

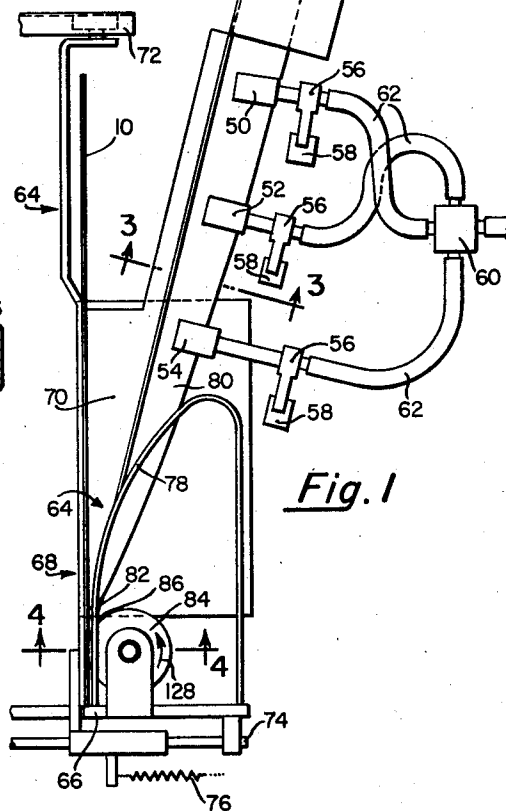
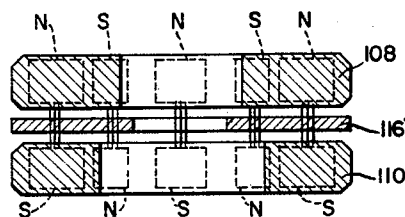
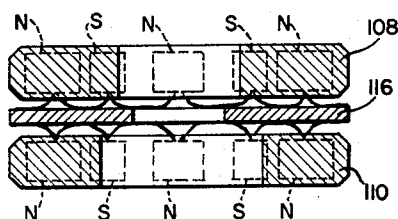
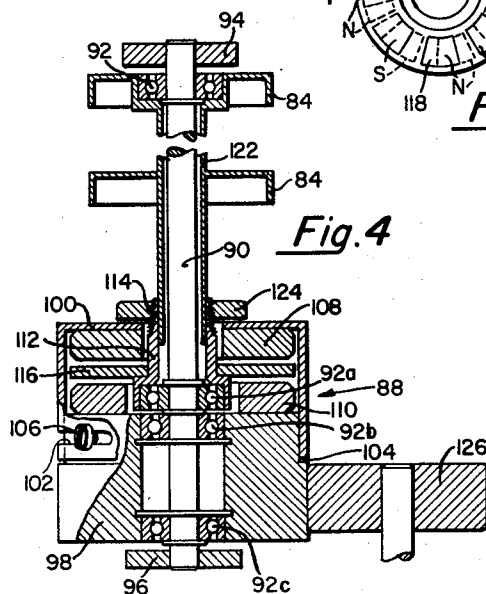
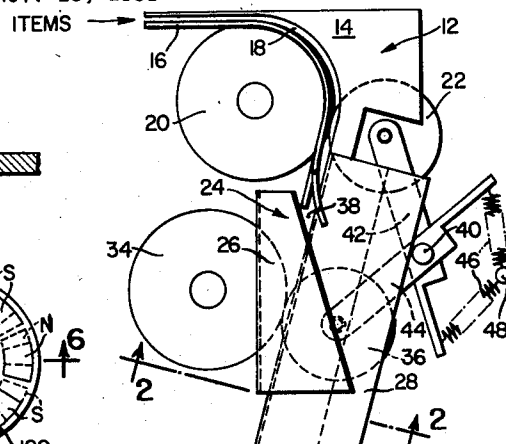
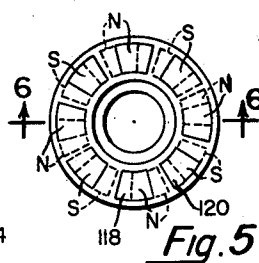
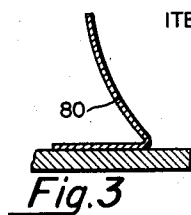
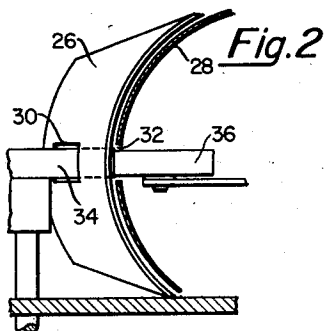
July 12, 1960

J. G. SMITH

2,944,813

DOCUMENT HANDLING APPARATUS

Filed Nov. 13, 1958



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1

2,944,813

DOCUMENT HANDLING APPARATUS

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Filed Nov. 13, 1958, Ser. No. 773,592

13 Claims. (Cl. 271-71)

This invention relates to document handling apparatus and, more particularly, to high speed means for automatically stacking and edge aligning documents.

In transporting documents of relatively thin material at extremely high speeds such as is performed with business machine document sorting apparatus, a considerable problem is involved due to air resistance. For example, thin paper checks which are of less width than length generally require considerable guidance during their movement otherwise there is a tendency for them to deflect, bend, weave or buckle due to the turbulence of air across their surfaces. Furthermore, when it is desired to stack such items in a receiving hopper or bin it has been found extremely difficult, after they leave the guide means, to prevent them from fluttering, which condition also tends to buckle, bend or deform them in a manner such that succeeding items may enter the stack of items out of order. Also, unless somehow restrained, the momentum of each item often is sufficient to cause it to bounce as it strikes the bottom or back portion of the receiving hopper.

It is an important object therefore of the present invention to provide apparatus which solves the foregoing problems in a novel, simple, efficient and economical manner.

It is a further important object of the present invention to provide an efficient stiffening and rigidifying apparatus for use with a document stacker which permits the items to be stacked at extremely high speed in sequence.

Another important object of the invention is to provide automatic apparatus for accurately and efficiently edge aligning the stacked items.

A still further object of the invention is to provide a novel apparatus for decelerating items entering a stacker at high speed in a manner preventing undesirable bounce and edge deformation of the items.

In accordance with the foregoing objects and first briefly described the invention comprises an automatic high speed document aligning and stacking apparatus comprising means for diverting a document out of its normal transport path into a document stiffening and rigidifying mechanism disposed adjacent the diverting means and adapted to inwardly bow and concave shape the item throughout its length. The item is then fed through the air to means for deflecting it sideways out of the path of succeeding items and into an edge aligning mechanism having means for frictionally engaging and decelerating the item and then moving the item into a hopper while simultaneously constraining the item from bouncing therefrom.

Other objects and advantages of the invention will become apparent from the following description of the preferred embodiment of the invention when taken in conjunction with the drawings which accompany and form part of the specification.

In the figures:

Fig. 1 is a top plan view of the preferred form of apparatus embodying the invention;

2

Fig. 2 is a sectional view taken along the line 2-2 of Fig. 1 showing the item stiffening and rigidifying means;

Fig. 3 is a sectional view taken along the line 3-3 of Fig. 1 showing the rigidifying extension;

Fig. 4 is a sectional view taken along the line 4-4 of Fig. 1 showing the item edge aligning drive and magnetic clutch control mechanism;

Fig. 5 is a diagrammatic view of the arrangement of the magnets of the device of Fig. 4; and,

Figs. 6 and 7 are diagrammatic views taken along line 6-6 of Fig. 5 showing the adjustability of the magnetic coupling of the edge aligning drive clutch mechanism.

The present invention finds application, for example, in a document sorter for processing items such as checks, deposit slips, etc. and, as is well known in the sorter art, such apparatus generally includes a plurality of item receiving hoppers, bins or pockets into which the documents are delivered at a relatively high rate of speed. Each bin or pocket is adapted to receive the items in a predetermined order or sequence and under sufficient momentum so that the items will terminate their travel well within the hopper thus preventing any misrouting thereof.

Documents such as paper checks, for example, have little dimensional stability or body rigidity. They are for the most part flexible, easily deformed or crumpled, and with all but the most careful handling, tend to waver, flutter and buckle due to air turbulence during transport. The preferred embodiment of the present invention contemplates moving such items edgewise from a loading hopper not shown, into an aligning stacker. The transport apparatus used herein, although not shown, provides means for supporting the upper and lower parallel edge portions of the item throughout its edgewise path of travel and may be of the type described and claimed in a copending U.S. patent application to Walter Hanstein, Serial No. 732,920, filed May 5, 1958, entitled "Magnetic Selection Apparatus," and assigned to the same assignee as the present invention.

Referring first to Fig. 1 of the drawing, items or documents to be stacked and aligned, e.g., checks 10, are transported at an extremely high rate of speed, by means not shown, into a turnout station 12. Arcuately shaped guide member 14 together with similarly arcuately shaped guide member 16, both members being disposed in parallel confronting relationship to one another, together form a narrow restricted passageway 18 into which the checks 10 are received and through which the latter are adapted to be passed. Drive roller 20 is disposed in peripheral contact with idler roller 22 adjacent said passageway and driven by conventional means not shown, is adapted, when rotated, to cause the check to be moved into and through the turnout station thereby diverting the check acutely out of its otherwise straight line path of movement.

Adjacent the aforementioned drive and idler rollers 20 and 22, in the turnout station, is located check curving and rigidifying means 24 comprising two curver members 26 and 28 angularly disposed with respect to each other and provided with individual apertures 30 and 32 (Fig. 2) therethrough. These apertures are located intermediate the ends of the respective curver members for the reception therethrough of drive rollers and idler rollers 34 and 36, respectively. Each curver member is inwardly bowed, concave or trough-shaped from side to side throughout its longest dimension, as shown most clearly in Fig. 2, for a purpose to be explained later on. The two curver members are angularly offset with respect to each other so as to form a funnel-shaped throat 38 adjacent the turnout station 12, into which the checks are received and from which they are obliged to pass. Deformed, torn or dog-eared checks leaving the turnout station are by means of this funnel-shaped throat

3

arrangement prevented from being caught or jammed up on the edge of either of the members 26 or 28.

Idler rollers 22 and 36 are jointly pivotally rockable on arms 42 and 46 about the fixed stud 40 and are biased into engagement with their respective drive rollers by means of the springs 46—46, opposite ends of each of which are secured to fixed stud 48. By means of these drive and idlers rollers positive control is thus exerted over the checks as they leave the straight line transport apparatus earlier referred to herein.

Checks entering the relatively narrow constricted passageway between the curved members 26 and 28 are transversely inwardly bowed and concave shaped so that the lengthwise edges thereof are placed in tension. The checks thus cannot buckle or bend lengthwise as a result of their high speed passage through the ambient air. The rightward curver member 28 extends for a short distance beyond the leftward curver member 26 in order to provide means for preventing the check from being accidentally deflected sideways out of its straight line path of movement.

The moving checks 10 are adapted to be stacked in sequence by means to be described later on. In advancing toward the stacking apparatus each check must follow the previously transported check in correct order or sequence. Since the checks are moving at approximately 400 inches per second, it is necessary, in order to prevent misorting, to move each check to one side, out of the way of the next incoming check.

To this end, as each check leaves the stiffening and rigidifying members 26 and 28 it is caused to be directed across a plurality of air nozzles 50, 52 and 54 arranged in a row parallel to the check path so as to project outwardly toward the inwardly bowed side of each incoming check. The nozzles, shown in Fig. 1 as individual unitary assemblies, may of course comprise other and different forms within the purview of the invention. As shown, however, each nozzle is adjustable by means of multiple swivel joints 56 and 58 so that the jets of air issuing therefrom can be caused to strike the upper, lower or middle portion of each check, as desired.

Air, under suitable pressure is fed from a pump or other air pressure source, not shown, to a connector-distributor member 60 from which point it is circulated by means of the hoses 62 to the respective individual nozzles. It is apparent that other and different arrangements and construction may be substituted for those shown for directing air into the check transport pathway all within the inventive concept herein set forth. The present arrangement is shown simply as one example of such means.

As the checks are forwarded across the area dominated by the nozzles, air under pressure is directed thereagainst so that the document which has been stiffened and substantially rigidified throughout its length by the inward bowing and concave shaping aforementioned, is deflected away from the nozzles and out of its straight line path of movement with a minimum amount of flutter or weaving.

Short narrow checks have so little inertia that if a relatively strong blast of air were to strike their surfaces they would be driven completely out of their line of movement toward the receiving hopper. Long wide checks are quite heavy by comparison and require a strong blast of air to move each one out of the path of the next succeeding check. Air pressure regulation for controlling the jets in such fashion that a low velocity of air stream is directed toward the small size checks while a high velocity of air stream is directed toward the large size checks is provided in a relatively simple, efficient and inexpensive fashion, by arranging the three nozzles in substantially parallel alignment as shown in Fig. 1, wherein, the leading nozzle 50 is vertically displaced above the other two. Air from all three nozzles thus blows against the larger checks due to their exten-

4

sive width whereas the lower two nozzles are effective to displace the short narrow checks. The leading nozzle is provided with an orifice not shown, adapted to produce the highest volume of air thus keeping the trailing edges of the heaviest check back out of the way of the incoming checks, while the other two nozzles 52 and 54, produce a lower volume of air so as to deflect the trailing edge of the small size checks. The checks in their bowed condition are thus adapted to be blown out of their normal path of movement by the jets of air.

It is apparent from the foregoing that each incoming check is thus presented to the stacking bin or hopper with a concave up bend lengthwise. This concave geometry prevents the air blasts from dipping the leading edge of a check into the trailing edges of previously stacked checks. This is a result of having the lengthwise edges of the incoming checks in tension, as earlier mentioned. Thus they cannot buckle. The initial contact of the incoming check with the previously stacked checks or with the back up plate if no checks have previously been sorted, takes place on the lower forward edge thereof which upon contact with other checks for example, can buckle very easily since the lengthwise edges of the check are now placed in compression.

Since the air jets push the trailing edge of each check back out of the way of the next incoming check, it is apparent that the contact point of the incoming check with other checks or the back up plate is well forward of the trailing edge of any previously stacked checks. Thus there is provided a novel means for feeding checks in rapid sequence into a stacking mechanism without overlapping or misorting any check in between other previously sorted checks.

The stacker and aligning apparatus of the present invention generally comprises a document receiving hopper 64 formed by means of the base plate 66 and the movable back up member 68 to which is secured the bottom plate 70. The hopper area is of varying extent since the back up member is mounted for movement back and forth along guide members 72 and 74. Thus the pocket or bin is adapted to expand and contract as the number of sorted items increases or decreases during machine operation. The back up plate 68 is biased rightwardly (Fig. 1) by any suitable means such as the spring 76. In this manner a slight but even pressure is applied through the back up plate member against the stack of checks.

The rightward portion of the hopper includes an inverted U-shaped deflection member 78 attached at both ends to the base plate 66 and disposed adjacent and tangent to the forward extension 80 of the curver member 28. Member 80 tapers from an arcuate shape at the end of the curver member 28 to a substantially perpendicularly disposed flat configuration as at 82 where it joins the member 78 at the hopper base plate 66. Means is thus provided for assuring that the checks will terminate their travel in a substantially vertical, on edge position.

Final deceleration and accurate automatic edge aligning of each document with other documents is performed at the stacking hopper by means of a plurality of movable aligning rollers 84 which are adapted to project through respective individual apertures 86 in the deflection member 78 so as to be positioned in confronting relationship to the incoming documents.

In order to avoid the effects of abrasive wear on the stacked checks, as would be the case with constantly rotating aligning members, the automatic edge aligner and stacker of the present invention utilizes a hysteresis type clutch mechanism operatively associated with the aforementioned alignment rollers 84, as will be more fully set forth hereinafter.

Referring now to Fig. 4, there is shown a sectional side elevational view of the hysteresis clutch control mechanism 88 wherein a central shaft 90 supported for rotation on bearings 92 strategically located along its

length is disposed between oppositely situated support members 94 and 96. A hollow annular body member 98 is rotatable relative to the shaft 90 on bearings 92a, 92b and 92c. A cup-like member 100 having an elongated aperture or slot 102 in one portion thereof is adapted to fit down over the shaft and to engage the periphery of the body member 98 so as to rest on the shoulder 104 on the latter. The cup-like member 100 is thus rotatable circumferentially with respect to the body member 98 by an amount substantially equivalent to the length of the slot 102. The screw 106 permits the rotative adjustment between members 98 and 100 to be fixed once the degree of rotation of the member 100 is ascertained.

Upper and lower annular magnetic members 108 and 110 respectively are disposed in confronting parallel relationship defining an air gap therebetween with shaft 90 projecting through and beyond these members as shown. The upper magnetic member 108 is secured to the member 100 while the lower magnetic member 110 is secured to the member 98. A collar 112 suitably supported by means of the bearings 92a surrounding shaft 90 is provided with a threaded portion 114 and carries an annular flange 116 of cobalt steel or other similar magnetizable material of substantially the same circumferential dimensions as the magnetic members 108 and 110 but slightly thinner in cross section.

Each of the magnetic members 108 and 110 is provided with a plurality of north poles 118 and south poles 120 circumferentially alternately arranged about each annular magnetic member as shown in Fig. 5. The number of such poles shown to be eight herein, is simply a matter of design. Other and varied numbers of poles are within the scope of the present invention.

For ease in fabrication and assembly the alignment rollers 84 are distributed in spaced apart relationship along a hollow tubular member 122 which surrounds shaft 90 throughout the greater portion of its length and is wedged into the collar 122 and secured thereupon by means of the nut 124, engaging the threaded portion 114 thereof. It is apparent from the foregoing that when the cobalt member 116 is revolved in a manner to be explained presently, alignment rollers 84 will also revolve. The periphery of each roller 84 is provided with a material having a suitable coefficient of friction relative to the document material such that the rollers may, when engaging the documents drive them into the pocket or bin without appreciable slippage.

As earlier mentioned herein, each of the magnetic members 108 and 110 are provided with a plurality of alternate north and south magnetic poles, which are disposed circumferentially and radially of each member, Fig. 5. Adjustment of the polar displacement and/or alignment of the two sets of confronting magnetic poles is simply and easily accomplished by rotation of the upper movable member 100 clockwise or counterclockwise within the rotational limits provided by the slot 102. In order to produce maximum flux density in the area of the pole pieces the annulus 116 is made of magnetically permeable, high hysteresis loss material and preferably of a material requiring a relatively low field intensity to produce this loss. It is preferable to employ a cobalt steel alloy, for this purpose as before mentioned although it is to be understood that any high hysteresis loss material could be used. The torque output of the present apparatus is theoretically independent of the rotational speed of the clutch magnets 108 and 110 being dependent only on the hysteresis loss of the material used for the annulus, the volume of the material and the number of poles thereon.

It will be seen thus far in the description that the two sections of the magnetic field producing body, i.e., the portions carrying the two magnets 108 and 110 mechanically coupled as shown in Fig. 4, are adapted to be rotated together by a capstan 126 and will produce

a rotating magnetic field across the air gap defined by the poles of each magnet. Since the annulus 116 is interposed in the air gap, it is magnetically coupled to rotating magnets 108 and 110 and thus transmits the torque to the alignment rollers 84 via the roller supporting tubular sleeve 122.

Referring to Figs. 6 and 7 it should be apparent that for a given arrangement embodying the foregoing factors, the maximum torque output will be obtained when magnet 108 is so oriented relative to magnet 110 that the poles of magnet 108 are opposite or are aligned with the opposite poles of magnet 110 with the result that the two magnets cooperate and assist each other in establishing a magnetic field, the lines of force of which pass through the annulus 116 (Fig. 7). Minimum torque output is obtained when the magnet 108 is rotated to the limits of the slot 102 in the direction such that each pole of magnet 108 is opposite a like pole of magnet 110. In this position (Fig. 6) the two magnets oppose each other and establish separate magnetic fields which are substantially outside the annulus 116. It should be clear therefore that the magnets will assist or oppose each other more or less, depending on their relative position and the effective field strength resulting from such relationship.

Utilization of the hysteresis clutch arrangement with the aligner-stacker of the present invention produces a relatively low inertia device such that with the capstan 126 revolving and driving the two magnets 108 and 110 and thus the alignment rollers 84 through the annulus 116, rollers 84 are urged in a counterclockwise direction, arrow 128, Fig. 1. However, assuming checks to be fully within the hopper, since these checks are motionless, the coefficient of friction between the surface of the last stacked check and the alignment rollers 84 is greater than the input torque of the hysteresis clutch assembly so that the alignment rollers stop revolving.

When the next incoming check arrives or enters the stacker-aligner it has a certain forward momentum due to its extremely high speed. This forward speed is imparted to the alignment rollers 84 which being part of the low inertia system cannot instantaneously accelerate to this high speed of rotation and thus the rollers exert a stopping or braking force on the incoming check. Since the coefficient of friction between the check interfaces is less than that between the check surface and the alignment rollers, the alignment rollers now drive the check at a reduced speed, further into the stacking hopper until the check bottoms without bouncing against the back plate 66 and is retained thereagainst in exact edge alignment with the other checks previously stacked therein.

The overall operation of the present invention generally is as follows: checks 10 of the same size or of varying widths, lengths and thicknesses are transported one at a time to the turnout station 12 where each check is deflected at an acute angle into the funnel shaped throat opening formed between the two curver members 26 and 28. These trough-shaped members deform and bow the check inwardly about its longer dimension so as to give it a concave bend. This structural configuration stiffens and rigidifies the check throughout its length. The check is then driven forwardly by means of the rollers 20 and 34 along the concave guide member 80 into the deflection area where due to its crosswise concave shape it is easily moved out of its normal straight line path of movement. The plurality of air jets located in the area to which the check is advanced deflect the trailing edge of the check so that the check in its forward travel toward the stacking aligning mechanism is moved out of the path of the next succeeding check. At the stacker aligner the leading edge of the check is caused to slidably contact the surface of the last stacked item. This contact tends to flatten the check against the surface of the already stacked item and to place the sides of the checks in compression so it is now easily deformed

out of its concave bent shape into a flat condition. The check is decelerated by the stationary aligning wheels. However, the forward momentum is of sufficient force to cause the aligning wheels slowly to rotate after which the hysteresis clutch mechanism becomes operative causing the wheels 84 to rotate and drive the check further into the hopper until the leading edge bottoms against the back plate of the hopper to cause the check to be automatically accurately aligned with other checks previously stacked in the aligning stacking hopper at which time wheels 84 stop.

What is claimed is:

1. Document handling apparatus comprising, means forming a throat for curvilinearly rigidifying a document, means adjacent said throat adapted to transport the document through said throat, means for deflecting said document out of its path of movement after it leaves said throat, and arresting means for said document, said arresting means including a fixed member, a plurality of rotatable members frictionally engageable with said document, a source of constant torque for rotating said rotatable members, a magnetic clutch for magnetically coupling said source of constant torque and said rotatable members to overcome said magnetic coupling thus normally to hold said rotatable members against rotation until a document is received, thus to decelerate said document and subsequently move it slowly against said fixed member.

2. Document handling apparatus of the class described comprising, means forming a throat through which documents can be passed, said throat forming means including a plurality of trough shaped members disposed in parallel side by side arrangement, means adjacent said trough shaped members adapted to transport a document therebetween, a receiving hopper for said documents, a plurality of rotatable members located adjacent said hopper and being frictionally engageable with a surface portion of a document, said rotatable members being adapted upon rotation thereof to move said documents into said receiving hopper, a pair of opposed similar annular magnetic members rotatably disposed in spaced apart relation and forming an air gap therebetween, a magnetizable member disposed within said air gap and operatively coupled with said document moving members, the magnetic lines of force between said magnetic members magnetically coupling said magnetizable member to said magnetic members for conjoint rotation, and means for applying a constant torque to said magnetic members.

3. Document handling apparatus of the class described comprising, a hopper having a fixed bottom wall, means for feeding documents into said hopper at high speed, means in said hopper to decelerate each document and move it slowly against the bottom wall of said hopper, said last means including a magnetic driving member, a magnetic driven member, means magnetically coupling said driving member and said driven member, means to deflect the trailing portion of said document from its path of movement in said hopper and out of the path of the leading portion of subsequent documents fed into the hopper, and a source of constant torque operably coupled to said driven member for rotating the latter member at a constant speed.

4. Document handling apparatus of the class described comprising, means forming a throat for curvilinearly shaping and stiffening a document, document drive means adjacent said throat for causing a document to be transported through said throat, means adjacent said throat adapted to provide a pressure differential across the surface of a document for deflecting the document out of its path of movement after it leaves said throat, and arresting means for said document, said arresting means including means frictionally engageable with said document, a rotatable clutch including oppositely disposed magnetic members having an air gap therebetween, a

high permeability member disposed within said air gap, means to vary the magnetic field intensity between said magnetic members through said air gap such that the lines of flux passing from one magnetic member to the other magnetic member are in aiding direction varying the magnetic coupling between said high permeability member and said magnetic members to thereby provide a drag coefficient on the means frictionally engageable with said document.

5. Document handling apparatus comprising, means forming a concave trough like throat through which documents can be passed to be transversely bowed and stiffened, a document receiving hopper, drive means for transporting said documents from said throat to said hopper, a plurality of positionable pressure differential means disposed intermediate said throat and said hopper, means for coupling a source of high pressure air to said pressure differential means, a mechanism for aligning said documents within said hopper, an adjustable slidably movable back up member operatively associated with said aligning mechanism, said aligning mechanism including movable means for decelerating said documents to prevent said documents from rebounding from aligned positions within said hopper.

6. In a document handling apparatus the combination comprising, a trough shaped member for guiding and shaping a document, a drive roller disposed in confronting relation to said trough shaped member and adapted to transport a document therebetween so as to curvilinearly rigidify said document, means providing an extension of said trough shaped member adapted to further guide said document, high velocity low volume pressure differential means adjacent said extension, low velocity high volume pressure differential means also adjacent said extension, means for adjustably positioning said differential means with respect to the path of travel of said document, edge aligning means for said document, a magnetic clutch including a pair of driving members and a driven member disposed therebetween, means operatively connecting said edge aligning means with said driven member for conjoint movement therewith, means for adjusting the coupling between said driving member and said driven member so as to change the relative speed of the latter with respect to said document drive roller, and a source of constant torque connected to said magnetic clutch for rotating the same.

7. Document handling apparatus of the class described, comprising, a plurality of document curver members disposed in the path of travel of said documents and forming therebetween a concave throat adapted to transversely bow said documents, pairs of rotatable drive means in said throat, means biasing each pair of drive means together into peripheral engagement whereby said documents can be frictionally moved therebetween, a plurality of air pressure nozzles, means connecting said nozzles to a source of air under pressure, means curvilinearly guiding said documents from said curver members past said nozzles, a document receiving hopper, means in said hopper forming a movable back stop for said documents, a pair of magnetic members disposed in spaced relation forming an air gap therebetween, each of said members having a plurality of alternately radially arranged north and south magnetic poles, a rotatable member, one end of said member supporting a plurality of document decelerating and aligning rollers, the opposite end of said rotatable member being provided with a magnetizable member disposed for rotation within said air gap, means to align the north magnetic poles of one of said magnetic members with the south magnetic poles of the other one of said magnetic members so as to magnetically couple said magnetizable member therebetween.

8. Document handling apparatus of the class described comprising, means in the path of movement of a document adapted to arcuately curve said document from side to side along its length to thereby stiffen and rigidify

said document, a stacking mechanism provided with a movable backing member forming a document receiving hopper, said stacking mechanism including means slidably adjustable in a direction to accommodate a progressively increasing stack of documents, a plurality of movable document aligning means operatively associated with said stacking mechanism and engageable by said document, means to move said document from said stiffening means to said hopper, and adjustable means intermediate said document stiffening means and said stacking mechanism adapted to apply a pressure differential to said document to deflect the trailing edge thereof out of its path of movement and into said hopper.

9. Document handling apparatus of the class described comprising, means for providing a document with an inwardly bowed concave shape throughout its length thereby to longitudinally stiffen and rigidify said document, automatic document stacking and aligning means, said last means including a continuously rotatable drive member, a plurality of document aligning rollers, oppositely disposed magnetic members having an air gap therebetween and adapted when rotated to produce a rotating magnetic field the lines of force of which traverse said air gap, means connecting said magnetic members to said rotatable drive member for rotation therewith, a member of high permeability disposed for rotation within said air gap, means connecting said last named member to said stacking and aligning means for rotating the latter, means to vary the effective strength of the magnetic field within said air gap to effect a magnetic drag on said member within said air gap thus to retard the rotation of said stacking and aligning means, and pressure differential means intermediate said document stiffening means and said stacking and aligning means for deflecting said document into said stacking and aligning means.

10. Document handling apparatus comprising, in combination, a pair of arcuately curved shaping and guiding members, providing a path for a document, one of said members being acutely angled with respect to the other of said members, each of said members being provided with an aperture, a pair of feed rollers disposed adjacent said members, the peripheries of said feed rollers extending through said apertures into confronting driving engagement, a substantially arcuately shaped member extending away from one of said members and forming a continuation of said path, a document receiving hopper, a movable back plate for said hopper, means to guide said back plate for movement to and fro perpendicular to said pathway, a plurality of aligning rollers disposed adjacent said back plate adapted to engage said back plate when said hopper is empty, a hysteresis clutch operatively associated with said aligning rollers, said hysteresis clutch including a pair of magnetic members each having a similar plurality of alternate north and south pole segments, said magnetic members being disposed in spaced relation defining an air gap therebetween, a magnetizable member located in said air gap and operatively connected to said aligning rollers, means for displacing

said magnetic members relative to each other to cause the lines of flux generated by the north and south pole segments of the magnetic members to magnetically couple said magnetizable element therebetween for conjoint rotation, and drive means for applying a source of constant torque to said clutch.

11. Document handling apparatus comprising, means forming a throat for curvilinearly rigidifying a document, means adjacent said throat adapted to transport a document through said throat, means for deflecting said document out of its path of movement after it leaves said throat, a member frictionally engageable with said document, a pair of opposite rotatable annular magnetic members each having multiple north and south pole segments, an annular magnetizable member disposed between said magnetic members and adapted to be magnetically coupled thereto for conjoint rotation therewith, said magnetizable member being operatively connected to said member frictionally engageable with said document, means to rotate said magnetic members, and means to adjust the relative alignment of the north and south pole segments on opposite sides of said magnetizable member whereby to vary the magnetic coupling between said magnetic members and said magnetizable member thus to change the speed of rotation of said document engaging members.

12. Document handling apparatus comprising, a document guideway, means for moving documents through said guideway at high speed, a document receiving bin having an end wall, rotatable means within said bin, a movable element within said bin and biased into frictional contact with said rotatable means, drive means, a slip clutch for coupling said rotatable means to said drive means, said rotatable means normally being held inactive by its frictional contact with said movable element causing said clutch means to slip while said rotatable means is so held, and means for deflecting documents from said guideway into said bin with the leading edge portion of each document directed between the rotatable means and said movable element thus to effect deceleration of said document and to activate said clutch means to move said document gently to a stationary position with its leading edge against said end wall of the bin and wherein said document is between said rotatable means and said movable member and effective to stop rotation of said rotatable means.

13. A construction according to claim 12 and further including means for moving the trailing edge of said document out of the path of a subsequent document being deflected into said bin.

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