Dec. 26, 1961 L. E. FOWLE 3,015,004

MECHANICAL APPARATUS

Filed May 1, 1958 2 Sheets-Sheet 1

Fig. 1

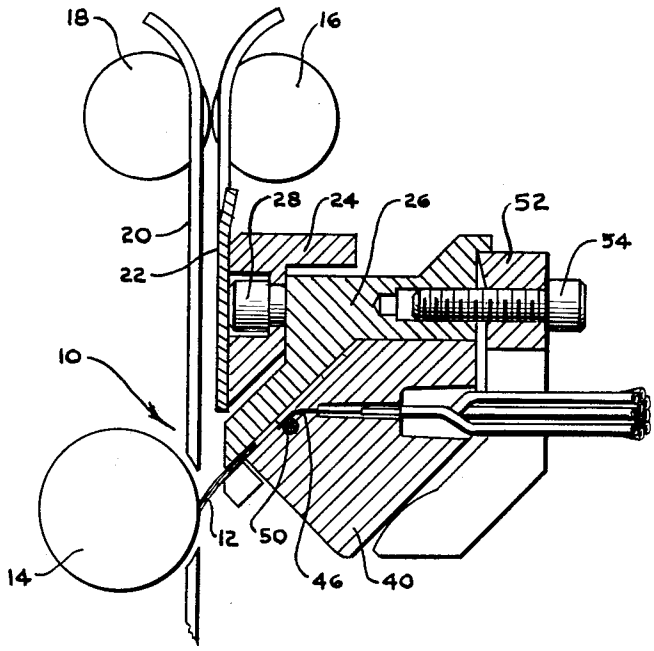
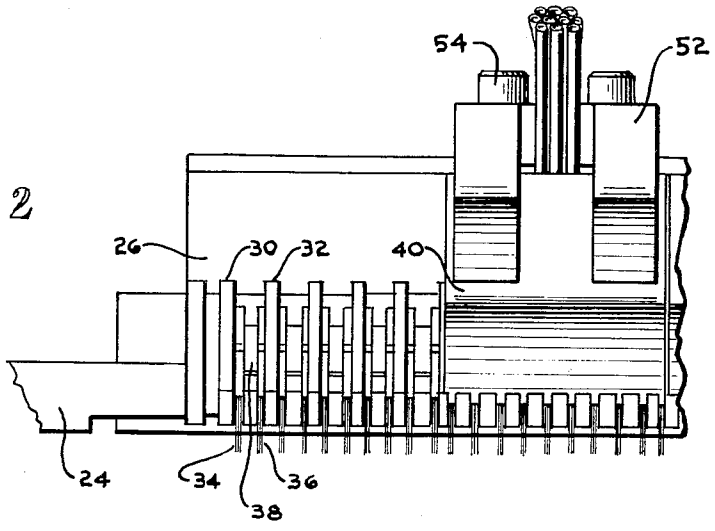


Fig. 2



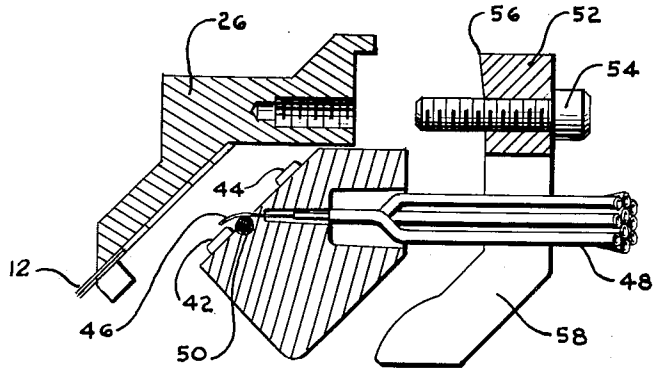
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Fig. 3



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3,015,004

MECHANICAL APPARATUS

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A general object of the present invention is to provide a new and improved apparatus for use in a document reading mechanism. More specifically, the present invention is concerned with a new and improved mounting for a tabulating card hole sensing brush combination which is characterized by its ease of manufacture, the ease by which the sensing brushes in the apparatus may be interchanged and the ease with which the individual brushes may be adjusted and aligned.

Punched tabulating cards are widely used for conveying data and information. The utilization of punched tabulating cards by automatic data processing equipment requires that there be a sensing made to determine where the cards may be punched. A typical tabulating card may have eighty columns spread along the length of the card with each column being comprised of twelve levels or rows. One well-known method of reading a punched tabulating card is to pass the card past a reading station where there are a plurality of electrical brush contacts which are adapted to project through the card at any position wherein there is a hole. When the brush contacts do pass through a hole in the card, an electrical circuit is completed and this electrical circuit may be used for converting the information which was on the card into a different form where it may be utilized by automatic means.

The ability of any document reading mechanism to sense holes in a punched tabulating card is dependent to a large extent upon the adequacy and reliability of the electrical brush contacts which are intended to pass through the holes in the card. In a preferred form of sensing brush, the brush is comprised of a plurality of wire elements bundled together and mounted so as to project into a predetermined position along the path of travel of the tabulating card as it passes through the document reader.

Even though extreme care is exercised in selecting the cards which are to be read, there is always a certain amount of mechanical wear on the brushes used for sensing the holes in the cards. In addition, card jams in the document reader may cause undesired jamming of the cards in the vicinity of the reading station to thereby mechanically bend the brushes beyond the point where they can be readily reused. This means that any brush which has been unduly bent or otherwise destroyed may have to be removed. In some instances, all of the brushes at one particular reading station are formed as an integral unit such that when any one brush in the unit is no longer usable, it is necessary to replace the entire assembly. Such an arrangement is extremely costly and has required that more flexible apparatus be provided at the brush reading station. To this end there has heretofore existed individual brush mounts, each of which had its own individual fastening means, for locking the individual brush elements into position. This arrangement, while useful in terms of individual brush replacement, is in fact extremely expensive to manufacture.

In accordance with the teachings of the present invention, there has been provided a new brush mounting assembly which is characterized by its accuracy in insuring proper brush alignment. Further, the apparatus has been arranged so that individual brushes may be adjusted in

their position on the mount or may be readily replaced in the event that they are no longer of any use.

It is accordingly a further more specific object of the present invention to provide a highly flexible brush mounting mechanism wherein the individual brushes of the mechanism are individually mounted and may be individually adjusted or replaced with a minimum of effort.

Another important feature of the present invention lies in the fact that once the individual brushes are in their appropriate position on a support member, electrical contact may be made with the same without the requirement of special contacting screws, soldering or other coupling means requiring appreciable time and effort to accomplish.

Another object of the invention is then to provide a new and improved brush sensing holder which embodies a very simple yet positive electrical connection between each individual brush while retaining the flexibility of being able to remove each individual brush without any major effort required in terms of electrical disconnection.

The foregoing objects and features of novelty which characterize the invention, as well as other objects of the invention, are pointed out with particularity in the claims annexed to and forming a part of the present specification. For a better understanding of the invention, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

Of the drawings:

FIGURE 1 is a cross-sectional view of a card reading station;

FIGURE 2 is a front elevational view of the card reading station with portions thereof removed; and

FIGURE 3 is an exploded view of the main portion of the brush holding mechanism of the present invention.

Referring first to FIGURE 1, the numeral **10** represents a brush type card reading station into which the present invention has been incorporated. Included in the card reading station is a brush or hole sensing element **12**. Normally the brush **12** will be engaging the surface of a contact roll **14**. When the brush is contacting the roll **14**, an electrical circuit will be completed between the brush and the contact roll.

For driving cards past the reading station, there is provided a pair of mechanical drive rolls **16** and **18**. These drive rolls are adapted to feed cards from a suitable card picking mechanism down through a chute formed by the guide members **20** and **22** so that the cards will pass under and between the brush **12** and the roll **14**. At any position wherein the card may be punched, the brush **12** will spring back into engagement with the contact roll **14** to complete an electrical circuit which may be used in any desired manner in a data utilization apparatus.

Considering the brush reading station in greater detail, it will be seen to comprise a base member **24** which is adapted to carry a brush support frame **26**. The base member **24** may be mounted on a suitable frame so as to be readily adjustable by means not shown. This type of adjustment provides for preliminarily aligning the assembly. The support frame **26** is fastened to the base **24** by a suitable fastening means **28**. As viewed in FIGURE 2, the brush support frame **26** has a plurality of slots cut along one edge thereof with edges of each of the slots being defined by a pair of ridges, such as the ridges **30** and **32**. Positioned within each of the slots, adjacent the edges thereof, as at the ridges **30** and **32**, are a pair of brush elements **34** and **36**. Positioned between the brushes **34** and **36** is a piece of compressible material **38**, such as a piece of rubber, which exerts sufficient

lateral pressure when in position to hold the brushes **34** and **36** in position. A similar brush holding combination is incorporated in each of the other slots on the brush support frame **26**.

For locking the brushes into position upon the support frame **26** there is provided a block **40**. As viewed in FIGURE 3, the block **40** will be seen to have formed on the brush engaging the side thereof a pair of embossed surfaces **42** and **44**. These two embossed surfaces, when the block **40** is in position, are adapted to exert an additional compressive force upon the material **38** to further cause this material to expand and firmly grip the brushes **34** and **36**.

Also carried by the block **40** is an electrical contacting member **46** which is adapted to extend through the block **40** from a connection made on the opposite side of the block to an appropriate electrical cable **48**. The electrical cable may well carry ten individual wires which are adapted to be connected to ten appropriate contacting wires, such as the wire **46** extending through the block. Once formed, the contact wire **46** and the associated cables may be potted in their position in the block **40**. Positioned immediately under the contact wire **46**, and all of the other contact wires extending through the block, is a resilient member **50**, the latter being slightly embedded in the surface of the block **40**.

When the block **40** is moved into position, the contact wire **46** will engage the associated brush **12** and will be bent to conform to the brush in the manner illustrated in FIGURE 1. The resilient member **50** will serve to exert a compressing force against the contact **46** to firmly hold the contact in engagement with the brush associated therewith.

A U-shaped clamping member **52** is adapted to be fastened by a suitable fastening means **54** to the brush support block **26**. This member has a knife-like edge at **56** which tends to rock the member so that the lower end thereof at **58** will bear against the block **40** and hold it firmly in position against the support frame **26**.

In one embodiment of the invention, as illustrated in FIGURE 2, the block **40** is adapted to accommodate ten brushes. It will be apparent however, that the principles of the invention are applicable to any desired combination.

In the event that it should be desired to adjust or replace a brush in the combination, it is but necessary to remove the U-shaped member **52** and then lift the block **40** associated with the brush in question from position. The brush may then be adjusted, or removed and replaced with another, and then the assembly quickly put back together again. Once assembled, a positive electrical contact will once again be made with the brush then in position and the apparatus will be ready for use.

It will be readily apparent from the foregoing explanation that the present invention eliminates the need for any costly screws, clamps, and the like for each of the individual brushes but instead provides a means which is very convenient for assembly and for servicing. Further, no solder connection or screw terminals are required in order to effect electrical connection to the brush which further enhances the servicability of the apparatus. It will also be apparent that each individual brush is now an expendible item rather than the entire block of brushes as was heretofore common practice in certain types of card reading mechanisms.

Other advantages of the invention will be apparent when it is noted that the brushes when in position in their slotted locations in the member **26** will positively coincide with the desired hole spacings on the cards to be read. Another advantage of the invention lies in the fact that the resilient member **50** aligned behind the contact members, such as the member **46**, provides the means for taking up inherent tolerance variations both in the block **40** and in the dimensions of the shank of the brush. This further insures that there will be good electrical contact made to each brush.

While, in accordance with the provisions of the statutes, there has been illustrated and described the best forms of the invention known, it will be apparent to those skilled in the art that changes may be made in the apparatus described without departing from the spirit of the invention as set forth in the appended claims and that in some cases, certain features of the invention may be used to advantage without a corresponding use of other features.

Having now described the invention, what is claimed as new and novel and for which it is desired to secure by Letters Patent is:

1. A brush holder for a document reader comprising a support member having a plurality of slots on one side thereof, a plurality of individual brush members positioned within said slots, a brush locking block carrying a plurality of electrical contacts, means fastening said block adjacent said support member so that said contacts engage said brush members and said contacts hold said brush members in position within said support member, and resilient means independent of said contacts positioned on said block between said block and said contacts to force said contacts into engagament with said brush members when said brush locking block is fastened to said support members.

2. In a document reading device, the combination comprising a support member, said support member having a plurality of elongated slots on one side thereof, a plurality of brush elements, two of which are adapted to be positioned against the opposite walls of each of said slots, and a compressible medium positioned in each of said slots between the two brush elements in each of said slots to hold the brush elements in position in said support member.

3. In a document reading device, the combination comprising a support member, said support member having a plurality of elongated slots on one side thereof, a plurality of brush elements, two of which are adapted to be positioned against the opposite walls of each of said slots, a compressible medium positioned in each of said slots between the two brush elements in each of said slots to hold the brush elements in position in said support member, and means positioned on said support member to exert a compressive force on said compressible material.

4. In a document reading device, the combination comprising a support member, said support member having a plurality of elongated slots on one side thereof, a plurality of brush elements, two of which are adapted to be positioned against the opposite walls of each of said slots, a compressible medium positioned in each of said slots between the two brush elements in said slot to hold the brush elements in position in said support member, a contact carrying block adapted to be mounted on said support member, said block when in position causing the contacts thereon to engage said brush elements, and means fastening said block in position.

5. In a document reading device, the combination comprising a support member, said support member having a plurality of elongated slots on one side thereof, a plurality of brush elements, two of which are adapted to be positioned against the opposite walls of each of said slots, a compressible medium positioned in each of said slots between the two brush elements in said slot to hold the brush elements in position in said support member, a contact carrying block adapted to be mounted on said support member, said block carrying a plurality of embossments adapted to engage said compressible medium, and means fastening said block in position on said support member.

6. In a document reading device, the combination comprising a support member, said support member having a plurality of elongated slots on one side thereof, a plurality of brush elements, two of which are adapted to be positioned against the opposite walls of each of

said slots, a compressible medium positioned in each of said slots between the two brush elements in each said slot to hold the brush elements in position in said support member, a brush locking block carrying a plurality of contacts, means fastening said block adjacent said support member so that said contacts engage said brush members and hold said brush members in position within said support member, and resilient means positioned on said block to force said contacts into engagement with said brush members.

7. A reading device as defined in claim 6 wherein said block carries a projection which is adapted to engage said compressible medium and expand said medium to firmly engage said brush elements.

8. A brush holder for a document reader comprising

a support member carrying a plurality of brushes, a plurality of electrical contacting means adapted to engage said brushes, a brush locking block having a side adjacent said brushes, a compressible resilient means independent of said contacting means positioned between said side of said block and said brushes, and a clamp adapted to be adjusted to bias said resilient means toward said brushes to maintain a mechanical pressure on said brushes.

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