters, or other indicia, under control of selectively settable matrix elements.

One object of the invention is to provide improved means for accurately locating the matrix elements in operative relation to the punches and for releasably retaining the elements in such positions, including latch members which are permanently mounted in the machine and adapted to be actuated to release the elements without being detached from the machine.

Another object is to provide a latch mechanism for perforator matrix elements which permits of a positive locking of the elements against movement, together with manually operable means for releasing for free manipulation.

Still another object is to arrange the manually operable latch means so as to be capable of convenient manipulation by the digits of one hand.

A further object is to provide improved means for preventing operation of the machine until all of the matrix elements are accurately positioned for perforating and effectively latched in such positions, and for preventing accidental release of the elements during a perforating operation.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiments illustrated in the accompanying drawings, in which:

Figure 1 is a fragmentary vertical sectional view of the matrix head and associated portions of a perforating machine embodying the features of the invention.

Fig. 2 is a fragmentary plan view of the machine.

Fig. 3 is a fragmentary view showing the head advanced for effecting a perforating operation.

Fig. 4 is a front elevational view of a perforator matrix head utilizing a modified form of latch mechanism.

Fig. 5 is a transverse sectional view taken in a vertical plane substantially on the line 5—5 of Fig. 4.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit

and scope of the invention as expressed in the appended claims.

Referring to Figs. 1 and 2 of the drawings, the perforating machine selected to illustrate the invention has a plurality of groups of punches 10 arranged in a row transversely of the machine. The punches are mounted in a support comprising a stationary frame 12 for movement vertically toward and from a cooperating die plate (not shown) upon which the paper or other material to be perforated is placed. The punches are normally held in an elevated position and are operated to perform their perforating function by application of pressure to their upper ends.

Operation of the punches 10 is effected by means of a series of matrix elements 14, one for each punch group, supported and guided for movement toward and from the punches in a direction longitudinally of the same. The matrix elements 14 are provided with a series of matrix faces 15 each having sockets 16 in the form of shallow depressions for cooperation with the ends of the punches to be operated and relatively deep holes 17 adapted to receive the ends of idle punches in a perforating operation. The sockets 16 and holes 17 in the several matrix faces of the elements are arranged in different patterns so that the punches are operated in varying combinations to perforate selected numerals, letters or other indicia according to the particular matrix face utilized in the operation.

In the exemplary perforating machine, the matrix elements 14 are in the form of metal rings rotatably mounted on a cylindrical mandrel 20 carried by a suitable support which in the present instance is a reciprocable head 21. The rings are confined between side plates 22 rigidly secured to the ends of the mandrel and connected by top and front plates 23 and 24. To provide for movement of the matrix elements 14 relative to the punches 10, the head structure is mounted on a shaft 25 extending axially through the mandrel 20 and supported at opposite ends by a pair of arms 26 keyed to and projecting radially from a rockshaft 27. The shaft 27 is journaled in upright side members 28 forming a part of the frame or housing of the machine. For rocking the shaft 27 one of the arms 26 is formed with a rearwardly projecting extension 29 which is connected by a link 30 with suitable actuating mechanism provided in the machine.

In the particular embodiment illustrated, the matrix faces 15 are formed on the peripheral surfaces of the rings 14 and are uniformly spaced apart circumferentially of the rings. Thus, by

3

rotative adjustment of the matrix ring on its supporting mandrel 20, any selected matrix face on the ring may be positioned for coaction with the associated group of punches.

In order to insure proper presentation of the matrix faces 15 to the punch groups, provision is made for accurately locating each matrix face with respect to the punches and for releasably latching the matrix rings in adjusted or set positions. For this purpose, each matrix ring is formed with a plurality of locating notches 32 coordinated with the matrix faces 15 and positioned for cooperation with latches 33. In the present instance, the notches 32 are formed in the periphpheral surfaces of the rings 14 and are located between adjacent matrix faces 15.

In accordance with the invention, the latches 33 are constructed so as to form a permanent part of the machine structure and are arranged so that their release and the adjustment of the associated matrix ring can be effected with one hand. To this end, the latches are mounted on the head so as to remain at all times in operative association with the matrix elements. As shown, they are in the form of elongated levers pivotally supported intermediate their ends on a rod 34 extending between the side plates 26 of the head in front of and closely adjacent the top plate 23. The latches are spaced apart along the rod 34 in alinement with the respective matrix rings with their inner ends extending downwardly and rearwardly closely adjacent the associated ring. At the said rear end of each latch lever is provided a laterally projecting lug 35 complementally shaped with reference to the notches 32 and adapted to engage therein. When so engaged, one of the matrix faces is accurately positioned to engage a group of punches 10 and the matrix ring is effectually latched against rotation. Spring means, herein shown as elongated leaf springs 36 carried by the top plate 23 and bearing against shoulders 37 on the latch levers, yieldably urge the levers into latching engagement with the matrix rings. It will be evident however, that when the latch element is withdrawn against the action of this spring, the corresponding matrix ring is freely movable and therefore capable of free and easy operation by the operator.

To facilitate manipulation, manually operable means is provided for each of the latches. Preferably this means forms a part of the latch levers 33 and as shown in Figs. 1 to 3 the outer ends of the latch levers are extended forwardly and upwardly so that the tip ends thereof are disposed generally radially of and beyond the matrix rings for convenient manipulation. The projecting end portions of the latch levers thus constitute finger pieces 40 by which the levers may be rocked or actuated to disengage the lugs 35 from the notches 32 in the matrix rings. By reason of this advantageous location of the finger pieces, any latch member may be held in the disengaged position with one finger while the associated matrix ring is rotatably adjusted with the thumb of the same hand. In this connection it will be observed that the disengagement of the latch member from its matrix ring frees the latter for easy movement. At the same time, the exposed notches in the face of the ring afford a convenient visual indication to the operator of the approach of the ring to adjusted position as determined by the alinement of the notch therein with the notches of adjacent rings so that the operator may release the latch member for movement by its spring into the notch

4

in the final operation of the movement of the ring into adjusted position.

The invention also provides novel control means for preventing operating movements of the head 21 until all of the matrix rings have been properly adjusted and latched, and for preventing accidental movements of the rings while a perforating operation is taking place. Referring to Figs. 1-3 of the drawings, the control means shown is of the mechanical type and includes a stationary stop member 40 arranged for cooperation with a movable stop member 41 carried by the head 21 and operatively associated with the latch levers 33.

As herein shown, the stationary stop member 40 comprises an elongated flat plate extending transversely across the machine at the rear of the matrix head 21 and supported in a vertical edge-wise position by a cross member 42 rigid with the frame members 28. The movable stop member 41 preferably comprises an elongated bar extending transversely across the head 21 and pivotally supported by pins 43 adjacent one edge on the side plates 26 of the head. The pins 43 are located so that the member 41 normally tends to assume a vertical position clear of the stationary stop member 40, as shown in full lines in Fig. 1, and is rocked to a position above the stationary stop member, as shown in broken lines, when any one of the latch lugs 35 is withdrawn from the notch 32 of the associated matrix ring. The members 40 and 41 are thus enabled to cooperate in preventing downward movement of the head unless the latch lugs of all the latch levers 33 are entered in their associated notches 32.

As the head moves downwardly in a perforating operation, the movable stop member 41 slides along the front face of the stationary stop member 40, as shown in Fig. 3. The member 41 is therefore held in its upright position and in turn serves to lock all of the latch levers 33 against operation. Withdrawal of the latch lugs 35 from the notches 32 is thus prevented and the matrix rings 14 effectually locked against accidental rotation as long as the matrix head is away from its normal retracted position.

While the control members 40 and 41 are effective to mechanically lock the matrix head against operation until all of the latches 33 are properly engaged, it will be apparent that the movements of the stop member 41 may be utilized in other ways to effect the safety locking action. One such alternative control arrangement is shown in connection with the matrix head illustrated in Figs. 4 and 5 of the drawings. The particular head there shown is of the type employed in power driven perforators. In this instance, a movable control member 50 corresponding generally to the member 41 is arranged for actuation by the individual matrix ring latching mechanisms to prevent operation of the machine by interrupting the supply of current to the driving motor until all of the matrix rings are properly set and latched.

Referring to Figs. 4 and 5 of the drawings, the exemplary matrix head comprises a frame 51 having a tubular mandrel 52 upon which are rotatably mounted a plurality of conventional matrix rings 53 for actuating a like plurality of punch groups 54. Each ring 54 is formed with a series of matrix faces 55 adapted to be presented selectively to the associated punch group 54 for operating the same in predetermined combinations. Notches 56 are provided in the periphery of the ring for the reception of a latch lug 57 rigid with a latch lever 58 pivotally sup-

5

ported on a rod 59 extending transversely across the frame 51. A spring 60 interposed between the latch lever 58 and a stationary part 61 of the frame yieldably urges the lever into latching engagement with the associated matrix ring. As is best shown in Fig. 4, the latch levers 58 are arranged in keyboard formation at the front of the head so that the matrix rings may be released by the pressure of a thumb or finger for manipulation by another finger of the same hand.

The movable control member 50 preferably comprises an elongated bar or plate extending across the latch levers 58 adjacent the front of the machine. The member is pivotally supported at its lower edge by a rod 62 carried by the frame 51 and its upper marginal edge portion is formed with a rearwardly turned lip 63 adapted to bear against the latch lever 58.

A suitable electric switch 64, such as a conventional micro-switch, is mounted in the frame 51 with its operating plunger 65 bearing against the front face of the member 50 and yieldably urging it against the latch levers 58. The arrangement is such that the switch 64 is closed when all of the latch levers are in the normal latching position shown, but operation of any latch lever or withdrawal of its latch lug 57 from a locating notch 56 serves to rock the member 50 about its pivotal axis and thus open the switch 64. The switch may be connected in the circuit of the perforator driving motor in well known manner, so that the motor circuit is opened and operation of the perforator is prevented until all of the latch levers are returned to their normal latching position, as shown in Fig. 5. Thus, the perforator can be operated only when the matrix faces of all of the matrix rings 53 are properly located with respect to the punches 54.

It will be apparent from the foregoing that the invention provides novel mechanism for accurately locating the matrix faces of the matrix elements of a perforating machine and for effectually latching the elements in adjusted position. The mechanism is also effective to prevent operation of the machine until all of the matrix elements are properly positioned and latched and to prevent release of the elements during a perforating operation. Since the mechanism constitutes a part of the machine and is inseparable therefrom, it cannot become lost or misplaced. Moreover, it is advantageously located so that the mechanism and the associated matrix ring may be manipulated with one hand. Adjustments of the machine may thus be effected quickly and efficiently.

The particular latch lever construction shown in Figs. 4 and 5 of the drawings forms no part of the present invention, but is disclosed and claimed in the copending application of Thomas M. Steinbach, Serial No. 709,076, filed November 9, 1946, now abandoned.

I claim as my invention:

1. In a perforating machine having a plurality of groups of punches, the combination of actuating means for the punches including a matrix element for each group, said elements being adjustable to effect the actuation of the punches of their associated groups in different combinations for perforating selected indicia, means supporting said matrix elements for movement into or out of engagement with the punches, said supporting means being normally held in a retracted position, a disengageable latch for each matrix element operative to hold the element in ad-

6

justed positions, and movable stop means operable in response to the disengagement of any latch from its associated matrix element to prevent movement of said supporting means from the retracted position.

2. In a perforating machine having a plurality of groups of punches, the combination of actuating means for the punches including a matrix element for each group, said elements being adjustable to effect the actuation of the punches of their associated groups in different combinations for perforating selected indicia, means supporting said matrix elements for movement into or out of engagement with the punches, said supporting means being normally held in a retracted position, a disengageable latch for each matrix element operative to hold the element in adjusted positions, and a control member cooperating with all of said latches, said member being operative to prevent disengagement of any latch while said supporting means is away from said retracted position and being further operative to prevent movement of the supporting means from retracted position when any latch is disengaged.

3. In a perforating machine having a plurality of groups of punches, the combination of actuating means for the punches including a matrix element for each group, said elements being adjustable to effect the actuation of the punches of their associated groups in different combinations for perforating selected indicia, means supporting said matrix elements for movement into or out of engagement with the punches, said supporting means being normally held in a retracted position, a disengageable latch for each matrix element operative to hold the element in adjusted positions, a stationary stop member, and a movable stop member carried by said supporting means and shiftable upon release of any one of said latches into operative relation to said stationary stop member to prevent movement of the supporting means from retracted position.

4. In a perforating machine, a reciprocable punch actuating head, a series of matrix rings rotatably supported in said head, each of said rings having a plurality of matrix faces adapted to be positioned selectively for operation by rotation of the ring, a latch lever for each ring pivotally supported on said head and yieldably urged to a latching position, said levers being rocked manually to release the associated rings for selective positioning of the matrix faces, and means including a member engageable by and shifted incident to the rocking of any of said levers for preventing reciprocation of said head.

5. In a perforating machine, a reciprocable punch actuating head, a series of matrix rings rotatably supported in said head, each of said rings having a plurality of matrix faces adapted to be positioned selectively for operation by rotation of the ring and having a series of peripheral notches coordinated with said matrix faces, a lever pivotally supported on said head adjacent each ring and having a latch lug engageable in the notches of the associated ring to accurately locate the selected matrix faces of the ring, and a member mounted on and movable with said head for positively retaining the latch levers in latching position when the head is moved out of its normal rest position.

6. In a perforating machine having a plurality of groups of punches, a head supported and guided for movement toward and from the punches, a plurality of matrix rings, one for

7

each group of punches, rotatably supported on said head, each of said rings having a series of matrix faces adapted to be positioned selectively by rotation of the ring for engagement with its associated punch group in the movement of said head, a latch lever for each ring pivotally supported intermediate its ends on said head and having a latch lug at one end extending toward the periphery of the ring, said rings having peripheral notches for the reception of the latch lugs coordinated with the matrix faces to locate them accurately with respect to the punches when engaged by the lugs, spring means acting on each latch lever to urge the latch lug of the lever against the ring, said levers being operable manually to withdraw the lugs from the notches and thereby release the matrix rings for adjustment, and a member for positively locking said levers against operation when the head is moved out of its normal rest position.

7. In a perforating machine having a plurality of groups of selectively operable punches, a head supported for movement toward and from the punches, a plurality of matrix rings rotatably supported on said head and each having a series of matrix faces adapted to be positioned by rotation of the ring for variously operating one of the punch groups incident to the movement of said head toward the punches, each of said rings having a series of locating notches coordinated with its matrix faces, a latch lever for each ring pivotally supported on said head and having a lug engageable with the notches in the associated ring to accurately locate the matrix faces relative to a punch group, said levers being operable manually to disengage their latch lugs from the notches and thereby release the rings for adjustments, a stationary stop member supported adjacent said head, and a movable stop member mounted on and movable with said head, said movable stop member being normally positioned to clear the stationary stop member in the movement of the head and being shifted by the operation of any latch lever into a position to engage said stationary stop member and thereby prevent movement of the head from normal rest position.

8. In a perforating machine having a plurality of groups of selectively operable punches, a head supported for movement toward and from the punches, a plurality of matrix rings rotatably supported on said head and each having a series of matrix faces adapted to be positioned by rotation of the ring for variously operating one of the punch groups incident to the movement of said head toward the punches, each of said rings having a series of locating notches coordinated with its matrix faces, a latch lever for each ring pivotally supported on said head and having a lug engageable with the notches in the associated ring to accurately locate the matrix faces relative to a punch group, said levers being operable manually to disengage their latch lugs from the notches and thereby release the rings for adjustments, a stop bar pivoted on said head

8

for cooperation with the ends of said latch levers, said bar normally occupying an upright position when the lugs of said latch levers are engaged in notches and being rocked to an inclined position upon operation of any latch lever to disengage its lug from the notch in the associated ring, and a stationary stop member adapted to cooperate with said stop bar when in its upright position to prevent operation of any latch lever while the head is away from normal rest position and to provide an abutment for engagement by the bar when in its inclined position to prevent movement of said head.

9. In a perforating machine having a group of punches, a matrix element adjustable into different positions to govern the operation of said punches selectively, actuating means for effecting relative movement between said punches and said matrix element, means releasably holding said element in its various set positions including a member shiftable relative to the matrix element when the latter is moved from one position to another, and movable stop means operable in response to such shifting of said member to disable the actuating means.

10. In a perforating machine having a group of punches, a matrix element adjustable into different positions to govern the operation of said punches selectively, actuating means for effecting relative movement between said punches and said matrix element, means releasably holding said element in its various set positions including a member manually shiftable relative to the matrix element to free the latter for movement from one position to another, and movable stop means operable in response to such shifting of said member to disable the actuating means.

11. In a perforating machine having a plurality of groups of punches, a matrix element for each group of punches adjustable into different operative positions to govern the operation of the associated group of punches selectively, actuating means for effecting relative movement between said punches and said matrix elements, a retaining device for each matrix element effective to releasably hold the element in adjusted operative positions, and movable stop means operable by the retaining device of any matrix element displaced from an operative position to prevent operation of said actuating means.

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