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GLUEING ATTACHMENT FOR COLLATING MACHINE

Filed Sept. 2, 1966

3 Sheets-Sheet 1

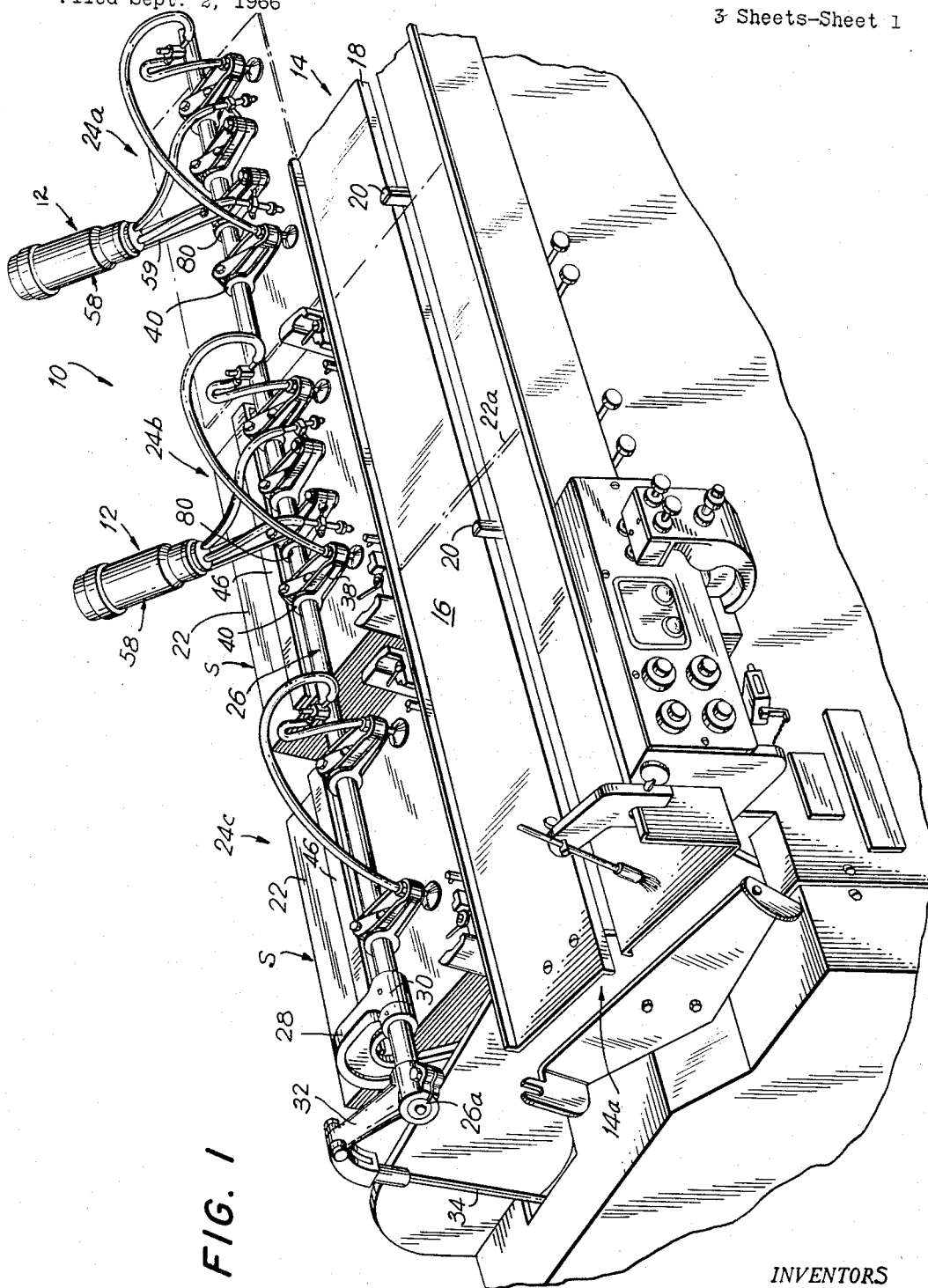


FIG. 1

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FIG. 2

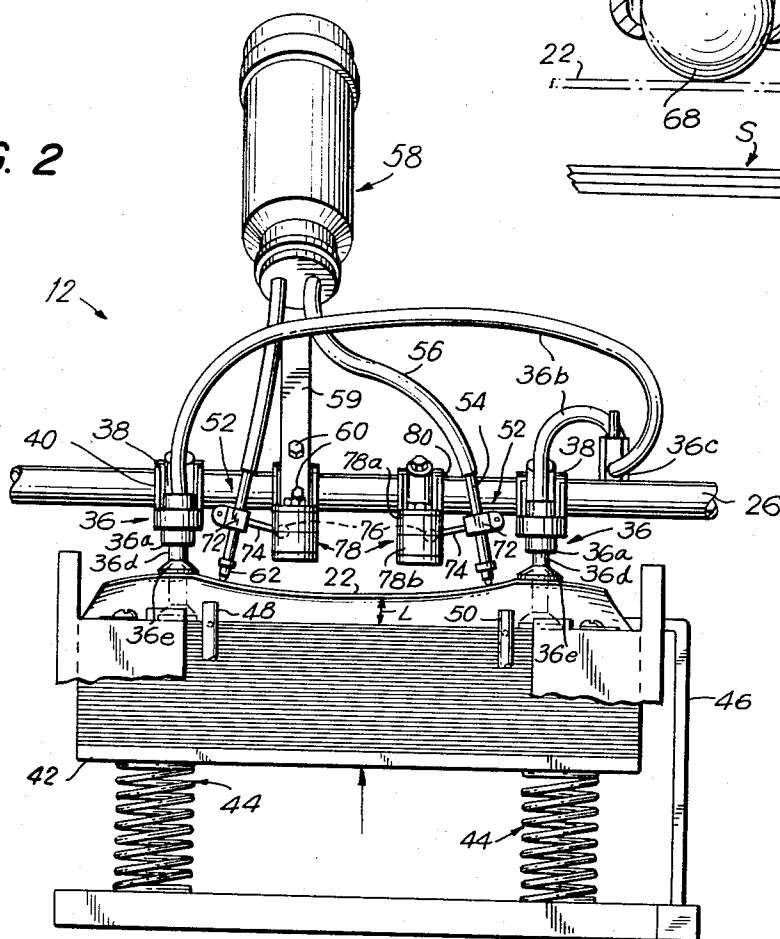
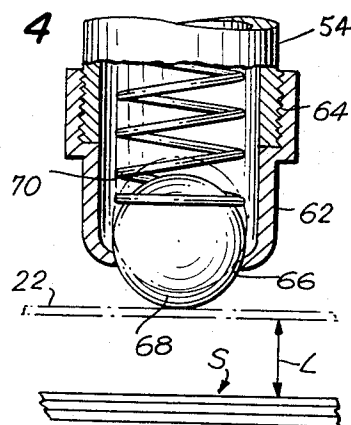


FIG. 4



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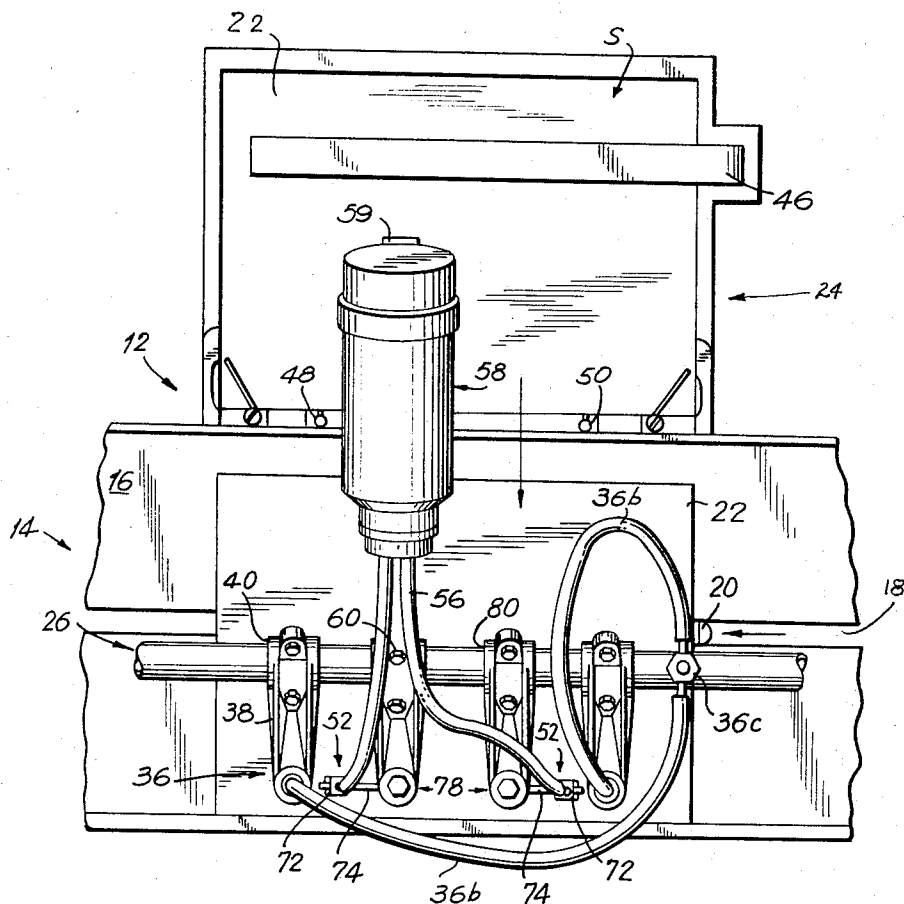
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3 Sheets-Sheet 3

FIG. 3



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GLUEING ATTACHMENT FOR COLLATING MACHINE

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Inc., New York, N.Y., a corporation of New York
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The present invention relates generally to the collating of printed material, and more particularly to an improved collating machine.

There are currently available machines for collating printed sheet material so as to place such material in a usable booklet form. As is generally the case, a typical collating machine is supplied with stacks of pages making up the booklet and is effective to work down these supply stacks, a single page at a time, during the production of collated arrangements of the pages. These collated arrangements are built-up on a conveyor which transports the same to a discharge point for further handling. Invariably, this handling includes the application of staples or similar mechanical attaching devices through the pages which are effective to hold these sheets together and thereby preserve their collated arrangements.

In most cases the resulting booklets are used in loose-leaf binders with the individual pages thereof subject to frequent revision and being often replaced by new pages. This requires that the user remove the staples or similar mechanical attachment to make the substitution of pages and this is a source of inconvenience.

Broadly, it is an object of the present invention to provide a glueing attachment for a collating machine which is effective to maintain the collated sheet arrangement by adhesive attachment of the sheets in substitution for stapling or mechanical attachment thereof. Specifically, it is an object to provide a glue-depositing device which is readily attached to a collating machine and which functions to provide adhesive attachment of the sheets without interference with and without requiring any change in the operation and functioning of the collating machine.

A glueing attachment demonstrating objects and advantages of the present invention is adapted to be operatively associated with a collating machine of the type including a conveyor, means defining plural stations for the stacks of sheets located adjacent the conveyor and sheet-transfer means at each station for transferring the individual sheets therefrom onto the conveyor. The sheet-transfer means includes vacuum-operated picking fingers which are effective, in response to a vacuum applied therethrough, to lift the sheet from the supply stack preparatory to the transfer of the sheet onto the conveyor. The glueing attachment is advantageously located adjacent the picking fingers and includes a supply source of an appropriate glue and glue-applying means activated by contact of the sheet lifted thereagainst by the vacuum to apply glue deposits to the sheet which maintains the sheet sequence in the collated arrangement in place of staples and mechanical attaching devices.

The above brief description, as well as further objects, features and advantages of the present invention, will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment in accordance with the present

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invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a partial perspective view of a collating machine having a glueing attachment thereon which is in accordance with the present invention;

FIG. 2 is a partial elevational view illustrating the lifting of a paper sheet and the application thereon of deposits of glue;

FIG. 3 is a plan view projected from FIG. 2 which best illustrates the two positions of movement of a sheet pick-up device of the collating machine; and

FIG. 4 is an enlarged sectional view of the glueing attachment and of the glue depositing structure thereof.

Reference is made to the drawings, and more particularly to FIG. 1, wherein there is partially shown a collating machine, generally designated 10, to which glueing attachments 12 demonstrating objects and features of the present invention are advantageously operatively associated with to provide an improved attachment of the collated arrangements of sheet material. For brevity sake only a description of that portion of the structure and functioning of the collating machine 10 which are necessary to an understanding of the present invention is set forth herein. As is generally understood, a collating machine 10, such as is exemplified by the Macey model 106A (107A) produced by the Harris-Seybold Company of Cleveland, Ohio has a suitable construction along one side thereof defining a conveyor 14, including a smooth-surfaced conveyor bed 16 having a central elongated notch 18 therein through which conveyor chain fingers 20 extend at predetermined intervals. As is further generally understood, the opposite or hidden ends of the chain fingers 20 are attached to an appropriate endless conveyor chain which, when operated, is effective to move the chain fingers 20 along the notch 18. In this way, any paper sheets 22, or more particularly any superposed collated arrangements 22a of the sheets 22 which are built up on the conveyor bed 16 are moved by the chain fingers 20 to a discharge point 14a at the end of the conveyor bed 16. In the illustrated embodiment of the machine 10 in FIG. 1 the discharge point 14a is at the left-hand end of the conveyor 14.

As may best be appreciated by consideration of FIGS. 1 and 3, a typical collating machine 10 additionally includes structure arranged adjacent the conveyor 14 which defines plural operating stations 24 along the length of the conveyor 14 at which stacks S of sheets 22 are positioned preparatory to being transferred, one at a time, onto the conveyor 14 to provide a predetermined collated sheet arrangement 22a. In other words, there may be as many as nine operating stations 24a, 24b, 24c, etc. arranged along the entire length of the conveyor 14 and individual sheets 22 are transferred, in turn, from these plural operating stations to the conveyor 14 to make up the collated sheet arrangement 22a that is desired. Thus, a sheet 22 from operating station 24a is placed on the conveyor 14 and is moved from this operating station in front of the operating station 24b at which time a sheet 22 from this station is transferred on top of the previously deposited sheet 22 to provide a collated arrangement therebetween, which is exemplary of a superposed arrangement which is provided to whatever number of sheets that correspond to the number of operating stations on the particular model of collating machine.

To function in the manner generally indicated above, a typical collating machine 10 further includes an elongated vacuum tube 26 which extends the length of the conveyor 14 and is connected in an appropriate manner to an air vacuum pump or other such device which applies a vacuum pressure throughout the vacuum tube 26. At its opposite ends, as exemplified by the connection to the left-hand end of the vacuum tube 26 as shown in FIG. 1, the vacuum tube 26 is mounted on a support bracket 28 including a bearing 30. Support bracket 28 is in turn appropriately operatively connected to a crank shaft or other such mechanical device which is effective in actuating the support bracket 28 through movement from a position, as illustrated in FIG. 1, above the operating stations 24a-c, etc., to a position above the conveyor 14 as illustrated in FIG. 3. In addition to this degree of movement, the vacuum tube 26 also has appropriately connected to one end thereof, as at 26a, a bracket 32 connected to a rod 34 which also is advantageously actuated through movement by rotation of a cam or crank shaft. Actuation of this mechanical linkage to the vacuum tube 26 is effective to rotate the tube 26 in the bearing supports 30 of the support arms 28 in a direction lowering any structure mounted on the vacuum tube 26 into a proximate position with the sheets 22 at the various operating stations. This facilitates sheet pick-up and is useful in facilitating the deposit or release of the picked-up sheet onto the conveyor 14.

As is perhaps best shown in FIG. 2, to which attention is now directed in conjunction with FIGS. 1, 3, there is appropriately located at each of the operating stations 24a, 24b a spaced pair of identically constructed vacuum-operated pick-up devices 36. Each pick-up device 36 may be of the type which is conventional for collating machines 10 and includes a cylindrical body 36a which has a connection at one end to a hose 36b connected, in turn, to a suitable fixture 36c on the vacuum tube 26 such that vacuum applied through the tube 26 is effectively applied through the fixture 36a. Slidably disposed in the fixture 36a is a valve body 36d terminating in a suction cup structure 36e and which, in response to the applied vacuum pressure, is telescoped within the fixture 36a as illustrated in full line in FIG. 2. In response to a cut-off of the vacuum pressure, the valve body 36d falls by gravity into an extended position as illustrated in phantom perspective in FIG. 2.

Each pick-up device 36 is mounted on the vacuum tube 26 by a supporting arm 38 having a bearing mounting 40 to the tube 26 so that rotative adjustments in the relative position of the arm 38 about the tube 26 are possible. As is generally understood in the operation of a conventional collating machine 10, a stack of sheets S are appropriately supported on a support panel 42 and are biased under spring urgency in an upward direction against a transversely extending arm of an L-shaped bar 46 which maintains the level of the stack of sheets S. Blower tubes 48 and 50 have exit openings therein advantageously located adjacent the predetermined level of the upper sheet of each stack S through which air streams are directed against and are effective to cause sheet separation to facilitate the picking of the top sheet 22 from the stack S. Thus, the normal functioning of the collating machine 10 the vacuum tube 26 when in position over the operating stations 24a, 24b is rotated in its bearing support in a direction which lowers the pick-up devices 36 into a proximate position above the stacks S and simultaneously therewith a vacuum pressure is applied through the pick-up devices 36. This results in the top sheet 22 of the stack, in response to the applied vacuum pressure, being lifted from a topmost position on the stack and moving therefrom through a lifting movement L into engagement with the suction cups 36e of each of the pick-up devices 36. In other words during the normal functioning of the collating machine 10, the pick-up devices 36 actually never contact the topmost

sheet 22 of a stack, but rather the topmost sheet 22 moves from the stack into engagement with each suction cup 36e, each valve body 36d at this time being in its raised position within the valve body 36a.

Coordinated to the functioning of a collating machine 10 as just described, is the glueing attachment 12 of the present invention which is effective to cause a small quantity or spot of glue, of an appropriate adhesive character, to be deposited along an edge of a picked sheet 22 and in this manner maintain the collated arrangement of a typical arrangement 22a of sheets which are deposited on the conveyor 14. The glueing attachments 12 are provided at each of the operating stations 24a, 24b, etc. but not at the operating station 24c adjacent the discharge point 14a. Each such attachment is identically constructed and includes a pair of glue depositing devices 52 spaced apart from each other and located between the spaced apart pick-up devices 36. Each pick-up device 52, in a preferred embodiment as illustrated herein, includes a tubular body 54 having a connection at one end to a hose 56 which is connected, in turn, to a suitable glue-reservoir or storage container 58. The container 58 is appropriately supported in an elevated position on a bracket 59 which may be bolted, as at 60, to one of the support arms of one of the devices 52 for gravity flow of the glue therefrom. At the lower or free end of the tubular body 54, and as is best shown in FIG. 4, there is a closure element 62 which is threadably engageable, as at 64 to the tubular body 54 and has a valve seat 66 in the end wall thereof which, in practice, is disposed in facing relation to the stack of sheets S at each of the operating stations 24a, 24b. A valve 68, in the form of a ball, normally seats in the valve seat 66 under the urgency of a valve spring 70, this spring urgency being of a low magnitude which is easily overcome by the vacuum urging a topmost sheet 22 through the previously described lift movement L against the valve 68. More particularly, a topmost sheet 22 as a result of the lift movement L comes into engagement with the spaced apart suction cups 36e and is effective to make contact with the lower extending portion of each of the valve balls 68. In so doing, the sheet 22 displaces each valve ball 68 inwardly of the closure element 62 to thereby open up the valve opening bounded by the valve seat 66. When this occurs, a controlled amount of glue passes through the valve seat opening 66 and is deposited on the topmost sheet 22. This deposit of glue is effective to maintain the collated arrangement of the sheets 22 and is a vast improvement over staples or other mechanical means heretofore used to achieve this result.

From the foregoing it will be seen that the deposit of glue upon each topmost sheet 22 which is effectively made by each of the glue-depositing devices 52 is accomplished at a time when the topmost sheet 22 has already been lifted from the stack S. Accordingly, this deposit of glue cannot seep through the body of the topmost sheet and inadvertently cause attachment of adjacent sheets of the stack S which are below the topmost sheet 22, or in any other way adversely effect the ability of the pick-up devices 36 to lift only one sheet from the stack S as is required in the operation of the collating machine 10.

Further in accordance with the present invention, each glue-depositing device 52 is supported from the vacuum tube 26 in support structure which does not restrict in any manner the specific location of the terminal ends of each of the tubular bodies 54. It will be appreciated that the location of these glue-depositing ends or, more particularly, each ball valve 68 relative to the edge of the paper which is being picked by the pick-up devices 36 is the factor which determines the precise location on the picked up sheet where the glue deposits will be made. Thus, in the illustrated embodiment, each tubular body 54 is engaged in a suitable clamp 72 which includes a rod extension 74 terminating in a ball 76 which is ac-

commodated in an appropriate spherical socket between two halves 78a and 78b in the supporting arm 78 which mounts each glue-depositing device 52. As in the case of the supporting arm for the pick-up device 36, each supporting arm 78 has appropriate bearing surfaces 80 in actual engagement with the vacuum tube 26 so that rotational movement is possible therebetween to fix any desired position in the supporting arm 78 relative to the vacuum tube 26. Thus, by appropriately moving the supporting arm 78 in rotation about the vacuum tube 26 and also axially along the longitudinal axis of the tube, and also by moving the tubular body 54 in the degrees of movement afforded by the universal mounting of the clamp 72 in the supporting arm 78, it is possible to provide any desired position to the ball valve 68 relative to the sheet of paper which is to be picked up so that the deposit of glue is made in any location desired on this sheet. As is best shown in FIG. 2, in order to insure that the ball valve 68 will be displaced from the valve seat 66 at the end of the lift movement L of a sheet 22, each of the ball valves as is shown in FIG. 2 should extend slightly below the suction caps 36e of the pick-up device 36 in the telescoped or lifted position of the valve bodies 36d within to the fixture 36a. Thus, a picked up sheet 22 which is extended between the two suction caps 36e in a fairly taut condition can not fail to exert an inward pressure against the ball valve 68 thereby opening up the valve opening 66 and permitting a controlled quantity of glue to be deposited on the sheet 22.

Any one of several types of commercially available glues may be effectively used in the glue attachment 12 of the present invention. The glue that is used should flow readily, should not be too tacky and should have a retarding drying agent therein such that the adhesive attachment is not completed until after about one and a half hours. This retarded drying of the glue will permit the collated sheet arrangement 22a to be adjusted, as is usually the case, at the machine discharge point 14a so that all the sheets are in proper alignment with each other before the glue actually takes effect and maintains the collated arrangement of the sheets. One such commercially available adhesive which has performed satisfactorily with the glueing attachment 12 of the present invention is an adhesive designated "28-252" and available from American Adhesive Manufacturing Co., Inc. of Brooklyn, N.Y.

A further noteworthy feature in the functioning of the glueing attachment 12 hereof resides in the fact that during the transfer of a picked-up sheet from above a stack of sheets S to a location above the conveyor 14 and preparatory to being deposited thereon, the transported sheet 22 displaces the ball valve 68 as it must to permit controlled flow of glue therefrom, and also during this time the sheet itself functions as a closure for the valve opening 66 so that the non-viscous glue does not flow onto the equipment or in any other way produce any adverse conditions. Thus the glueing attachment 12 hereof coordinates efficiently with the normal functioning of a collating machine in providing deposits of glue as a replacement for staples and other mechanical means for maintaining the collated arrangement of sheet arrangements 22a which are deposited on the machine conveyor 14, and further does not in any way adversely detract from the normal functioning of the machine.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What is claimed is:

1. A glueing attachment for a collating machine of the type having a conveyor, means located adjacent said conveyor defining plural stations for storing stacks of

sheets adapted to be placed on said conveyor in a collated arrangement and sheet-transfer means at each said station for transferring individual sheets from said stacks to said conveyor including a pair of spaced picking fingers operatively connected to a vacuum and effective to draw the topmost sheet of a stack through a prescribed lift movement against said picking fingers in response to the application of said vacuum through said picking fingers, said glueing attachment being operatively associated with at least some of said sheet-transfer means and comprising glue-applying means located adjacent to said spaced picking fingers and having an exit opening therein operatively arranged in facing relation to said topmost sheet of said stacks and flow-control means in said exit opening effective to be actuated by contact of said sheet during said prescribed lift movement thereof into an operative position permitting a controlled flow of glue from said exit opening onto said sheet for maintaining the collated arrangement of said sheets which are transferred to said conveyor.

2. A glueing attachment as defined in claim 1 wherein said flow-control means extends a prescribed extent beyond said picking fingers in the direction of said topmost sheet to insure that during said prescribed lift movement of said sheet against said picking fingers that contact is made by said sheet against said flow-control means.

3. A glueing attachment as defined in claim 2 wherein said glue-applying means has at least two exit openings therein, each said exit opening being located adjacent a picking finger and of an extent which in cooperation with said flow-control means results in a comparatively small spot of glue being deposited at locations on said sheet making contact with said exit openings.

4. A glueing attachment as defined in claim 2 wherein there are at least two separate glue-applying means and said sheet-transfer means includes a support and rotatable mounting means thereon for said picking fingers and for each said glue-applying means such that by adjusting the orientation of said picking fingers and said glue-applying means the flow-control means of each said glue-applying means can be set in any adjusted position extending beyond said picking fingers.

5. A glueing attachment for a collating machine of the type having a conveyor, means located adjacent said conveyor defining plural stations for storing stacks of sheets adapted to be placed on said conveyor in a collated arrangement and sheet-transfer means at each said station for transferring individual sheets from said stacks to said conveyor including a support, a pair of spaced picking fingers mounted on said support operatively connected to a vacuum and effective to draw the topmost sheet of a stack through a prescribed lift movement against said picking fingers in response to the application of said vacuum through said picking fingers, said glueing attachment being operatively associated with at least some of said sheet-transfer means and comprising at least two glue-applying means each having a valve opening therein operatively arranged in facing relation to said topmost sheet of said stacks, rotatable mounting means for each said glue-applying means for mounting each on said support in a location between said picking fingers and in a predetermined angular orientation relative to said picking fingers and valve means operatively disposed in said valve openings and effective to be actuated by contact of said sheet during said prescribed lift movement thereof into an operative position opening said valve openings to permit a controlled flow of glue therefrom onto said sheet, said predetermined angular orientation of said glue-applying means being such as to position the valves thereof a predetermined extent beyond said picking fingers in the direction of the sheets to insure that during said prescribed lift movement said valves are actuated into their said operative positions.

6. A glueing attachment as defined in claim 5 wherein

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said valve openings are of an extent which in cooperation with said valves result in a comparatively small spot of glue being deposited at locations on said sheet making contact with said valve openings.

7. A glueing attachment as defined in claim 6 wherein 5
said valves are balls and including springs for normally biasing said balls into a seated position within said valve openings.

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