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Robnolte

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[54] **DEVICE FOR FACILITATING THE FEEDING OF SHEETS INTO A REPRODUCTION MACHINE OR THE LIKE**

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[51] **Int. Cl.**[2] **B65H 5/38;** G03B 27/02

[58] **Field of Search** 355/97, 104, 108; 271/3, 271/8, 172

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

A device is provided for facilitating the entry of sheets of material into a reproduction or copying machine, or the like. The device is mounted on a feed table adjacent an entry opening of the machine and includes a pair of supports located adjacent the ends of the entry opening with a stiffening bar supported at ends by the supports and located above the table surface. An entry strip having an edge carried by the bar has a forward edge extending near or into the entry opening of the machine. A sheet barrier extends upwardly from the entry device and intercepts the forward edges of sheets exiting from the machine above the entry opening to prevent such exiting sheets from interfering with the feeding of new sheets into the machine. The stiffening bar is an extrusion on which the sheet barrier can be integrally formed, with the bar having a groove for receiving the entry strip and for also receiving the end supports. In addition, the end supports have openings facing away from the machine which enable folded corners or the like on sheets being fed into the machine to be straightened.

8 Claims, 3 Drawing Figures

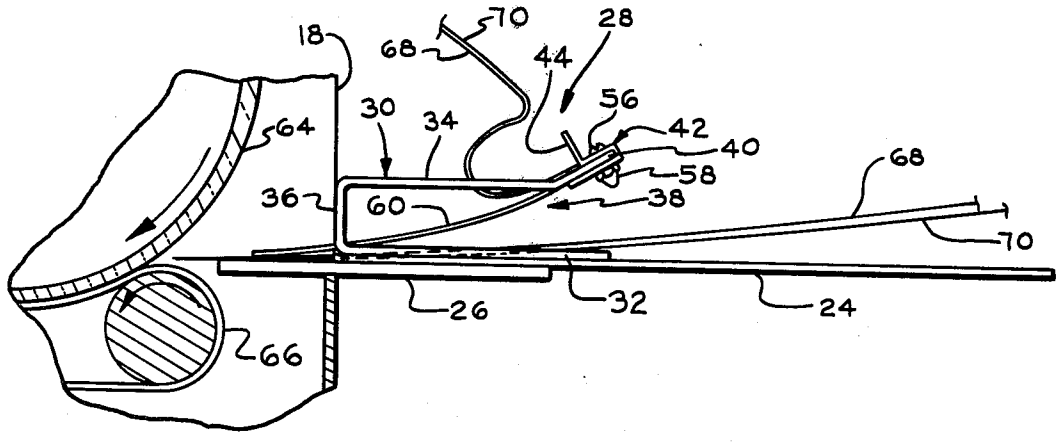
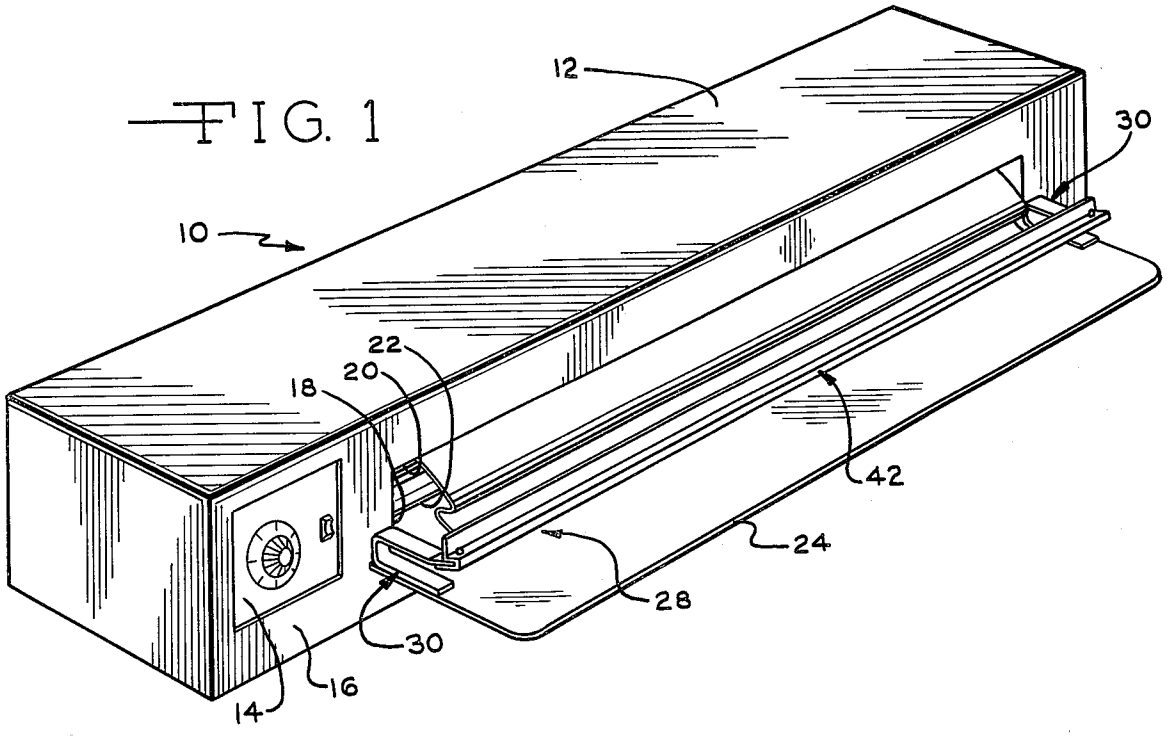


FIG. 1



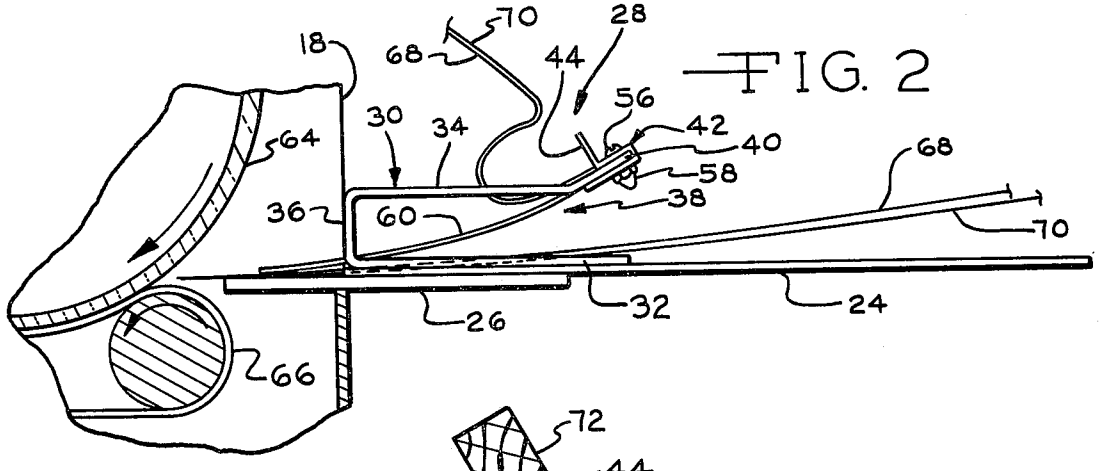


FIG. 2

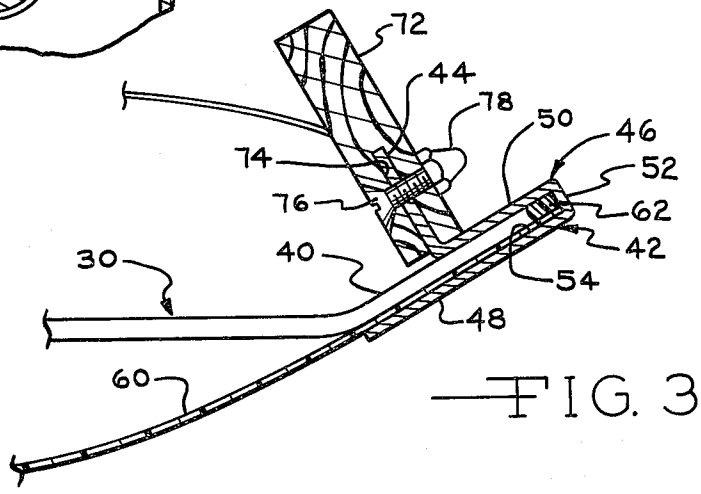


FIG. 3

DEVICE FOR FACILITATING THE FEEDING OF SHEETS INTO A REPRODUCTION MACHINE OR THE LIKE

This invention relates to a device for facilitating feeding of sheet material into a reproduction machine or the like.

When feeding large sheets of material into a reproduction machine, it is not uncommon for portions thereof to curl or fold back on themselves when being fed into the entry opening of the machine. Also, it is not uncommon particularly for the sheet material to be copied to have corners which are folded back on themselves when in storage. Atmospheric conditions and particularly moisture often cause the sheet material to curl, requiring smoothing before reaching the feeding rolls or belts of the machine.

In addition, many, if not most, reproduction machines, have the exit for the sheet being copied, and frequently along with the copy sheet, at a location above the entry opening into which the sheets are fed. The exiting sheets interfere with material being fed into the machine so that it often is necessary to wait for all the material in the machine to emerge before the new sheets can be fed thereinto.

In accordance with the invention, an entry device is provided for a reproduction machine or the like, which device overcomes the above disadvantages and has additional advantages. The entry device preferably is employed with a supporting surface formed by a feed table or lip which extends outwardly from a lower edge of an entry opening of the reproduction machine, either being part of the machine or being affixed to a smaller lip located adjacent the lower edge of the entry opening. A pair of supports are positioned on the supporting surface adjacent ends of the entry opening. These can simply rest on the surface or be suitably affixed thereto as discussed more fully in my U.S. Pat. Nos. 3,634,010 and 3,758,208. A stiffening member or bar has ends held by the supports and is spaced above the surface of the feed table or lip throughout its length and throughout the length of the entry opening. An entry strip preferably of a transparent material has an edge portion affixed to the bar and extends toward the machine near to or slightly through the entry opening where it rests on the feed table or lip near the feed rolls or belts in the machine.

In accordance with the invention, the entry device and preferably the stiffening bar thereof, has a sheet barrier extending upwardly therefrom to engage the forward edge of a sheet or sheets exiting from an exit opening of the machine above the entry opening. This blocks movement of the sheet to or toward the feed table which otherwise causes the entrance of the entry device to be obstructed or closed off. The exiting sheet can then be received on top of the entry strip which, in effect, forms a receiving tray with the barrier for receiving the exiting material. Consequently, it is not necessary for the operator to wait until the exiting material has emerged or to clear the partially emerged sheet before feeding additional sheets to the entry opening. If desired, an extension strip can be placed on the sheet barrier to raise the effective height thereof in order to assure that the exiting sheet will be intercepted.

Also in accordance with the invention, the stiffening bar is an extrusion integrally forming the sheet barrier and also forming a groove along the entire length of the bar. The groove receives an edge of the entry strip to hold it in place by suitable affixing means such as a resilient rod forced into the groove adjacent the entry strip. The ends of the groove also receive the supports of the entry device and suitable means can be used to affix the stiffening bar to the supports. This design provides a relatively simple yet sturdy and low cost construction for the entry device according to the invention.

The entry device further features specially shaped supports or brackets which provide elongate openings facing toward the operator. Specifically, these openings are formed by the supports being of U-shaped design with the legs of the U being parallel to the feed table and with the closed end of the U being adjacent the machine. With this arrangement, particularly corner folds of the sheet to be copied or the copy sheet can be inserted into the elongate opening of one of the supports and manipulated toward the center of the machine to straighten out the folds with the aid of the entry strip in combination with the supporting surface. Once the folds are straightened, they are held straight between the entry strip and the surface while the sheets are fed into the machine.

It is, therefore, a principal object of the invention to provide an entry device for a reproduction machine or the like having the many advantages outlined above.

Other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawings, in which:

FIG. 1 is a somewhat schematic view in perspective of a reproduction machine in combination with an entry device according to the invention;

FIG. 2 is an enlarged, end view of the entry device of FIG. 1 with the machine being in fragmentary cross section; and

FIG. 3 is a further enlarged view in transverse cross section taken through part of the entry device of FIGS. 1 and 2 and further showing a sheet barrier extension assembled therewith.

Referring to the drawings and particularly to FIG. 1, a reproduction or copying machine with which the invention can be used is indicated at **10.** The machine is representative of a number of commercially available reproduction machines including, by way of illustration but not limitation, those known under the names of Bruning, Ozalid, Diazit, and Dietzgen. The machine shown is of the table top type, but the invention is equally suited for larger floor machines of a wide variety. The machine **10** includes a housing **12** having suitable controls **14** and a front wall **16** with an entry opening **18** extending a substantial distance along the wall **16,** from 48 to 60 inches typically. A discharge opening or slot **20** is located at the front of the machine **10** above the entry opening **18,** being separated therefrom in this instance by a divider **22.** A relatively wide feed table **24** extends outwardly from the lower edge of the entry opening **18,** being suitably affixed to a shorter lip **26** (FIG. 2) in this instance.

Depending on the type of machine, either the sheet being copied or that sheet and the sheet on which the copy is made exit from the discharge opening **20.** In some machines, the copy sheet is again directed into the machine for further processing and is discharged at a higher opening in the machine or the copy sheet is discharged at the rear of the machine. However, even when just the sheet being copied emerges from the

opening **20**, it tends to interfere with the feeding of additional sheets into the entry opening **18**, often necessitating that the operator wait until the sheet or sheets have been completely discharged before feeding more material into the machine. This substantially slows down the operation and is particularly disadvantageous for commercial operation.

Particularly when wide sheet material is being copied, the original to be copied often has folded corners caused either during storage or when previously copied. This is particularly true for certain types of sheet material such as engineering drawings made on tracing paper. Under certain atmospheric conditions, the sheets also tend to curl, rendering it difficult to feed them smoothly into the reproduction machine.

In accordance with the invention, an entry device **28** is provided adjacent the entry opening **18** to overcome the above problems. The length of the device is sufficient to extend beyond both ends of the opening **18** with the overall width being narrower than the width of the feed table **24**. The entry device includes a pair of end supports or brackets **30** which can be substantially identical, being located on a supporting surface formed by the feed table **24** or the lip **26**, if it is wide enough, near the opposite ends of the entry opening **18**. The supports can simply rest on the table or lip or can be fastened by suitable clips or the like. The supports are of generally horizontal U-shaped configuration, including a lower leg **32** which is in contact with the supporting surface of the feed table **24** or the lip **26**, an upper parallel leg **34** spaced from the leg **32**, and a closed end or web **36** which preferably abuts the front wall **16** of the reproduction machine **10** to maintain the entry device in a given position relative to the entry opening **18**. The support **30** forms an elongate opening indicated by the arrow **38** facing away from the machine **10** and toward the operator, the purpose of which will be discussed more fully subsequently. The outer end of the leg **34** terminates in a slanted portion **40**. If the lower end of the web **36** of the support is affixed directly to the table **24** or the lip **26**, the lower horizontal leg **32** can be eliminated. Further, if the end of the upper leg **34** is affixed directly to the front wall **16** of the machine or a similar portion of the machine, the web **36** can also be eliminated.

An elongate stiffening member or bar **42** extends the length of the entry device between the supports **30**. It is sufficiently rigid to maintain an equal distance above the feed table **24** for all out portions of the entry device. The stiffening bar **42** includes an upwardly extending flange or sheet barrier **44** and a lower U-shaped portion **46** having a wide lower leg **48**, a narrower upper leg **50** integral with the flange **44**, and a web **52** forming a groove **54** with the legs **48** and **50**. The slanted end portions **40** of the supports **30** are received in the grooves **54** at the ends of the stiffening bar **42** and can be affixed thereto by fasteners or screws **56** and nuts **58** (FIG. **2**). The degree of slant or angle of the slanted end portions **40** thereby determines the position of the stiffening bar **42** relative to the table **24**.

An entry sheet or strip **60** has an outer longitudinal edge received in the groove **54** and held therein by suitable means. As shown, a resilient rod **62** is wedged into the groove **54** above the strip **60** to frictionally hold the strip therein with cement added, if desired. The rod **62** need not extend the full length of the bar **42**, two segments in the order of two inches long being sufficient near the ends of the bar to hold the entry strip **60**. The outer longitudinal edge portion of the strip **60** thereby is supported through the stiffening bar **42** with the leg **48** of the U-shaped portion **46** determining the outer angle of the strip **60**. The inner longitudinal edge of the strip **60** rests on the lip **26** or the feed table **24** near the entry opening **18**, being inside the opening **18** in this instance. The strip **60** thereby forms a general curved configuration for the entry device. With the supports **30** abutting the front wall **16** of the machine **10**, the inner edge of the entry strip **60** cannot be accidentally moved too far into the machine and caught by the feed members therein, such as an upper drive roll **64** and lower feed belts **66**. The width of the entry strip **60** will depend on the particular machine, with a width of 7 inches being most satisfactory for the widest number of machines. The thickness of the strip can be from 5 mils to ⅛ inch with a 10 mil thickness being preferred. The strip **60** preferably is made of a transparent plastic or Mylar to enable the operator to more readily control the sheets being fed to the machine, watching for folds, creases, etc.

The supports **30** and the stiffening bar **42** preferably are of anodized aluminum to prevent marking of the sheets fed through the machine, with the stiffening bar **42** being an extrusion. With these materials and components, the entry device **28** can be produced at a relatively low cost and yet provide durability and reliability.

Representative material being fed into the machine is shown in FIG. **2** wherein a sheet **68** is the material to be copied and a sheet **70** is the material on which the copy is to be made. Once these two sheets are aligned in superimposed relationship, the forward edges are maintained in that relationship with the aid of the entry device and specifically the entry strip **60** cooperating with the supporting surface of the feed table **24** or the lip **26**. Further, curls or undulations in the sheets tend to be flattened by the strip.

With the specific machine shown, the sheet **68** being copied and the copy sheet **70** both emerge from the exit opening **20** and are directed downwardly by gravity. Particularly with large sheets, they can move over and beyond the stiffening bar **42** of the entry device **28** and block the entry opening. Thus, the operator must either physically pick up the sheets with one hand to clear the opening while he feeds more sheets in with the other hand or he must wait until the exiting sheets fully emerge from the machine and can then be removed. However, with the entry device **28** according to the invention, the sheet barrier **44** intercepts the forward edges of the emerging sheets and blocks them from moving beyond the stiffening bar **42**. Thus, the sheets tend to fold into an undulating configuration as generally shown in FIGS. **1** and **2** onto the upper surface of the entry strip **60**, the strip **60** and the barrier **44** thereby serving in effect as a receiving tray for the emerging sheets. In some reproduction machines, only one of the sheets **68** or **70**, usually the sheet **68** being copied emerges from an exit opening above the entry opening. Even in such cases, the entry device serves the same purpose since one sheet can be as effective as two in blocking the feeding of new sheets into the machine.

Even where both sheets exit from the machine at a position or positions which will not interfere with the entry opening **18**, the entry device still effectively serves the purposes of maintaining the sheets being fed

to the machine flat and aiding in holding them in superimposed relationship during feeding. In such cases, the barrier **44** still serves as an effective stiffening flange for the stiffening bar **42**, enabling the bar to remain rigid even though of light weight construction.

The outwardly facing openings **38** formed by the supports **30** also provide an important function for the entry device **28**. Frequently the corners of the sheets **68** and **70**, particularly the sheets **68** which probably have been previously copied a number of times, tend to fold back on themselves and even be creased if fed through the machine when so folded. However, with the entry device **28**, the sheets **68** and **70** can be initially positioned partly to one side so that they are not aligned with the entry opening **18**. Rather, the sheets are placed so that they extend into one of the openings **38** of one of the supports **30** with the folded corner extending beyond the end of the entry device. The sheets can then be manipulated sideways toward the center of the machine and into alignment with the entry opening. During this manipulation, the folded corner is pulled transversely through the opening **38** and through the narrow space between the entry strip **60** and the feed table **24** near the front wall **18** of the machine. The strip **60** will then engage and straighten the folded corner and maintain it flat as the sheets are fed into the machine.

With some reproduction machines, the paper barrier **44** may not be sufficiently high to intercept the sheets exiting from the machine. In such an instance, a barrier extension **72** can be used on the barrier **44**. The extension **72** can simply be a long wooden strip having a slot or kerf **74** which is received on the barrier **44**. The extension **72** can be held on the barrier by a friction fit or, if desired, fasteners **76** and nuts **78** can also be used.

It will be seen from the above that the entry device **28** according to the invention has a number of advantages. The barrier **44** prevents the exiting sheets from interfering with new sheets being fed. The specific design and construction of the entry device **28** provides an inexpensive, durable, reliable, and light weight device. Further, the outwardly facing openings of the support **30** enable the sheets being fed to be smoothed or corners unfolded as they are fed into the machine without extra, time consuming operation being required on behalf of the operator.

Various modifications of the above-described embodiment of the invention will be apparent to those skilled in the art and it is to be understood that such modifications can be made without departing from the scope of the invention, if they are within the spirit and the tenor of the accompanying claims.

I claim:

1. A device for facilitating entry of sheet material into a reproduction machine, said machine having a supporting surface adjacent an elongate opening of the machine, said device comprising two spaced supports to be located on said surface near opposite ends of the entry opening, said supports forming openings facing outwardly from the machine toward the operator whereby sheets can be inserted into the support openings, a stiffening bar extending between said supports, an entry strip affixed to said stiffening bar and having a forward edge extending toward the entry opening when said supports are on said supporting surface, said stiffening bar forming a groove extending substantially the entire length thereof, portions of said supports being received in ends of said groove and said entry strip having a rearward edge received in said groove and affixed to said stiffening bar.

2. A device according to claim **1** characterized by each of said supports comprising a generally horizontally extending leg and means for spacing the leg above the supporting surface.

3. A device according to claim **1** characterized by each of said supports being of generally U-shaped configuration with lower and upper generally horizontally extending legs and a web connecting ends thereof.

4. A device according to claim **1** characterized by a sheet barrier extending upwardly from said stiffening bar and also adding to the rigidity of said stiffening bar.

5. A device for facilitating entry of sheet material into a reproduction machine, said machine having a supporting surface adjacent an elongate entry opening of the machine, said device comprising two spaced supports to be located on said surface near opposite ends of the entry opening, a stiffening bar extending between said supports, said stiffening bar being an extrusion forming a groove to face generally toward the machine, an entry strip having a longitudinal edge received in said groove and having an opposite parallel, longitudinal edge near the entry opening, and means for holding said entry strip in said groove.

6. A device according to claim **5** characterized further by a sheet barrier extending upwardly from said extrusion.

7. A device according to claim **5** characterized by said supports having generally horizontally extending legs with ends thereof received in said stiffening bar groove.

8. A device for facilitating entry of sheet material into a reproduction machine, said machine having a supporting surface adjacent an elongate entry opening of the machine, said device comprising two spaced supports to be located on said surface near opposite ends of the entry opening, a stiffening bar extending between said supports, and an entry strip affixed to said stiffening bar and having a forward edge extending toward the entry opening when said supports are on said supporting surface, each of said supports being of generally U-shaped configuration with lower and upper generally horizontally extending elongate legs positioned substantially perpendicular to said stiffening bar, and a web connecting common ends of said elongate legs spaced from said stiffening bar, each of said supports thereby forming an opening facing outwardly away from the machine toward the operator, whereby sheets to be copied can be inserted into the support opening and extend outside the support and then be moved back through the support opening toward the center of the entry opening to straighten corner portions of the sheets.

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