

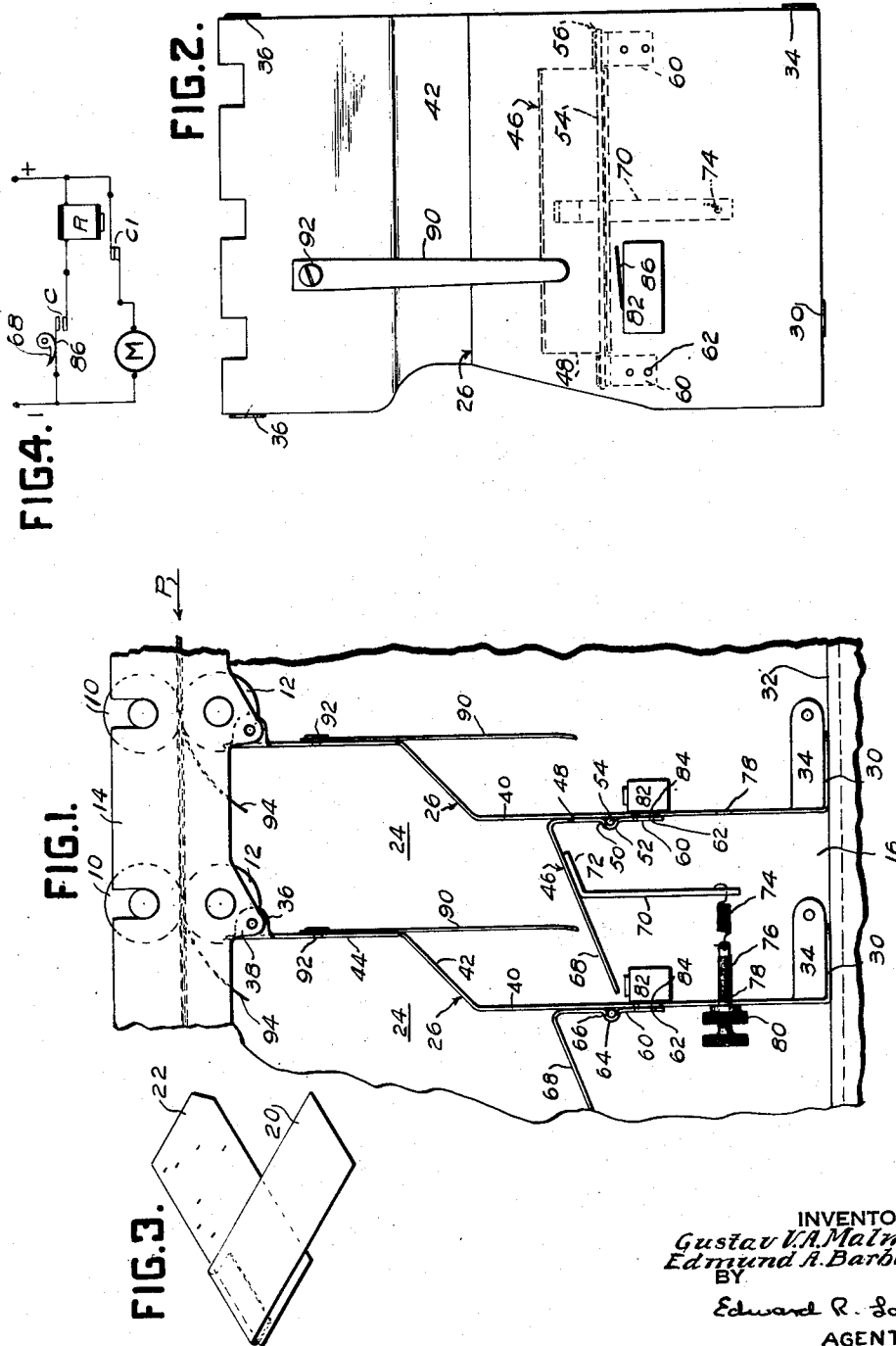
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POCKET CONSTRUCTION FOR SORTING MACHINES

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POCKET CONSTRUCTION FOR SORTING
MACHINES

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The improved pocket construction comprising the present invention is essentially designed for use in connection with sorting machines which are employed for the sorting of record material in the form of source documents and which are each attached to an individual carrier vehicle in the form of a punched tabulating card.

It has recently been proposed for the successful sorting of source documents, such as checks, drafts, sales slips, receipts, bills of lading, bills of sale, etc., which have no common size, shape, thickness or stock weight and in which there are no special or unique identifying means, such as perforations, removed corners, cut-away portions, conductive regions or the like which are capable of detection by conventional sorting machines, that such source documents be folded or creased along their short dimensions and that a conventional punched tabulating card be inserted in the crease or fold of each document in such a manner that the leading edge of the card is closely nested within the fold with the document overlying an unpunched region of the card, preferably at one side thereof. If the document is longer than the width of the card it is permitted to overlap the trailing edge of the card. In this manner, the card and document are effectively secured to each other for sorting purposes. The combined documents and cards are then stacked in superimposed relationship in the feed magazine of a sorting machine of more or less conventional design and which has been modified to accommodate the card and document combinations. Sorting takes place in somewhat the usual manner with the cards acting as carrier vehicles to conduct their individual attached cards to the desired sorting pocket.

Such a sorting machine has been shown in a copending application of Clarence B. Church, Serial No. 773,254, filed September 10, 1947, for Method of an apparatus for sorting cheques and other documents, and reference may be had thereto for a full disclosure and description of the operation of the machine.

Inasmuch as in sorting card and document combinations according to the method described in the above mentioned application of Church, the source documents occupy positions on one side of the cards in overlapping relationship with respect thereto, the conventional sorting pockets which are employed in standard sorting machines and which are of a width substantially equal to the width of a tabulating card are inadequate to accommodate the combined card and document combinations.

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Accordingly, a principal object of the present invention is to provide a sorting pocket which has been designed especially to receive, from the feed rolls of a sorting machine, card and document combinations in such a manner that these combinations will issue from the feed rolls and be deposited in the pocket in stacked relationship without obstruction and which will also serve to permit stacking of such combinations in a convenient manner whereby they are readily accessible for removal purposes.

A further object of the invention is to provide such a pocket construction having associated therewith a pair of pocket stop contacts which normally remain open, but which, when a predetermined number of card and document combinations have been received in the pocket, become closed and operate through relay means to open the circuit to the electric motor which drives the sorting machine, thus terminating sorting operations.

A still further object of the invention is to provide a pocket construction in which the path leading from the feed rolls to the bottom of the pocket, and through which the card and document combinations must pass, is free and unobstructed and permits ready stacking of the card and document combinations one above the other so that the additional thickness afforded at one side of the stack by virtue of the position of the documents relative to the carrier cards, will not cause tilting of the stack and consequent interference with proper reception of subsequently received card and document combinations.

Yet another object of the invention is to provide a pocket construction having associated therewith means whereby interlacing, interleaving, or tumbling of the folded source documents in the pockets will effectively be prevented so that the individual superimposed source documents will be separated from one another.

In carrying out the above mentioned objects, the invention contemplates the provision of a pocket construction having a forwardly offset lower region, thus rendering the pocket space generally Z-shaped. This feature is resorted to to accommodate the normal "throw" of the card and check combinations as they leave the feed rolls and proceed forwardly and downwardly into the pocket. Additionally, because the card and document combinations exist with the rear ends or "tails" of the documents trailing behind the cards, the angle of inclination of these superimposed tails will remain inclined as the stack within the pocket builds up with the stacked portion

of the tails leaning against the rear wall of the pocket. Because of the increased width afforded by the offset portion of the pocket, there will be no tendency for the document tails to bend forwardly and interfere with the oncoming card and document combinations. Still further, the provision of a Z-shaped pocket affords materially greater storage space than would ordinarily be the case with conventional straight-sided pockets.

The invention also contemplates the provision of a pocket construction having a downwardly movable and hinged bottom, the degree of inclination of which is determined by the weight of pressure of the stack as it builds up within the pocket, thus presenting a changing angle for the pocket bottom as the pocket becomes filled. This feature has been found advantageous inasmuch as a stack of cards and attached documents will ordinarily shape up in wedge-shaped fashion with the leading edge of the stack higher than the trailing edge. The movable bottom referred to above affords a substantially fixed angle for the top card and check combination with respect to the next oncoming combination so that the card and check combination will stack up properly. It is by means of this latter feature that interlacing, interleaving or tumbling of the card and check combinations is prevented.

The invention also contemplates the provision of a flexible finger which projects downwardly into the pocket and which is formed of relatively thin spring material. This finger is positioned well forward in the pocket and is adapted to receive therebeneath the forward regions of each card and check combination as the same falls to the bottom of the pocket or to the top of the stack in the pocket. This finger is so designed as to bear downwardly on the forward regions of the stack and maintain the V-shaped crease provided in the folded documents closed to prevent interlacing of the succeeding documents. This finger is of particular importance in connection with extremely short documents whose rear ends do not overlap the tabulating card. In such instances, the open V-shaped formation of the document is an invitation for the next succeeding or oncoming card and document combination to become lodged in the crease thus formed. By the provision of the flexible finger, the crease is maintained closed and a succeeding check and document combination falls squarely on top of the stack with its forward edge regions nested beneath the lower end of the finger.

The provision of a pocket construction of the character generally outlined above being the principal object of the invention, 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 fragmentary side elevational view of a portion of a sorting machine showing the improved pocket construction comprising the present invention associated therewith.

Fig. 2 is a fragmentary end view of the structure shown in Fig. 1.

Fig. 3 is a perspective view, schematic in its representation, showing a folded document and check combination.

Fig. 4 is a circuit diagram illustrating the func-

tions of a microswitch assembly employed in connection with the present invention.

In all of the above views similar characters of reference have been employed to designate similar parts throughout.

Referring now to the drawings in detail, the sorting machine shown fragmentarily herein is of the type shown in the above mentioned application by Church. This machine is generally similar to conventional shorting machines employing horizontal sorting means, as for example, the machine shown and described in the patent to Horsfield, No. 1,933,328, dated October 31, 1933. Such a machine embodies conventional card feeding mechanism including the usual upper and lower feed rolls 10 and 12 providing a card path P along which the cards are adapted to travel while being conducted to the respective sorting pockets to which they are assigned. These feed rolls 10 and 12 are suitably mounted in the front and rear plates 14 and 16, respectively, of the sorting machine.

Referring now to Fig. 3, a source document, which may be in the form of a conventional bank check is designated in its entirety at 20 and, for sorting purposes, each check is adapted to be associated with a punched tabulating card 22 which may be of the Hollerith type, the latter serving as a conducting vehicle for transporting the check through the sorting machine from the feed hopper thereof (not shown) along the card path P to the card receiving pocket to which the check is assigned, the combination being moved along the path by means of the feed rolls 10 and 12. The card 22 serves also as an identifying instrument and function device whereby proper chute blade selection is made for the proper selective sorting of a stack of the assembled checks and cards contained in the feed hopper.

The individual card pockets are designated at 24 and are substantially identical in construction, wherefor a description of one will suffice for them all. Each pocket involves in its general organization a generally Z-shaped front wall 26 and a similarly shaped rear wall, the rear wall of a forward pocket serving as the front wall for the next adjacent rearward pocket. The walls 26 are in the form of partitions having laterally turned flange portions 30 suitably secured to the sorting machine bottom plate 32 and a laterally turned flange 34 secured to the rear side plate 16. The edges of the walls 26 adjacent the top thereof are provided with laterally turned ears 36, one of which is secured to a downwardly extending lug 38 formed on the front plate 14 and the other of which is secured to the rear plate 16.

Each wall 26 is provided with a vertically extending forwardly offset portion 40, a forwardly and downwardly inclined portion 42 and a rearwardly vertically extending offset portion 44. The forward offset portion 40 is of greater height than the rearwardly offset portion 44, its height being somewhat greater in extent than one-half the overall height of the pocket 24. The extended plane of the downwardly and forwardly extending portion 42 of the wall 26 substantially intersects the line of contact of the feed rolls 10 and 12 from which card and check combinations destined for the particular pocket concerned issue and thus the shape of the pocket 24 existing between adjacent walls 26 is such as to readily accommodate the forward throw of the various card and check combinations.

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Each pocket is provided with a downwardly movable bottom assembly 46 formed of thin sheet metal and including a vertically extending portion 48, the lower edge of which is curved as at 50 to provide a recess 52 or groove therealong in which there is affixed, as by spot welding or the like, an attachment rod 54 whose ends project outwardly as at 56 beyond the confines of the vertically extending portion 48. A pair of brackets 60 are riveted as at 62 to the wall 26 and have their upper edges curved as at 64 to provide recesses 66 in which the ends 56 of the rod 54 are adapted to be received in order to effectively clamp the pocket bottom assembly 46 in position with the pocket 24. The brackets 60 are formed of spring metal and by the simple expedient of bending them rearwardly the pocket bottom assembly 46, together with its attached rod 54, may readily be removed for purposes of inspection, replacement or repair.

Each bottom assembly 46 is provided with a forwardly and downwardly inclined bottom proper 68 which, by virtue of the inherent resiliency of the sheet metal from which the pocket construction is formed, is capable of downward swinging movement under the influence of the weight of the stack of card and check combinations as this stack builds up within the pocket.

The bottom proper 68 is normally maintained in an elevated position by virtue of an arm 70 which is secured as at 72 to the underneath side of the bottom 68 and which extends downwardly to a point well below the bottom 68. The lower end of the arm 70 has secured thereto one end of a coil spring 74, the other end thereof being secured to an adjusting screw 76 which extends through an opening 78 provided in the forward offset portion 40 of the wall 26. A locking nut 80 serves to stabilize the adjustment of the tension of the coil spring 74. A conventional microswitch assembly 82, including a pair of normally open contacts c (Fig. 4), is secured as at 84 to the forward offset portion 40 of the wall 26 beneath the forward edge of the pocket bottom 68 and is provided with an operating arm 86 which is positioned in the path of movement of the pocket bottom 68. Each pocket is provided with a relatively thin, narrow, extremely flexible card retaining finger 90, the upper end of which is riveted as at 92 to the vertical portion 44 of the front wall 26 and this finger lies flush with the portion 44 and extends downwardly beyond the inclined portion 42 of the wall 26 to a point slightly above the inclined plane of the pocket bottom proper 68 when this bottom is in its uppermost position. The finger 90 is preferably positioned in the pocket 24 somewhat to the left of the center thereof, as viewed in Fig. 2, so that it will overlie the medial regions of the checks as the check and card combinations build up within the pocket.

A curved plate 94 of conventional construction extends rearwardly and downwardly from the line of emergence of the various card and check combinations as they leave the feed rolls 10 and 12 and serves to guide these combinations into the card receiving pocket 24 so that they will cooperate properly with the flexible finger 90 and the pocket bottom 46 for proper stacking within the pocket in a manner that will be set forth presently.

Referring now specifically to Fig. 1, it will be seen that as each card and check combination emerges from the rolls 10 and 12 it will be deflected downwardly by the curved guide plate 94

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and the leading edge of this card and check combination will strike the finger 90 at some point between the lower edge of the vertically extending portion 44 of the wall 26 and the lower end of the finger 90. This will cause the finger 90 to become flexed forwardly so that the leading edge of the card and check combination may slide beneath the lower end of the finger 90 as it comes to rest upon the bottom proper 68. When the card and check combination finally does come to rest upon the bottom 68, the leading edge thereof will bear against the forward offset portion 40 of the front wall 26 and the tabulating card will lie substantially flat upon the bottom 68. The trailing end of the check 20, if it is of sufficient extent, will curve upwardly and loosely lie against the downwardly inclined portion 42 of the rear wall 26.

The extreme forward edge region of the card 22, particularly at the left-hand side of the pocket as viewed in Fig. 2, will be slightly elevated from the pocket bottom 68 by virtue of the thickness of the folded-over edge of the check 20 and, as succeeding card and check combinations issue from the feed rolls 10 and 12 and enter the pocket 24 thus building up the stack, this elevation of the specified region of the various cards 22 will be cumulative so that as the stack thickness increases the tendency of the uppermost card therein to become inclined both laterally and longitudinally increases as each succeeding card is received in the pocket 24. To compensate for this progressively increasing tendency of the uppermost card to become inclined, the tension of the spring 74 is so adjusted as to permit the progressively increasing weight of the stack to move the bottom 68 gradually downwardly until such time as it engages the operating arm 86 of the microswitch 82 to open the contacts c and stop the operation of the machine. The adjustment of the spring 74 is fairly critical and the tension applied to the spring should be such that when a predetermined and desired number of card and check combinations have been received in the pocket the microswitch 82 will be actuated. During the building up of the stack to the limit of its thickness, the uppermost card and check combination in the stack at all times will be maintained at a substantially constant inclination and in this manner tumbling of the card and check combinations in the pocket, jamming or interleaving thereof is effectively prevented.

The flexible finger 90 serves the purpose of gently pressing the checks downwardly on the card and causing them to lie substantially flat upon the cards to which they are attached. There is usually a tendency, particularly in connection with relatively short checks, for the checks to "open" slightly and form a V because the folding of the check around the card will not, in all cases, permit the folded check to lie flat on the card. The extent of this opening of the check is, of course, a factor that is associated with the resiliency or springiness of the paper material from which the check is formed. When such opening occurs, the oncoming succeeding card will drive against or into the fold in the preceding check, thus causing interleaving of the succeeding card and check combinations. Such interleaving is effectively prevented by the finger 90 which bears downwardly on the upper surface of the uppermost check in the stack and causes the same to lie flush with its respective card to which it is attached so that the leading edge of the next succeeding combination will first strike the finger

90 and then slide along the upper surface of the uppermost check in the stack and come properly to rest in position on the top of the stack without interleaving. The nature and character of the finger 90 and its positioning within the pocket 24 is critical and the finger is designed and positioned so that the proper pressure is obtained to barely hold the check against the card without too much pressure so that the succeeding card and check combination will not fail to slide downwardly into the pocket and come to rest flush on the top of the stack.

Referring now to Fig. 4, the normally open microswitch contacts *c* are so arranged in an electrical circuit that upon closing thereof they will operate a relay magnet *R* to open a second pair of contacts *c1* disposed within the circuit of the sorting machine motor *M* to deenergize the motor and prevent further feeding of cards from the card hopper or receptacle.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the apparatus 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 document sorting machine wherein a document to be sorted is folded over the leading edge of a carrier card, the said machine having means for feeding the said cards in a predetermined direction, a series of pockets transversely adjacent the path of feed of the said cards into which documents are stored, each said pocket having a forward wall including an inclined portion and a vertical portion against which vertical portion a document is carried by its carrier card and having a rearward wall including a vertical

portion and an inclined portion upon which inclined portion a trailing portion of a document may rest, the rearward wall of each pocket forming the forward wall of each preceding pocket.

2. The invention set forth in claim 1 with the further provision of a flexible finger member having one end fixed to the forward wall of each said pocket and the other end interposed in the normal plane of rest of a document in said pocket to bear continuously upon the top document in each said pocket for retaining the said document folded about its carrier card.

3. In a machine having means for feeding documents in a predetermined path and a series of pockets along said path into which said documents are variously sorted, a pocket composed of an upper portion having parallel vertical forward and rearward walls, a lower portion having parallel vertical forward and rearward walls displaced forwardly in the said feed path from the said upper portion, and an intermediate portion having parallel inclined forward and rearward walls connecting the said upper and lower portions, the composite rearward wall of each pocket forming the forward wall of each preceding pocket, whereby the leading edge of a document sorted into a pocket is delivered against the forward vertical wall of the said lower portion and the trailing edge rests upon the rearward inclined wall of the said intermediate portion.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
958,230	Cowley et al.	May 17, 1910
2,124,858	Marchand	July 26, 1938
2,358,051	Broido	Sept. 12, 1944