

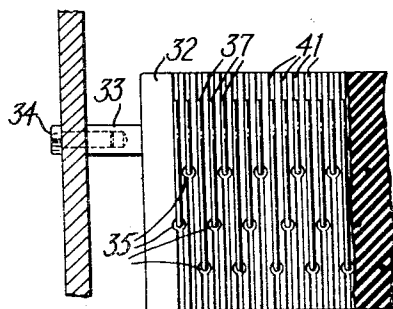
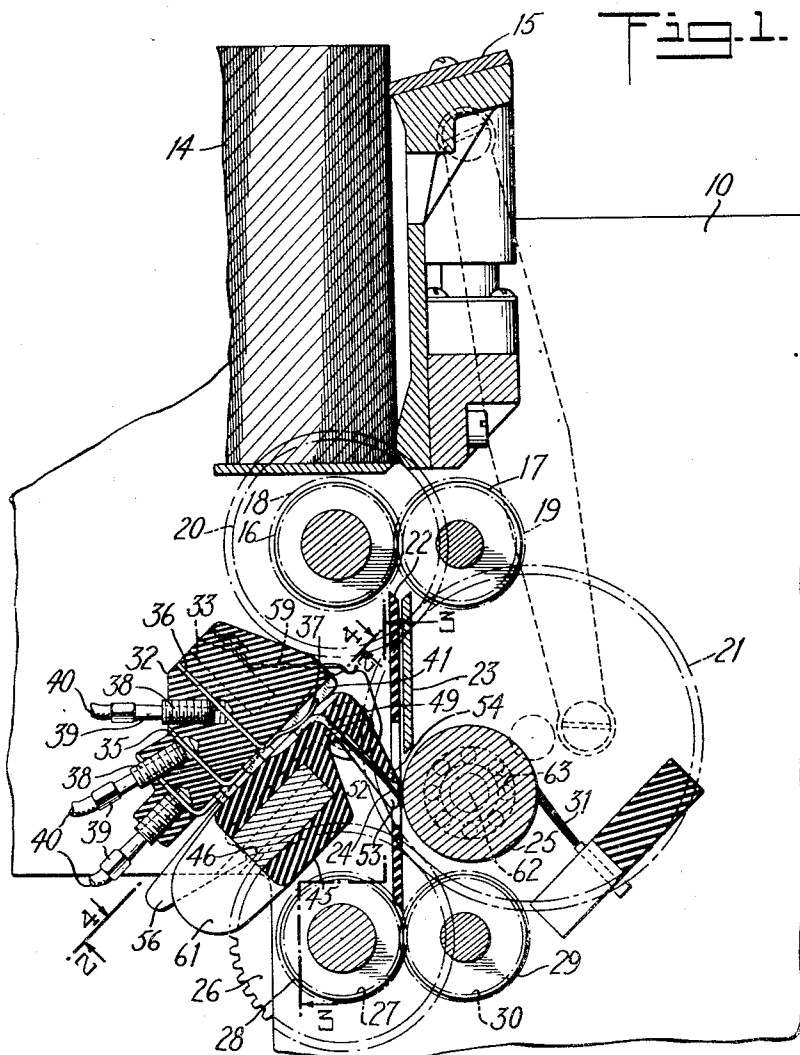
March 6, 1951

E. A. FORD
PERFORATED RECORD ANALYZING MEANS WITH
REMOVABLE BRUSH HOLDER

2,543,906

Filed Feb. 7, 1947

2 Sheets-Sheet 1



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Fig. 3.

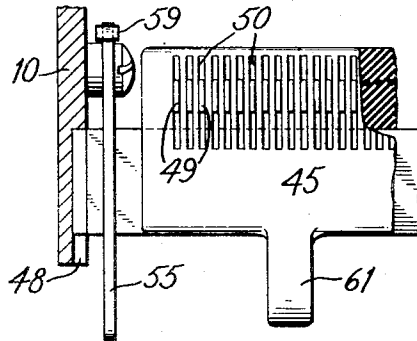
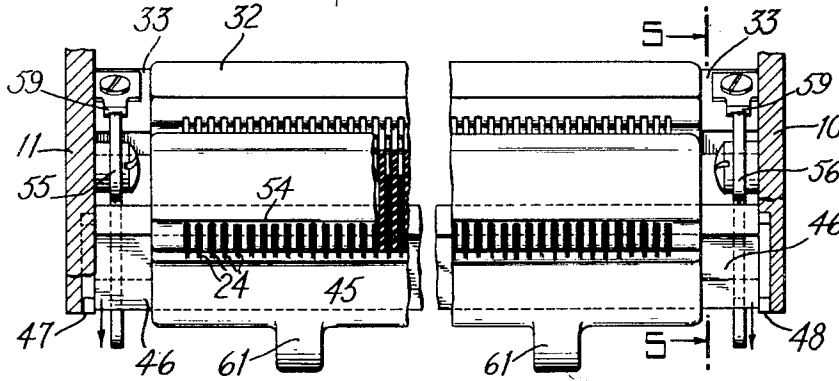


Fig. 4.

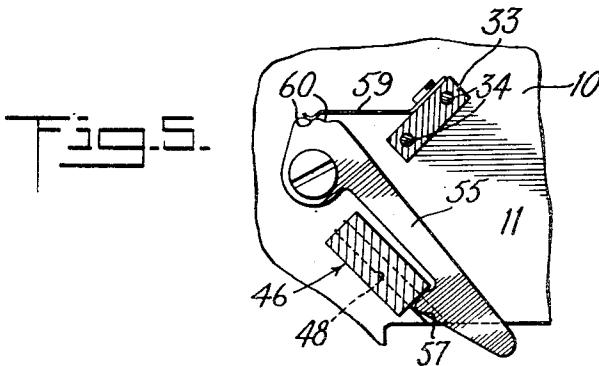


Fig. 5.

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PERFORATED RECORD ANALYZING MEANS
WITH REMOVABLE BRUSH HOLDEREugene A. Ford, Endicott, N. Y., assignor to International Business Machines Corporation,
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2 Claims. (Cl. 173—328)

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This invention relates to record controlled machines and more particularly to the type of machine in which perforated records are analyzed by brushes or the like, which are in an operating or control circuit.

Such types of machines are customarily provided with a perforated record analyzer unit which comprises a support carrying the plurality of analyzing brushes to which plug wire connections are made so that the brushes are connected in the operating or control circuits.

The unit has, heretofore, as evidenced by the patent to R. Ziguelde, No. 1,944,678, been arranged to be removable from the cooperating contact roller to free a torn card which may have been jammed while in transmit through the analyzing mechanism, or for the purpose of cleaning the flexible wire brushes to remove the fine paper shreds or surface dirt picked up by the brushes.

However, when such unit is worn to such an extent that replacement is desirable to maintain the machine in efficient operation, it is necessary to remove all the plug wire connections, and when the unit is incorporated in a record analyzer for a well known type of record controlled accounting machine, eighty plug connections must be removed, which requires considerable time, and more time when the new brush unit is re-plugged because care must be taken to make the plug connections to the correlated brushes.

It is, therefore, a broad object of the present invention to devise a brush holder which can be removed with facility from the machine without disturbing the plug wire connections made to the brushes.

Another object of the invention is to devise a brush holder which is structurally separate and detachable from a support for the aforesaid plug connections, and to provide means to make the necessary electrical connections between the brushes and plug sockets when the brush holder is attached to the support.

Another object of the invention relates to the provision of latching devices to latch the brush holder to the support to maintain it in proper operating position.

A still further object and feature of the invention relates to the specific construction of the brush holder which preferably comprises a moulded unit with a series of holes in which the brush units are inserted and displaced at the desired angle for brush tension and contact, and to provide a comb section which guides the brushes to the card, and to devise the comb section so that it forms a protecting shield which is in the

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path of travel of the card to prevent damage to the brushes in the event of a card jam or other malfunction.

Another object of the invention which also relates to the record analyzer but involves another part is to provide a freely rotatable contact roller which rotates a different extent for each card to keep the contact roller bright and clean by distributing the sensing spots over the surface of the contact roller at an infinite number of points.

In a preferred construction the contact roller comprises a solid steel roll, case hardened, ground and polished to provide a durable, easily cleaned surface, to which easy access is provided when necessary by the removable brush holder.

In the present preferred arrangement the contact roller is mounted on ball bearings for free rotation and is caused to rotate by the transitory movement of the card past the brushes. As a result of the card travel, and the inertia of the heavy steel contact roller and the braking action of the brushes on the roller, there is a variable amount of slipping between the card and roller from card to card to provide an infinite number of brush sensing spots around the peripheral surface of the roller which eliminates the pitting at spots previously encountered when the contact roll was gear driven.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a sectional view showing the card picker mechanism for feeding cards singly from the supply magazine, the improved record analyzer and the drive for the coordinated feeding rollers.

Fig. 2 is an inverted plan view taken on the line 2—2 of Fig. 1.

Fig. 3 is a side elevational view taken on the line 3—3 of Fig. 1.

Fig. 4 is a plan view taken on the line 4—4 of Fig. 1.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3.

For illustrative purposes the present invention is shown incorporated in a form of record controlled accounting machine shown and described in the patent to C. D. Lake, No. 1,600,413, which also shows in full detail the entire card feeding mechanism and a perforated record analyzer of

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the type having the disadvantages previously mentioned.

The numerals 10 and 11 identify the side frames of the frame supporting the card feeding devices and perforated record analyzer and are held in spaced relation by suitable cross bars.

As more fully explained in the patent to C. D. Lake, No. 1,600,413, the record cards 14 (Fig. 1) which are in a supply magazine are fed downwardly by a picker 15 which feeds the leading edge of the card to feed rollers 16, 17 which are now rotating, being intergeared by a pair of gears 18, 19, the gear 18 being rotatable with a larger gear 20 which is driven by the main rotating gear 21 of the card feed mechanism which operates the picker 15. The card is thus fed downwardly between guide plates 22, 23, thus guiding the perforated record to be analyzed between the sensing brushes 24 on one side and the metal contact roller 25 on the other side.

Gear 21 drives a gear 26 which is fixed to a gear 27 rotatable with a feed roller 28. Gear 27 meshes with a gear 30 rotatable with a feed roller 29. Thus, feed rollers 28, 29 also cooperate with the card to feed it downwardly to another analyzing station, if so desired, as in the patent to C. D. Lake, No. 1,600,413, or to a suitable storage magazine.

The individual brushes 24 for each column make contact with the contact roller 25 through the perforations, and contact roller 25 is common to the circuits, and electrical connection thereto is provided by the brush 31 bearing against said roller 25.

So far the arrangement, except the lack of a gear drive for contact roller 25, does not materially differ from previous arrangement, as in the patent to C. D. Lake, No. 1,600,413.

The stationary holder 32 is a moulded unit of insulating material and has embedded therein a transverse metal bar 33 extending, as shown in Figs. 2 and 3, beyond each end of the holder 32 and attached to either side frame 10 or 11 by screws 34. The holder 32 has three series of holes 35 in which fit metal contact strips, each comprising a straight portion 36 and a bent resilient spring portion 37 (Fig. 1). The holder 32 also has a series of holes angularly arranged with respect to the holes 35 and in each hole there is embedded or screwed a plug socket or plug hub 38, each of said plug hubs being embedded or screwed inwardly sufficiently to intersect and pass through the correlated portion 36 of a contact strip, to thus make an electrical connection. The hubs 38 receive the plugs 39 of the wires 40 which are in the operating and control circuits. By the three series arrangement of the holes, each group of three plug hubs 40 is arranged in staggered or echelon formation to facilitate and space the plug connections. Although the portions 36 are so disposed in three series the underside bent contact portions 37 are of the same length, as shown in Fig. 2. To avoid contact of adjacent portions 37, each of the latter is arranged to fit in one of the slots 41 which are formed by either machining or moulding.

The aforescribed holder 32 is maintained in fixed position in the machine and after the sockets 38 are once plugged up the connections are never disturbed even though the brush holder now to be described is removed.

The brush holder 45 is preferably a moulded unit although it may be machined to the desired formation and has embedded therein a steel bar 46 for reinforcing and assembly purposes and as

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shown in Fig. 3 the bar 46 extends to each side of the holder 45 and fits in slots 48, 47 formed in the side frames 10, 11. The holder 45 preferably carries the brushes 24 by having the ferrules 49 which carry the brush strands to project through holes in the holder, and said holes are at the correct angle for brush tension and spaced according to the card columns. The top of each ferrule 49 is bent over at right angles, as seen in Figs. 1 and 4 to be disposed in a slot 50, and said slots 41 and 50 are aligned so that each contact portion 37 bears upon the ferrule 49 with a resilient action to make the desired circuit connection to the brushes when the brush holder is in place.

The longitudinal slot 52 (Fig. 1) provides a comb bar formed with guide slots 53 in which the brushes 24 fit and move as they pass through the perforations. The comb bar thus provides a blade 54 which functions as a shield for the brushes in the event of a card jam, or other misoperation which may cause damage to the brushes.

Any suitable means may be provided to clamp the brush holder in position and preferably there is pivoted on the frames 10, 11 a pair of latches 55, 56, each having a shouldered hook 57 to fit over the end of the bar 46 and thus latch the brush holder at each end. Spring blade detents 59 fit in either of the related notches 60 (Fig. 5) to hold the latches in either position of adjustment. Finger pieces 61 are provided to facilitate the withdrawal of the brush holder.

Individual brush removal for replacement purposes can be effected when the brush holder is out of the machine by merely pulling the brush unit 24, 49 out of the hole in which it was inserted. In this case the ferrule 49 fits rather tightly in the cooperating hole to prevent upward movement during the analysis of the card perforations.

Obviously, by unlatching the latches 55, 56 the brush holder is free to be slid downwardly and towards the operator and outwardly of the machine, when desired for the purposes described. The plug wire connections 40 remain in position and thus the desired attention to the brush holder may be made with facility. The removal of the brush holder gives access to the metal contact roller 25 which is preferably mounted in a manner now to be described.

The contact roller 25 is preferably a solid steel roll, case hardened, ground and polished and its support shaft 62 is rotatably mounted in ball bearings 63 carried by the side plates 10 and 11. Thus, the contact roller is freely rotatable. As the card is fed downwardly by the rollers 16, 17 and 28, 29 the tension of brushes 24 presses the surface of the card against the contact roller 25 and due to the frictional engagement between the surface of the contact roller 25 and the cooperating card surface the contact roller is rotated as the card is analyzed. As a brush encounters a perforation it will pass through to make contact with a spot on the surface of the roller. However, due to the braking action of the brushes there is a variable amount of slipping between the card and contact roller in successive card analyzing operations. Furthermore, the independent rotation of the contact roller effected by its inertia when the trailing edge of the card clears the brushes is variable from card to card. Either or both of these variable actions provide an infinite number of brush sensing spots around the surface of the roller which varies from card to card and also provides a burnishing ac-

tion between card and contact roller, tending to keep contact roller surface clean and bright for good electrical contact. This variable distribution prevents contact at the same spot and eliminates contact pitting and spotting usually encountered whenever the contact roller is gear-driven in synchronism with card feed.

While there have been shown and described and pointed out the fundamental novel features of the invention, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a record controlled machine wherein perforated records are successively fed between a row of analyzing brushes and a coacting contact roller engaged by said brushes through the perforations, the combination of a row of said analyzing brushes, a member supported in a fixed position in the machine insulatably carrying a row of plug wire receiving sockets for receiving a related plug connection in an electrical circuit to be completed by the associated brush and contact roller when a perforation is encountered, said sockets having exposed terminal ends, a second member removably mounted in the machine insulatably carrying said row of analyzing brushes also having exposed terminal ends electrically contacting with associated ones of said first named terminal ends and said brushes coacting with said contact roller when said second member is fixed in said machine in analyzing position, and means for detachably supporting said second member in framework plates of the ma-

chine in said fixed position with the terminal members of both members in electrical contact, and said brushes in coaction with said contact roller, said detachable means being disabled to enable withdrawal of the second member from analyzing position for inspection of said brushes without disturbing said plug connections made to the sockets of said first named member, and providing by its removal complete access to said contact roller.

2. The combination set forth in claim 1 wherein said framework plates are spaced and have guide slots therein, and said second member is provided with extensions cooperating with said guide slots to guide the member into or out of analyzing position when it is being inserted or withdrawn, and said detachable means comprises a pair of spring-operated latches pivoted on said framework plates for engaging said second member to latch the latter in analyzing position.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,478,691	Bagge	Dec. 25, 1923
1,839,398	Lee	Jan. 5, 1932
2,053,069	Daly	Sept. 1, 1936
2,056,361	Mills	Oct. 6, 1936
2,111,118	Lake	Mar. 15, 1938
2,129,764	Hayes	Sept. 13, 1938
2,203,013	Ford	June 4, 1940
2,353,061	Oldenboom	July 4, 1944
2,372,882	Daly et al.	Apr. 3, 1945
2,379,226	Frey	June 26, 1945