May 27, 1958 H. F. WELSH 2,836,245

CARD PUNCHING DEVICE

Filed Nov. 18, 1955 2 Sheets-Sheet 1

FIG. 1.

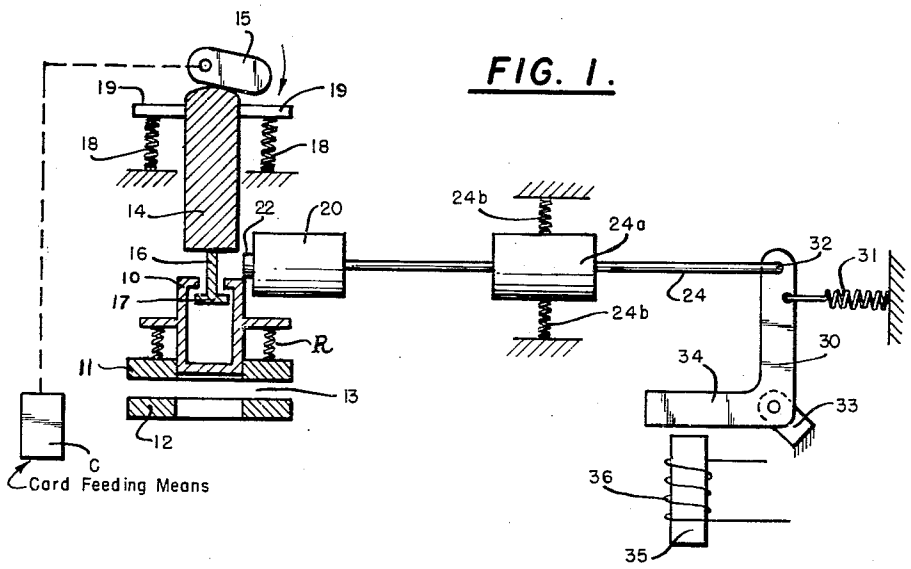
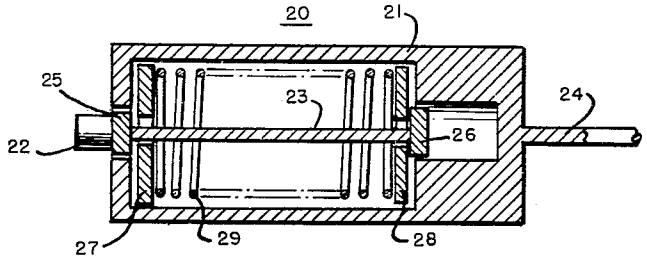


FIG. 2.



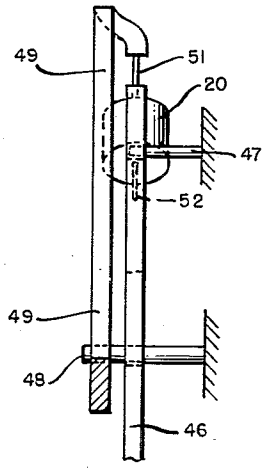


FIG. 4.

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May 27, 1958 H. F. WELSH 2,836,245

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Filed Nov. 18, 1955 2 Sheets-Sheet 2

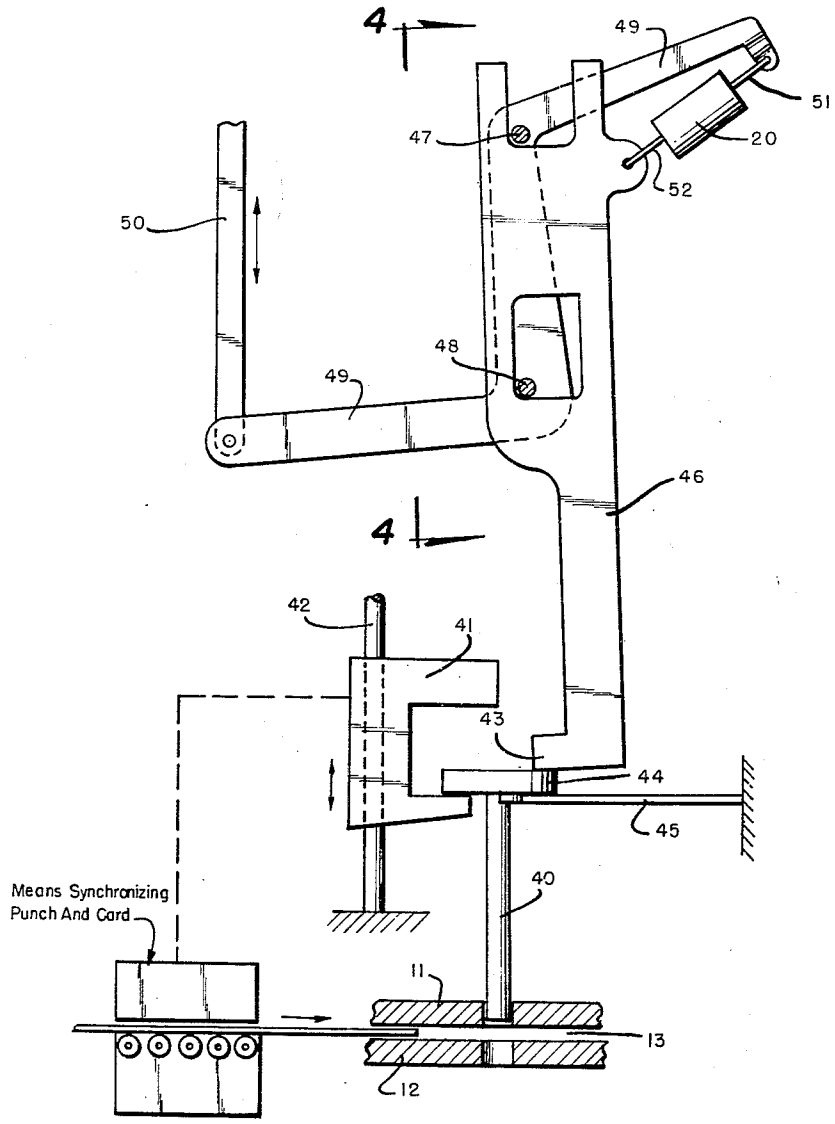


FIG. 3.

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CARD PUNCHING DEVICE

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14 Claims. (Cl. 164—111)

This invention relates to card punching devices and more particularly to such devices in which the operation of the punch is controlled by an interposer. In card punching devices where a series of holes are punched in a card in order to represent particular information, it is customary to have a punch operated by a reciprocating member. There is an interposer which must be between the reciprocating member and the punch before the latter is operated. Whether a hole is punched during a particular cycle of the reciprocating member depends on whether the interposer is moved into a position between the reciprocating member and the punch. When high speed punching is desired, some difficulty is involved in inserting and removing the interposer as rapidly as desired. Hence the principal limitation upon the speed at which the card punching machine operates is the operation of the interposer. The primary object of the present invention is to provide an arrangement whereby the interposer may be operated at a greater speed than heretofore.

Another object of the invention is to provide means for operating the interposer more efficiently and effectively.

Still another object of the invention is to increase the speed of a card punching machine.

Other objects of the invention will appear as this descripton proceeds.

In the drawings:

Figure 1 is a side view, partially in section, of a card punching device embodying the invention.

Figure 2 is a sectional view of the part 20 of Figure 1.

Figure 3 is a side view of a modified form of the invention; and

Figure 4 is a section taken along line 4—4 of Figure 3.

In Figure 1 the punch 10 operates through holes in two parallel plates 11 and 12. The card is fed into the space 13 by a card feeding means C which accurately controls the position of the card and at the same time the frequency of rotation of cam 15. Cam 15 operates a driving member 14 which is adapted to reciprocate in a vertical direction. The motion of member 14 is limited to vertical movements by suitable guides, not shown. This member has a downwardly projecting stem 16 which carries a head 17 instead of the punch 10, so that during the upward movements of member 14 (the member being biased upward by reason of springs 18 in cooperation with washer 19), the head 17 will move the punch 10 upward, while during the downward motion of member 14, the latter will not touch the punch 10 and will not move the same downward unless the interposer 22 is inserted between member 14 and punch 10. Hence so long as interposer 22 remains in the positon shown, the punch 10 will rest on the top of the card (or if desired, may be biased slightly above the card by small springs, R), and the reciprocating member 14 will move up and down without moving the punch 10. On the other hand, if interposer 22 is moved to the left somewhat so that it is between member 14 and punch 10, as the member 14 moves downward, it drives the interposer 22 into contact

with the upper end of punch 10 and this causes the punch 10 to move downward along with further downward movement of the member 14 and thus punch a hole through the card.

The interposer 22 is connected by means of an element 20 to an actuator rod 24. The latter is pivoted at 32 to a member 30 which in turn is pivoted to a stationary member 33. The member 30 is biased to the right by spring 31. Member 30 carries an armature 34 which may be attracted by electromagnet 35 when current flows through the coil 36.

The details of the element 20 are shown in Figure 2. An outer casing 21 is connected to the rod 24 while the interposer 22 is connected to shaft 23 as well as discs 25 and 26. Two washers 27 and 28 have centrally located holes therein larger than the shaft 23 whereby these washers may readily slip along the shaft. A helical spring 29 tends to force the washers 27 and 28 away from each other.

With the present invention it is unnecessary to move the actuator rod 24 at precisely the instant when there is a space between driving member 14 and punch 10. If, for example, the member 14 has moved down below the level of interposer 22, the same may still be actuated so that it will be certain of making engagement in time for the next punching cycle. This actuation would consist of moving rod 24 to the left by energizing coil 36. Interposer 22 would then bear against member 14 and would thus press casing 21 and washer 28 to the left, placing spring 29 under compression. As soon as the driving member 14 moves to a sufficiently high level so that interposer 22 can pass under the same, the biasing action of spring 29 will force interposer 22 under member 14 so that the latter, on its next downward stroke, will move the interposer 22 into engagement with the punch 10.

The pressure of the drivng member 14 on the interposer 22, during punching, will tend to hold the interposer between the driving member 14 and the punch 10. If it is now contemplated that no punching should take place during the next downward motion of member 14, the actuator 24 may be moved to the right, prior to said next downward motion, by de-energizing coil 36 even while the interposer 22 is being held between members 14 and 10 by virtue of the pressure of operation. In this case, disc 26 now presses to the left and compresses spring 29, thus placing a bias on disc 26 tending to move interposer 22 toward the right. As soon as the punching operation is complete, the spring 29 will promptly withdraw the interposer 22 from between elements 10 and 14 so that no punching will occur during the next operation. The actuator rod 24 is held in a normal position since it passes through a sleeve 24*a* which is held in a normal position by springs 24*b*.

Figure 3 illustrates a commercial form of card punching machine that has been modified to include the present invention. The punch 40 operates through punching plates 11 and 12 to punch a card which is passed through a space 13 by the card operating device C. The latter moves the card through the space 13 at a predetermined rate and simultaneously causes member 41 to reciprocate on shaft 42 at the desired rate and at desired positions of the card. The interposer 43 is located between the reciprocating member 41 and the head 44 of the punch 40. A spring 45 tends to bias the head 44 upwardly to the position shown. The interposer 43 is carried by a vertical member 46 which has its motion limited both to the left and to the right by shafts 47 and 48. The shaft 48 extends through and constitutes a pivot for lever 49, but shaft 47 is shorter than shaft 48 and never reaches member 49. An actuating arm 50 causes lever 49 to rotate about shaft 48. The element 20 is connected to the lever 49 by the rod 51 and is fur-

ther connected to the member 46 by the rod 52. The element 20 of Figures 3 and 4 is identical in construction and mode of operation to the element 20 of Figure 2. In this figure, rod 51 corresponds to rod 24 and rod 52 corresponds to element 22.

When the actuator rod 50 is in the position shown, it draws rod 51 toward the right, causing washer 28 (see Figure 2) to exert a force on shaft 23 toward the right, thus compressing spring 29 and applying a force to disc 26 which in turn biases rod 52 toward the right. This moves the lever arm 46 to the right until further motion is limited by the shafts 47 and 48. The interposer 43 is now out of the field of driving member 41 and consequently reciprocating action of the latter will not move the punch 40. On the other hand, if actuator rod 50 is moved upwardly, rod 49 would be rotated clockwise, thus moving rods 51 and 52 closer together and the force of this operation will tend to move lever 46 to the left until rods 47 and 48 contact the right inner side walls of the slits in lever 46. The interposer 43 is now under the driving member 41, and punching may take place. The actuator rod 50 may be moved to a new position prior to the time that interposer 43 is ready to move. For example, if driving member 41 is moved down until there is only a small space between it and head 44, with the interposer being out of operating position, it is possible to actuate the rod 50 at this instant in an effort to bring the interposer 43 into readiness for the next cycle. This actuation of rod 50 would move interposer 43 against the vertical side wall of driving member 41 where it would remain until the latter moved upward enough to allow interposer 43 to slip under it. At this instant the spring in the element 20 would promptly snap the interposer 43 into operating position. As driving member 41 proceeded downwardly on its next stroke, interposer 43 would be held between member 41 and head 44 due to the pressure of operation. At this time the actuator rod can be moved downwardly so that the interposer 43 will be retracted from operating position prior to the next downward stroke. As soon as the member 41 has moved upward enough to release interposer 43, the compression of spring 29 will remove it from between member 41 and head 44.

Hence, the interposition of interposer 43 and the removal thereof can be started well in advance of the time that it must perform its function and the element 20 will cause it to snap into the desired position as soon as possible. Hence the operation of the device is speeded up and the time at which the actuator 50 must be operated need not be as critical as heretofore required.

It is understood that the movement of the card, the downward strokes of member 41, and the operation of the actuator 50 are all accurately synchronized by suitable means now in common use. These synchronizing devices are not shown in detail in view of the fact that they are conventional.

I claim to have invented:

1. A punching device comprising, a punch, an interposer, reciprocating driving means, said punch and driving means being spaced so that when the interposer is between them the driving means will operate the punch but when the interposer is not between them the punch is not operated by the driving means, control means operable to move the interposer toward a first position between said driving means and punch and to move the interposer toward a second position away from between said driving means and punch, and resilient means coupling said control means to said interposer for resiliently biasing said interposer toward said first position when said control means is operative to move said interposer toward said first position, said resilient coupling means being operative to resiliently bias said interposer away from said first position when said control means is operative to move said interposer toward said second position.

2. A punching device comprising, a punch, resilient supporting means for said punch, an interposer, reciprocating driving means, said punch and driving means being spaced so that when the interposer is between them the driving means will operate the punch but when the interposer is not between them the punch is not operated by the driving means, control means operable to move the interposer between said driving means said punch and to withdraw the interposer from between said driving means and punch, and means which biases the interposer in a direction away from the driving means and punch when the control means tends to withdraw the interposer from between the driving means and the punch while the interposer is being held between the driving means and the punch by reason of the pressure exerted thereon by said resilient punch supporting means and by said driving means, and which biases the interposer toward a position between the driving means and the punch when the driving means and punch are so close together that the interposer will not fit between them and the control means is tending to move the interposer to a position between the driving means and the punch.

3. A punching device comprising, a punch, an interposer, reciprocating driving means, said punch and driving means being spaced so that when the interposer is between them the driving means will operate the punch but when the interposer is not between them the punch is not operated by the driving means, control means movable between first and second positions to move the interposer between said driving means and punch and to withdraw the interposer from between said driving means and punch, and means responsive to the position of said control means for applying a resilient force to said interposer in one of two opposing directions whereby said last-named means biases the interposer toward a position between the driving means and the punch when said control means is in its said first position, and said last-named means biases said interposer to a position away from between said driving means and said punch when said control means is in its said second position.

4. A punching device comprising a punch, an interposer, positioning means which tends to move the interposer selectively to first and second positions respectively, cyclically movable means adjacent to but spaced from said punch, said cyclically movable means being operative as it approaches a given position of each cycle to engage the interposer when the latter is in its first position and thus operate the punch but being operable not to engage the interposer in event the latter is in its second position in which case the punch is not operated, and means responsive to the operation of said positioning means for biasing the interposer toward its said first position when said positioning means tends to move the interposer to said first position and for biasing the interposer toward its said second position when said positioning means tends to move the interposer to said second position.

5. A punching device comprising a punch mounted for reciprocating motion, said punch having a punching end and a force-receiving end, reciprocating driving means which moves toward and away from the force-receiving end of said punch, an interposer which when interposed between said force-receiving end and said driving means will cause the said driving means to operate the punch and when the interposer is removed from between the force-receiving end and the driving means the latter will not operate the punch, control means movable between first and second operating positions for moving the interposer to and away from a position where it is between the driving means and the force-receiving end, and means responsive to the operation of said control means for applying a resilient force to said interposer in a direction aiding said control means as said control means moves toward both its first and second operating positions.

6. A punching device comprising reciprocating driving

means, a punch means, interposer means, all of which means are so positioned that when the interposer means is in a first position the driving means drives the punch means through the interposed means and when the interposer means is in a second position the driving means does not drive the punch means, a spring connected to said interposer means, and control means connected to said spring to deflect the same in first and second directions whereby said spring tends to move the interposer means to said first and second positions respectively.

7. In combination, driven means, an interposer, reciprocating driving means, said driven means and driving means being spaced so that when the interposer is between them the driving means will operate the driven means but when the interposer is not between them the driven means is not operated by the driving means, control means operable to move the interposer between said driving means and driven means and to withdraw the interposer from between said driving means and driven means, and means for resiliently biasing the interposer in a direction away from the driving means and driven means when the control means tends to withdraw the interposer from between the driving means and the driven means, said last-named means being operative to resiliently bias said interposer in a direction toward said driving means and driven means when the control means tends to move the interposer toward a position between said driving means and driven means.

8. In combination, driven means, an interposer, reciprocating driving means, said driven means and driving means being spaced so that when the interposer is between them the driving means will operate to move said driven means forcibly from a first to a second position, but when the interposer is not between said driving means and said driven means the driven means is not operated by the said driving means, control means operable selectively to move the interposer between said driving means and driven means and to withdraw the interposer from between said driving means and driven means and resilient means for urging the interposer in a direction away from the driving means and driven means when the control means tends to withdraw the interposer from between the driving means and the driven means, said driving means and driven means being operative to overcome the urging of said resilient means thereby to hold said interposer in position therebetween as said driven means is forcibly moved from said first to said second position, said resilient means being operative to urge the interposer toward a position between the driving means and the driven means when the driving means and driven means are so close together that the interposer will not fit between them and the control means is tending to move the interposer to a position between the driving means and the driven means.

9. In combination, driven means, an interposer, reciprocating driving means, said driven means and driving means being spaced so that when the interposer is between them the driving means will operate the driven means but when the interposer is not between them the driven means is not operated by the driving means control means movable to position the interposer between said driving means and driven means and to withdraw the interposer from between said driving means and driven means, a resilient connection between said control means and said interposer whereby said control means may move both toward and away from said interposer, said resilient connection being operable to resiliently urge said interposer away from said control means when said control means moves toward said interposer and being operable to resiliently urge said interposer toward said control means when said control means moves away from said interposer.

10. In combination, driven means, an interposer, positioning means which tends to move the interposer to first and second positions respectively, cyclically movable means adjacent to but spaced from said driven means, said cyclically movable means being operable as it approaches a given position of each cycle to engage the interposer when the latter is in its first position and thus operate the driven means but not to engage the interposer in event the latter is in its second position in which case the driven means is not operated, and means for urging said interposer toward the first position when said positioning means tends to move it to that position and for urging the interposer toward the second position when the said positioning means tends to move the interposer into its second position.

11. In combination, driven means mounted for reciprocating motion, said driven means having a force-receiving end, driving means having a reciprocating motion and which moves toward and away from the force-receiving end of said driven means, an interposer which when interposed between said force-receiving end and said driving end will cause the driving means to operate the driven means and when the interposer is removed from between the force-receiving end and the driving means the latter will not operate the driven means, control means for moving the interposer to and away from a position where it is between the driving means and the force-receiving end, and a resilient coupling between said interposer and said control means comprising first and second members movable with respect to one another, said first member being connected to said control means, said second member being connected to said interposer, and resilient means between said first and second members for urging said members toward a predetermined quiescent position relative to one another when said members are moved away from said quiescent relative position due to changes in relative position between said control means and said interposer.

12. A punching device as defined in claim 5 in which the last-named means comprises a casing having washers at opposite ends of the inside thereof, spring means tending to force the washers away from each other, and a bar extending through the washers and having enlargements on the sides of the washers opposite the spring means whereby when the casing moves relative to the bar one of the enlargements will press against its complementary washer and compress the spring means.

13. A punching device as defined by claim 12 in which one end of said bar comprises said interposer.

14. A punching device as defined in claim 5 in which the interposer comprises a member mounted for reciprocating motion, said member having two openings, two stationary elements in said openings respectively to limit the motion of said member, said control means being mounted for pivotal motion about one of said elements.

References Cited in the file of this patent

UNITED STATES PATENTS

1,702,097	Vold	Feb. 12, 1929
1,856,175	Towle	May 3, 1952
2,732,900	Rabinow	Jan. 31, 1956