

March 31, 1936.

W. E. ECKER
PRINTING MECHANISM

2,036,027

Filed May 2, 1934

2 Sheets-Sheet 1

FIG. 1.

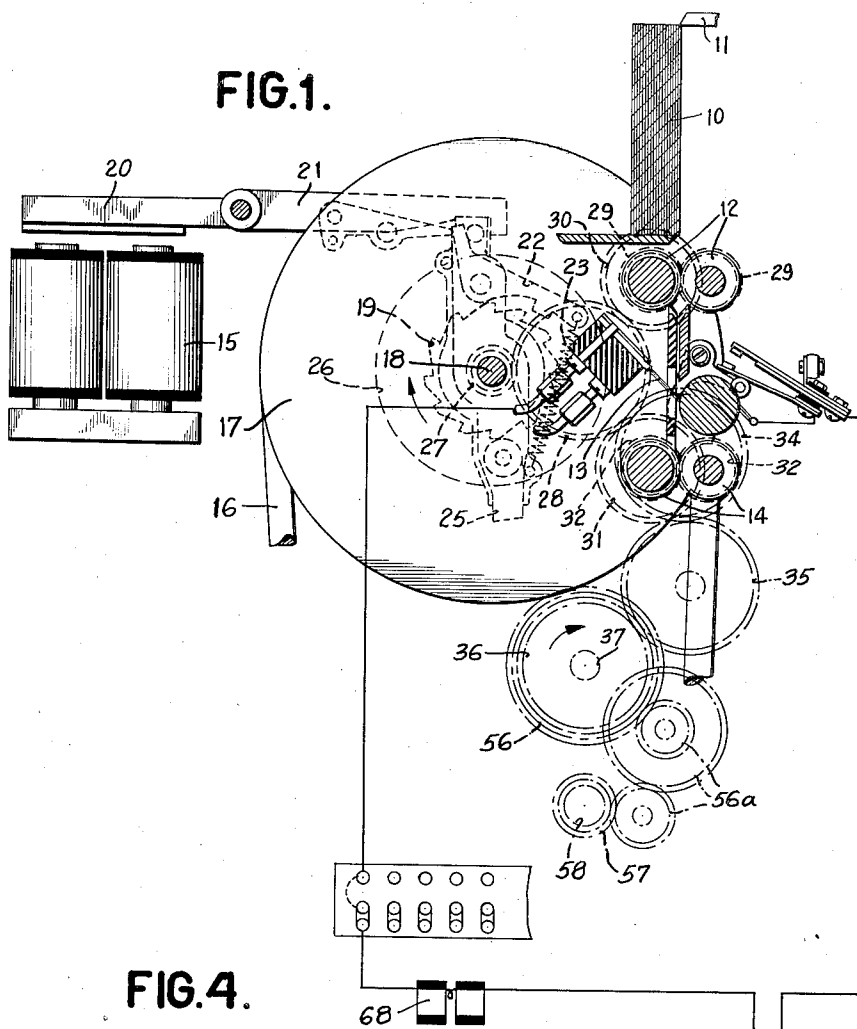
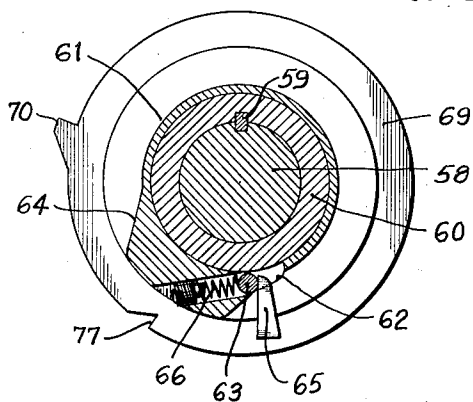


FIG. 4.



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2 Sheets-Sheet 2

FIG.2.

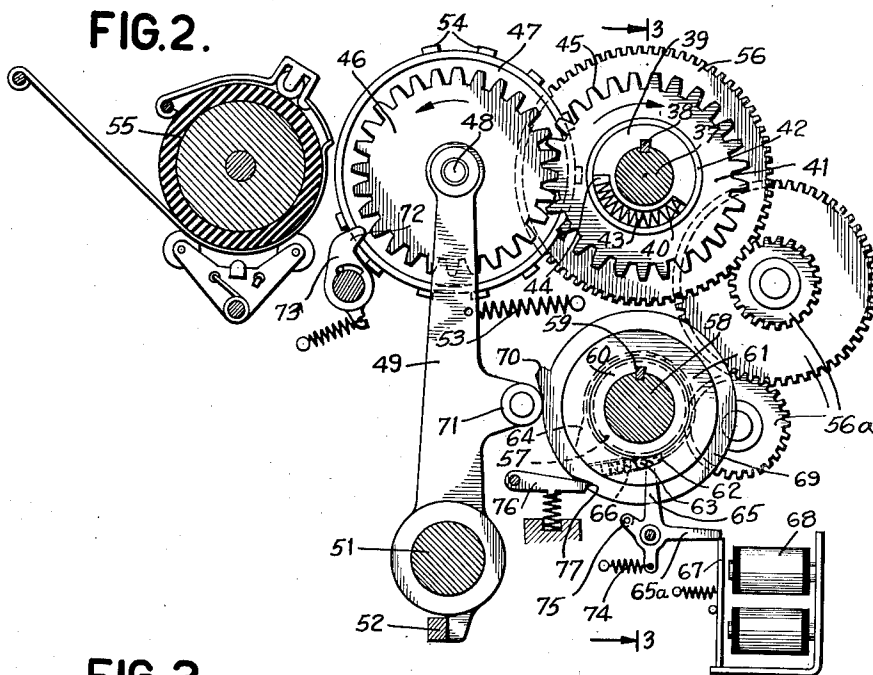
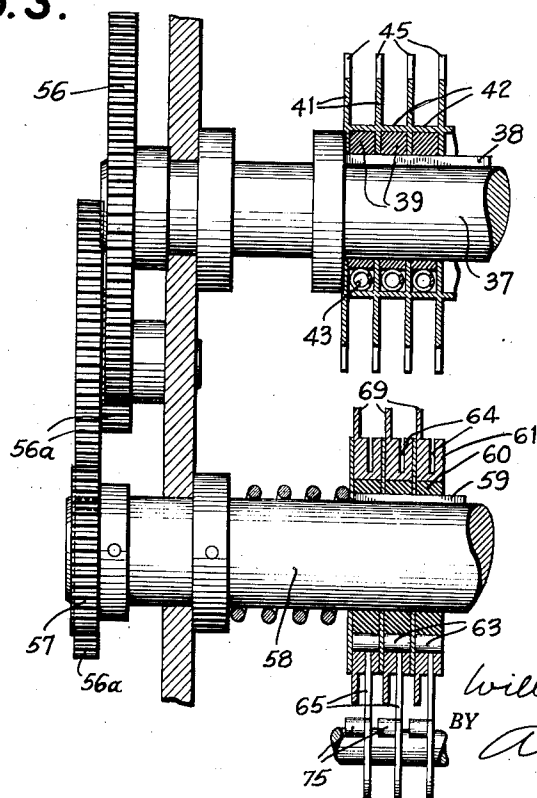


FIG. 3.



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PRINTING MECHANISM

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Application May 2, 1934, Serial No. 723,441

17 Claims. (Cl. 101—91)

This invention relates to printing mechanisms adapted to print characters such as numerals, alphabetical characters, etc., upon a record sheet.

The main object of the present invention is to devise a printing mechanism which is especially adapted for performing printing operations at high speeds. In carrying out this main object of the invention the printing type are carried by a wheel which is rotatable and is in continuous rotation until a preselected type is at the printing line, at which time the wheel is temporarily stopped and the preselected type impressed against the record sheet.

A still further object of the invention is to provide a suitable mechanism so that the printing wheel may be rotated in synchronous relationship with the controlling element, which in the present instance, comprises a perforated tabulating card.

A still further object is the provision of an improved structure for causing the rotation of the printing wheel in synchronous relationship with the feeding of the tabulating card after it has been disturbed or temporarily interrupted by the stoppage of the printing wheel for effecting the printing operation.

A still further object is to provide an improved construction whereby the printing device of the improved type just described can effect printing by employing a conventional platen. By avoiding the use of type hammers a simplified structure is provided and their elimination permits the use of a conventional platen. The latter is especially useful, if not actually required, when carbon prints are desired and is especially well adapted for securing unusual or varying line spacing operations by simplified mechanisms.

A still further object is to provide an improved form of device for effecting printing impressions, lending itself particularly well adapted for control by a magnet to which impulses are transmitted in accordance with printing from the preselected type.

A still further object is to provide means to prevent a disarrangement or destruction of parts of the printing device if a printing wheel should unintentionally be shifted to a printing position.

The invention is illustrated in the accompanying drawings, in which

Fig. 1 is a sectional view of mechanisms ordinarily employed in a conventional tabulating machine for feeding and analyzing tabulating cards.

Fig. 2 is a sectional view in side elevation illustrating the parts necessary for a single unit of the improved printing mechanism.

Fig. 3 is a front view, part in section, of a certain portion of the improved printing mechanism.

Fig. 4 is a detail of one of the parts of the printing impression clutch.

The machine in which the present improvements have been incorporated is well known and is exemplified in the patents to Lake No. 1,379,268, dated May 24, 1921, No. 1,600,413, dated September 21, 1926, and the patent to Daly et al., No. 1,896,540, dated February 7, 1933.

In machines illustrated in detail in the above described patents and generally herein, tabulating cards 10 are adapted to be fed singly by a picker 11 from a supply stack to a pair of upper feeding rollers 12 which convey the card so as to have the perforations of the card analyzed by the usual perforation analyzing brushes 13 while the card is in motion. The card analyzed then passes to a lower set of feeding rollers 14 which then convey the card to a storage hopper, usual in the type of machine referred to.

Card feeding operations are instituted by the usual manual start key designated as ST in the last mentioned patent so as to cause by an electrical circuit the energization of a card feed clutch magnet 15.

The power for driving the card feeding rollers and other parts of the machine is derived from a motor (not shown) which by a belt 16 and pulley 17 constantly rotates a ratchet wheel 19 secured thereto. The pulley 17 and ratchet wheel 19 are loosely mounted upon a shaft 18.

In Fig. 1 there is shown the card feed clutch for causing card feed and is similar to the card feed clutch disclosed in Fig. 1a of the Lake Patent No. 1,822,594, dated September 8, 1931 to which reference should be had for details of construction and operation.

Upon completion of the electrical circuit to clutch magnet 15 the latter attracts its armature 20 to raise a clutch lever 21 to thereby unlatch the latter from a clutch pawl 22. The latter is then drawn by a related spring 23 to engage the constantly rotating ratchet wheel 19. The clutch pawl 22 is carried by a bar 25, which is secured to a disk 26 secured to shaft 18 and to the latter there is secured a pinion 27.

The construction and operation of the card feed clutch, as is well known, are such that upon energization of magnet 15, disk 26 will be rotated and successive rotations of the shaft 18, and therefore pinion 27, will ensue as long as tabulating operations are desired.

The pinion 27 is in mesh with a gear 28 and the latter drives the upper set of feeding rollers

12 and the lower set of feeding rollers 14. The upper set of feeding rollers is intergeared by pinions 29 one of which is rotatable with a gear 30 in mesh with the driving gear 28. The latter also meshes with a pinion 31 which is rotatable with one of a pair of intergeared pinions 32 carried by the rollers 14 which drive the lower set of feeding rollers 14 in opposite directions. The driving gear 28 is of sufficient width to drive a gear 34 so that by a train of gears 35, 36 a shaft 37 is driven. It is understood that as is usual in tabulating machines the card feed clutch is so designed and the gears are so proportioned that shaft 37 will be given a complete revolution in the arrow direction shown in Fig. 1.

It is customary in the type of machine described to cause printing from type of a printing mechanism which are presented to printing line in synchronous relationship with the analyzing of the index points of the card and to carry out the printing function in a novel manner an improved construction will now be described.

Referring to Fig. 2 there is shown a printing unit for a single order which obviously is duplicated to effect multiple printing. By means of a spline 38 a collar 39 having a circumferential recess 40 is secured to the shaft 37. Loosely mounted on the shaft 37 is a disk 41 having an annular ring 42 overlying the collar 39. A compression coil spring 43 functioning in a manner hereinafter to be explained, fits in the pocket formed by the recess 40, the ring 42 of a disk 41, and the side faces of adjacent disks 41. One end of the spring 43 projects against the collar 39 and the other projects against a lug 44 of the ring 42. The periphery of the disk 41 is formed with gear teeth 45 in continuous mesh with teeth of a gear 46 and riveted to the latter is a printing wheel 47. Both the gear 46 and printing wheel 47 are loosely mounted by a stud 48 on the upper end of an arm 49. The latter is pivoted by a rod 51 and drawn to the right against a stop bar 52 by a spring 53 in which position any of the numeral type 54 for printing numerals 0-9 inclusive are out of contact with a conventional platen 55.

It will be understood that the gearing to the shaft 37, the feeding of the card, and the spacing of the type 54 about the wheel 47 are so constructed and arranged that each time a numerical index point position is presented to the analyzing brush 13 a correlated numeral type is at the printing line of the platen 55. The preferred means whereby an impression may be taken from the selected type will now be explained.

To shaft 37 there is secured a gear 56 which through a train of gears 56a drives a pinion 57 secured to a shaft 58. By means of a spline 59 a clutch collar 60 encircling shaft 58 is secured for rotation with and by the shaft 58. Loosely mounted upon collar 60 is an annular clutch ring 61 provided with an inclined pocket 62 opening to the collar 60 in which fits a small cylinder or clutch ball 63. The ring 61 is slotted at 64 (Fig. 5) and in said slot fits a vertical arm 65 normally so positioned as to contact with the ball 63 and prevent its related spring 66 fitting in a pocket of the ring 61 from projecting ball 63 to the smaller end of the inclined pocket 62. The gearing 56, 56a, and 57 is so designed that shaft 58 can be driven, if desired, by the clutch device above described a single revolution for any of the ten numeral index point positions of the perforated card.

The vertical arm 65 is an integral part of a

bell crank the horizontal arm 65a of which normally rests upon the upper end of an armature 67 of a printing control magnet 68. The latter as shown in Fig. 1 is in circuit connection with the analyzing brush 13 so that when the latter encounters a perforation the energization of the magnet 68 will cause its armature to be freed from the arm 65a whereupon spring 66 being unrestrained in its action will shift ball 63 to the right to the smaller end of the pocket 63 thereby clutching as is well known the collar 60 which is now rotating to the clutch ring 61. The clutch ring 61 has an integral cam disk 69 having a cam projection 70 normally near a roller 71 carried by the arm 49.

When the clutch is energized due to the presence of a perforation on the card cam projection 70 encountering the roller 71 will rock the upper end of arm 49 to the left so as to force the type 54 corresponding to the perforation analyzed against the usual inking ribbon to print upon paper carried by the platen 55. When arm 49 is rocked to effect the imprint one of the inter-dental spaces of gear 46 is received by a tooth 72 of a spring pressed finger 73 so as to thereby stop the movement of gear 46. Although arm 49 is rocked to effect the imprint the engagement of the gears 45 and 46 is maintained so that while both intermeshing gears 45 and 46 are stopped in their rotation the shaft 37 will keep on rotating synchronously with the feeding of the card and independent of the gear 45. Therefore, the rotation of shaft 37 under such conditions will cause spring 43 to be compressed but before the spring 43 is fully compressed the cam projection 70 will leave the roller 71 causing spring 53 to restore and draw arm 49 to the right to thereby disengage the tooth 72 from the inter-dental space of the gear 46 it previously entered. When a full disengagement is effected the compression stored up in spring 43 due to the independent rotation of shaft 37 will now act to turn or spin the printing wheel 47, gears 45 and 46 until the lug 44 encounters the related shoulder 40a of the recess 40 of collar 39. When this has been done the printing wheel 47 will rotate together with shaft 37 and both in synchronism with the feeding of the tabulating card.

When the armature 67 is attracted by the energization of the magnet 68 so that the ball 63 may be shifted to the wedging position the clutch ring 61 will be rotated, as previously stated. When the bell crank 65-65a is unlatched a spring 74 connected thereto will cause a roller 75 carried by said bell crank to contact with the periphery of the cam disk 69. After the printing impression has been effected the cam projection 70 will contact with the roller 75 and rock the bell crank 65-65a against the action of spring 74 elevating arm 65a sufficiently above the upper end of the armature 67 so that the latter snaps beneath the underside of the arm 65a. It is understood that the arm 65 at this time may enter the notch 64.

When a full revolution of the clutch ring 61 is effected the arm 65 will contact with the roller 63 forcing it back to the larger end of the pocket 62 as the clutch ring 61 rotates. This will disengage the wedge connection between clutch ring 61 and collar 60 so that free rotation of the latter and shaft 58 may then ensue.

During the unclutching action clutch ring 61 may tend to kick back or rebound slightly. This, in the present instance, is effectively prevented 75

by means of a spring urged pawl 76 engaging a notch 77 in the cam disk 69.

It may sometimes happen that an arm 49 is accidentally shifted to printing position when a printing operation is undesirable. If held in printing position a sufficient length of time it is obvious that the coil spring 43 will be fully compressed and if a fixed locking bar which engages the teeth of gear 46 is used instead of the spring urged finger 73 preferably employed, destruction of certain parts of the machine would undoubtedly result.

By the employment of the spring urged finger 73 it is evident that a positive drive to the gear 46 under the conditions mentioned will merely cause the tooth 72 to cam in and out of the teeth of the gear 46. However, under normal conditions of operation the finger 73 will act to stop the rotation of the printing wheel when a normal printing action is desired. While this expedient is preferable, if desired, a stationary locking bar may be used.

It is evident of course that a printing wheel may carry alphabet type or other characters and the showing of numeral type is to be considered as merely illustrative.

What is claimed is as follows:—

1. In a machine of the class described, the combination with a platen, of means for analyzing card perforations, a rotatable type wheel, a movable carrier for said type wheel, a shaft for driving said type wheel synchronously with the analyzing of card perforations, a resilient connection between said shaft and the type wheel forming the connection for driving said wheel by said shaft, and means under control of said analyzing means for moving said carrier to impress the selected type against the platen.

2. In a machine of the class described, the combination with a platen, of means for analyzing card perforations, a rotatable type wheel, a gear connected thereto, a movable carrier for said wheel and said gear, a shaft, a gear driven by said shaft and intermeshing with the first named gear, a resilient connection forming the driving connection between one of said gears and said shaft, and means operable when a perforation is analyzed for moving said carrier to impress the type against the platen while maintaining the intermeshing relationship between said gears.

3. In a machine of the class described, in combination, a platen, a rotatable type wheel, a shaft, a resilient connection between said wheel and said shaft forming the connection for driving the wheel by said shaft, a movable carrier for said type wheel, and means operable when a selected type is at a printing line for interrupting the rotation of said type wheel and for moving said carrier to impress the selected type against the platen.

4. In a machine of the class described, in combination, a rotatable type wheel, a shaft, resilient means for driving said wheel by said shaft, means for taking an impression from selected type on said wheel, and means independent of said impression taking means for causing the temporary stopping of the rotation of the wheel during the impression taking operation.

5. In a machine of the class described, in combination, a rotatable type carrying wheel, a shaft, a resilient means for causing the wheel to be rotated synchronously with and by said shaft, a carrier for said wheel, means for shifting said carrier to effect a printing impression from a selected type on said wheel, a dentated element

rotatable with said wheel, and a device engaging said element when said carrier is shifted for stopping the rotation of said wheel temporarily during the impression operation.

6. In a machine of the class described, in combination, a platen, a rotatable type carrying wheel, a shaft with a resilient connection to said wheel for driving the latter synchronously with analyzing of card perforations, a carrier for said wheel, means operable when a perforation is analyzed for moving said wheel to a printing position against said platen, and means for causing the interruption of the rotation of the type carrying wheel when a selected type is in printing position.

7. In a machine of the class described, in combination, a shaft, a rotatable type wheel driven by said shaft, a resilient means forming the driving connection between said wheel and said shaft, and means operated by said shaft for causing a printing impression to be taken from a preselected type.

8. In a machine of the class described, in combination, a shaft, a rotatable type wheel driven by said shaft, a resilient means forming the driving connection between said wheel and said shaft, a carrier for said wheel, means for analyzing card perforations, and means operable by said shaft and under control of said analyzing means for causing said carrier to be shifted to effect a printing impression from a selected type on said wheel.

9. In a machine of the class described, in combination, a shaft, a rotatable type wheel driven by said shaft, a resilient means forming the driving connection between said type wheel and said shaft, means for shifting said type wheel to effect a printing impression from a selected type on said wheel, and means effective during the time the printing impression is being effected for causing the interruption of the rotation of said wheel.

10. In a machine of the class described, in combination, a shaft, a series of rotatable type wheels driven by said shaft, means for driving said type wheels by said shaft, means operated by said shaft for shifting said type wheels at different times to effect an impression from selected type on said wheels, and means for stopping the rotation of said wheels during the different times the printing impressions are being effected.

11. In a machine of the class described, in combination, a member carrying a series of type, means for rotating said member, a shaft, means normally disconnected from said shaft adapted when operated by said shaft to cause the type to be shifted to a printing position, a clutch device adapted when energized to connect said shaft and the last named means to render said means effective, and analyzing means for causing the clutch to be energized at a differential time when a card perforation is analyzed.

12. In a machine of the class described, in combination, a rotatable shaft, a gear, resilient means forming a driving connection between said shaft and said gear, an arm carrying a rotatable type wheel, a gear secured to said wheel and intermeshing with the first named gear, means operable by said shaft for causing said arm to be moved to take a print from a selected type while retaining said gears intermeshed, and a pawl engageable with a tooth of the second named gear for stopping the rotation of said type wheel when an imprint is effected.

13. In a machine of the class described, in combination, a rotatable wheel carrying printing type, means for shifting said wheel to effect an imprint from a preselected type on said wheel, and

a pawl engageable with an interdental space when said wheel is shifted, said pawl having camming edges engaging said interdental space and operable when said wheel is accidentally shifted.

- 5 14. In a machine of the class described, in combination, a rotatable type carrying wheel, a driving connection therefor comprising, a shaft, a circular element splined to the shaft and having a recessed portion, a gear for driving said type wheel and having a flange encircling the periphery of the circular element, a spring fitting in said recessed portion, and means for effecting a printing impression from said type wheel comprising, means for shifting said type carrying wheel, and means for temporarily locking the same against rotation while said spring is being compressed.

- 10 15. In a machine of the class described, in combination, a rotatable type carrying wheel, an arm carrying said wheel, and means for shifting said arm to effect a printing impression from a preselected type on said wheel comprising, a rotatable element, a member encircling said element adapted to cause the arm to be shifted, and a spring pressed ball clutch connection between said element and said member.

16. In a machine of the class described, in combination, a rotatable type carrying wheel, a drive shaft, resilient means forming a driving connection between said drive shaft and said type wheel, an element having a cam portion adapted to shift said wheel to effect an imprint from a preselected type thereon, a shaft driven by the first named shaft and having a clutch connection to said element, a magnet adapted to control the energization of said clutch, and electrical card perforation analyzing means for controlling the energization of said clutch control magnet.

17. In a machine of the class described, in combination, a rotatable type carrying wheel, rotatable cam means for shifting said wheel to effect an imprint from a preselected type on said wheel, a clutch device adapted when energized to cause said cam means to be effective, a magnet, a double armed member having one arm for controlling the energization of said clutch, and its other arm normally latched by an armature of said magnet, and means to cause energization of said magnet, said rotatable cam means thereafter causing said member to be relatched by said armature.

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