

April 12, 1955

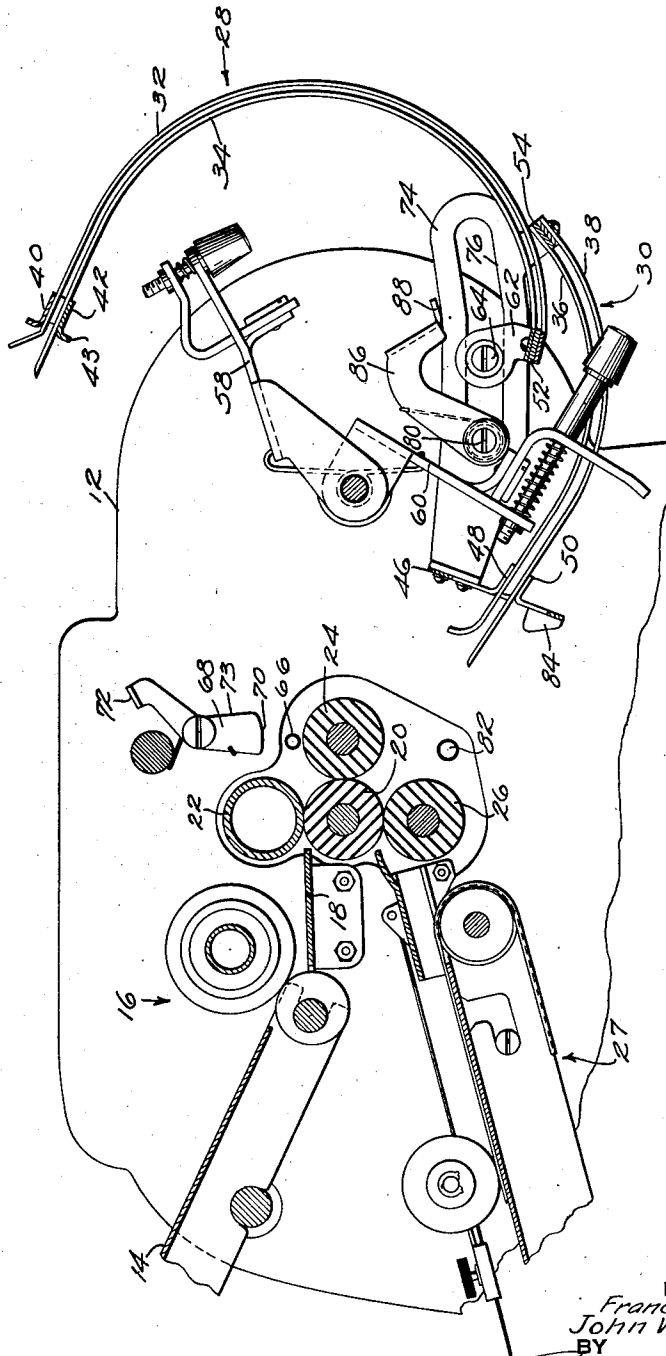
F. J. ROUAN ET AL
PIVOTALLY MOUNTED BUCKLE CHUTE
FOR SHEET FOLDING MACHINE

2,706,115

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2 Sheets-Sheet 1

Fig. 1



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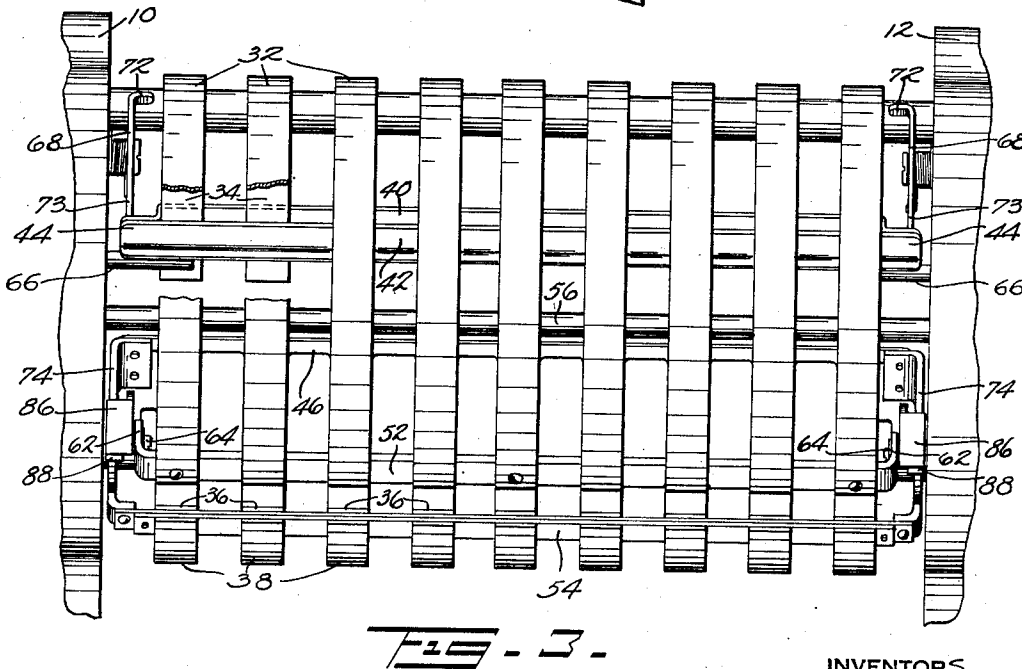
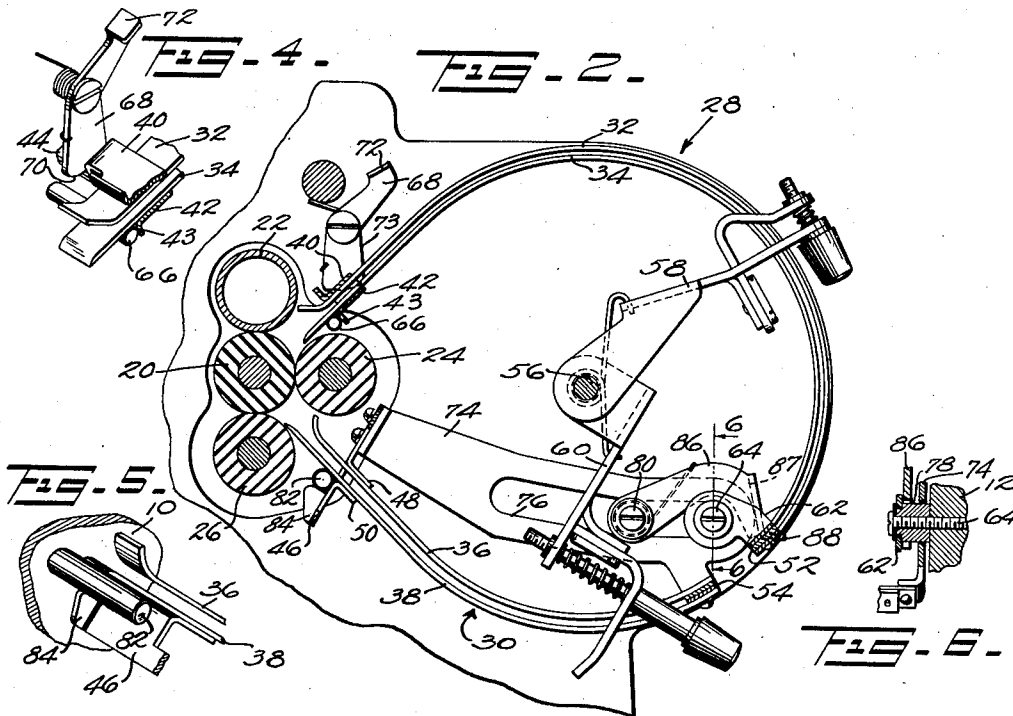
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PIVOTALLY MOUNTED BUCKLE CHUTE FOR SHEET FOLDING MACHINE

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8 Claims. (Cl. 270-68)

This invention relates to sheet folding machines, and particularly to arrangements providing for the ready clearing of jams in such folding machines when they occur.

The experience of workers in the paper handling art has been that any device in which paper is being rapidly moved is peculiarly subject to occasional jamming. While machines which are well designed and properly adjusted do not jam frequently, the variations possible in paper action due to humidity, paper composition, etc., are known to be so many that it is at least impractical to make provision for them all in the design of most machines or to be assured that only paper which operates the best will be used in the machine. It is accordingly advisable to provide a ready means for clearing jams with minimum effort when they occur.

Folding machines of the buckle chute type have been constructed for providing two transverse folds in a sheet. These machines normally include four rollers, and a pair of buckle chutes, one upper and one lower. In this type of machine it has been known to provide buckle chutes which are detachable bodily from the machine frame when a jam occurs, and are replaced after the jam has been cleared. The removal and replacement of these chutes, however, is an awkward operation calling for more mechanical skill than is usually expected of the ordinary clerk.

An object of the invention is to provide means whereby the ordinary clerk is capable of quickly clearing a jam and is accomplished by the provision of means whereby the buckle chute or chutes may be retracted for jam clearing without being detached from the machine.

A feature of the present invention is the complete dissociation, insofar as mechanical connection is concerned, of the buckle stops and the buckle chutes, so that when retraction of the buckle chutes is effected, said chutes normally move relative to and away from the buckle stops, thus permitting rapid adjustment of the chutes when a sheet folding jam occurs.

Still another important feature of the invention is the provision of retaining means or latches for holding the chutes in operative position which are manually releasable and automatically biased to catch and retain the chute in its operative position when returned thereto.

A further feature of this invention is the provision of means whereby each of the chutes is individually movable on the machine to jam-clearing position so that if the jam is in the upper chute the lower need not be disturbed.

For purposes of illustration and explanation the invention is shown in detail in its preferred form in the accompanying drawings, wherein:

Fig. 1 is a longitudinal section of the folding machine with the buckle chutes in retracted position;

Fig. 2 is a fragmentary section showing the right-hand end portion of the device of Fig. 1 with the buckle chutes in operative position;

Fig. 3 is a fragmentary end elevation taken from the right-hand end and looking towards the left in Fig. 2 with the buckle stops and folding rollers omitted, and with parts broken away for purposes of illustration;

Fig. 4 is a detail perspective view illustrating the catch means for positioning and retaining the inlet end of the upper buckle chute in operative position, and for releasing the same therefrom;

Fig. 5 is a detail perspective view illustrating the positioning and support means for the inlet end of the lower buckle chute when in operative position;

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Fig. 6 is a detail section taken on line 6-6 of Fig. 2.

Referring to the drawings in detail, the invention described herein relates to buckle chute folding machines and is described in detail with particular reference to a known type of four roller buckle chute folder for providing one or two transverse folds in a sheet of paper.

The machine is illustrated as including side frame elements 10 and 12, only the latter of which appears in the section of Fig. 1. Between these side elements is mounted a sheet supply holder and guide 14, a feed mechanism 16 of known construction for removing from the supply holder 14 one sheet at a time and thrusting the same forward to be operated upon, and a short guide plate 18 bridging the gap between the feeder 16 and the folding rollers. The folding rollers consist of a central or main feed roller 20, an upper or auxiliary press roller 22, a rear or first folding roller 24 and a bottom or second folding roller 26. The central roller 20 rotates clockwise as seen in Fig. 1 under the influence of a power source (not shown) and the other rollers are urged against roller 20 in a known manner. Sheets issuing from between rollers 20 and 26 are transported away to a collection point by stacking mechanism 27.

Referring now to Figs. 2 and 3 of the drawing, an upper curved buckle chute 28 is shown mounted between the side frame elements 10 and 12, and has its inlet end positioned between rollers 22 and 24 and opposite the discharge of roller pair 20, 22. Similarly, a lower curved buckle chute 30 extends between the side frame elements 24 and 26 and has its inlet positioned between rollers 24 and 26 and opposite the discharge of roller pair 20, 24. These buckle chutes are discontinuous across the machine, the upper chute including pairs of opposed curved strips 32, 34 spaced across the machine, and the lower chute including similar pairs of opposed curved strips 36, 38. A bar 40 extends across the machine and is connected to the upper surfaces of the strips 32 at their inlet ends to form a unit. A parallel bar 42 extends similarly across below the lower surfaces of the inlet ends of strips 34 to unite them. Bars 40 and 42 are connected at their ends, as shown in Figs. 3 and 4 to form laterally projecting locking ears 44, and to hold the strips 32, 34 forming the chute 28 properly spaced.

A somewhat similar arrangement is provided for the inlet ends of the bars of the lower buckle chute 30. Here a plate 46, which extends across the machine, is provided with integral and inwardly bent flange portions 48, 50 for connection with the strips of the lower buckle chute. The upper flange 48 is connected to the bars 36, and the lower flange 50 is connected to the bars 38.

The ends of the upper chute strips 32, 34, remote from their inlet ends, are spaced and connected by a bar 52 extending across the machine. A similar bar 54, shown in the drawing as consisting of a pair of strips, serves to space and connect the remote ends of the lower chute strips 36, 38.

From the foregoing description it can be seen that strips 32, 34 and bars 40, 42 and 52 are assembled to form the upper buckle chute 28, while strips 36, 38, plate 46 and bar 54 provide the lower buckle chute 30. It will be clear, especially from Fig. 2 that the buckle chutes 28 and 30 are arranged essentially on the circumference of a circle, the inlet ends only being straightened out in the direction of tangents to the circle. Due to this construction the buckle stops can be arranged for rotation about an axis near the center of the chute circle and hence require no additional means for guiding their movement along the buckle chutes, and can remain mechanically independent of the chutes. The buckle stop system includes a central shaft 56 which rotatably supports a series of upper stop arms 58 and a series of lower stop arms 60. The former operate in the slots formed between adjacent pairs of strips 32, 34 of the upper chute 28, while the latter operate in the slots formed between adjacent pairs of strips 36, 38 of the lower chute 30. Suitable means (not shown) are also provided for driving each series of stop arms to the desired radial position for use.

When a jam occurs, clearing of the same can be greatly facilitated by withdrawing the chutes from their positions in close proximity to the rollers. In order that the chutes

may be readily retracted for clearing jams, the present invention provides buckle chutes so mounted that they may be shifted to a retracted position without removal from the machine, and arranged, furthermore, for ready release merely by finger pressure on suitable catch members.

The movable mounting for the upper buckle chute 23, in the form of the invention herein disclosed as exemplary thereof, is a pivotal connection with the machine frame near that end of the chute remote from the inlet and consists of the bent ends of bar 52, which form ears 62, said ears being apertured and receiving pivot screws 64 which are mounted in the frame elements 10 and 12. The upper buckle chute 28 can, therefore, be swung about the common axis of screws 64 from the position of Fig. 2 to that of Fig. 1 and back. In order to position the inlet end of the buckle chute 23 properly as the same is returned to operative position, there are provided on the frame elements 10 and 12, inwardly projecting positioning studs 66 which are received in the corners formed between the endmost strips 34 and a depending flange 43 on the bar 42 (see Fig. 4) and which hold the inlet of the chute in proper position with relation to the discharge of rollers 20, 22. A pair of spring pressed catches or presser feet 68 cooperate, one with each of the studs 66 to clamp the chute thereagainst by overlying the ear 44 at the corresponding side of the chute. Each of the catches has a gradually sloping bottom surface 70 so arranged that the spring pressure will cam or wedge the catch against the ear 44 and thus prevent any looseness and rattling of the parts during use. Manually engageable portions 72 are provided for releasing the catches against the spring force to permit swinging of the chute 28 back to inoperative, access-permitting position. Each catch 68 preferably includes a surface 73 so shaped and positioned that the ear 44 will strike the same as the chute 28 is moving into operative position, will swing the catch 68 aside, and allow the catch to snap back automatically to locking position over the corresponding ear 44 when the chute 28 has moved to final operative position.

In the embodiment of the invention herein illustrated, the lower buckle chute 30, in order to provide substantial access from below and to reduce the possible interference with the upper chute, is preferably mounted for sliding movement, the ends of the chute being attached to upturned brackets 74 each connected at one of its ends with an end of the plate 46, and at its other end with an end of the bar 54. Each bracket 74 is provided with an elongate slot 76 which receives guide means mounted on the corresponding frame element 10 or 12. In the form of the invention illustrated the guide means provided at each frame element consists of a pair of sleeves, the sleeve 78 being mounted on the screw 64 and a similar sleeve (not shown) being held by another parallel screw 80. The length of slot 76 and the position of screws 64 and 80 are selected to provide suitable end stops for the sliding motion of the buckle chute 30. The lower buckle chute can therefore be slid from the position of Fig. 2 to that of Fig. 1, and back. In order to position the inlet end of the buckle chute properly and to hold the same firmly in operative position, there are provided, one on each of the frame elements 10 and 12, inwardly projecting positioning studs 82 which are received under the endmost strips 38 and between them and the upper edges of ears 84 turned out from the ends of plate 46 (see Fig. 5) to hold the inlet end of the chute 30 in proper relation to the discharge of rollers 20, 24. The lower chute 30 is retained in operative position by a pair of spring-pressed catches or presser feet 86 which are mounted on screws 80 and are urged downwardly so that they drop automatically over the outer ends of the brackets 74 when the latter are in their innermost or operative positions as seen in Fig. 2. The surfaces 87 of the catches 86 are given a slope such that they will tend to cam or wedge the brackets 74 toward the left in Fig. 2 and thus hold the lower buckle chute 30 firmly and without rattling during operation of the machine. The catches 86 are readily released for retraction of the chute 30 by upward pressure on the manually engageable portions 88 thereof.

In operation of the machine, when the paper goes askew, rumples or otherwise acts improperly causing a jam to occur, it is only necessary for the operator to release the two catches 68 and to swing back the chute 28, whereupon the jam may usually be cleared by upward withdrawal of the spoiled sheets. In some cases

access from the bottom of the machine may also be desirable to facilitate a quick clearing of the jam. Under such circumstances it is only necessary to move the two catches 86 upwardly and slide the chute 30 to retracted position. As shown in Fig. 1, ample access is thus provided to the jam area from both the top and bottom. It will also be seen that the chutes are retractable without reference to the position of and without interference with stop arms 58 and 60, and the latter can be adjusted as desired whether chutes 28 and 30 are in retracted or operative position. Merely returning the chutes to operative position causes catches 68 and 86, which are biased to operative position, to snap into retaining position and hold the chutes in place.

It will be seen from an inspection of Fig. 1 that the invention includes mounting both the upper buckle chute 28 and the lower buckle chute 30 in such manner as to provide retracting movement for each such that at least a substantial initial portion of the retracting movement is in a direction generally the same as that in which a sheet moves after entering the corresponding chute during normal folding operations. This provides for the speedy clearing of many jams, since a sheet which has been crumpled up into a chute will ordinarily be most readily withdrawn therefrom by a straightening pull in the opposite direction. Moving either of the chutes to retracted position will tend to have exactly this effect on such a crumpled sheet and will therefore, of itself, assist materially in rendering many jams less acute.

Another feature of the folding machine of the present invention is the provision of chute withdrawal mechanism which retains the chutes against removal from the machine, but which also avoids any interference with the operation of the folding rollers. When the parts are in the position of Fig. 1 with chutes retracted, the folding rollers 20, 22, 24 and 26 may be operated by hand or power to feed out any incorrectly folded sheets which might be caught between them. This arrangement therefore assists further in the speedy clearing of jams.

While in order to comply with the statute the invention is described in language which is rather specific as to structural features and arrangements, it is to be understood that the invention is not limited to the specific details shown, but that the means herein disclosed comprises the preferred of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the scope of the language employed in the appended claims.

Having described the invention, what is claimed is:

1. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; a slotted, curved buckle chute whose inlet is normally placed for operation adjacent the discharge of a coating pair of said rollers; buckle stop arms pivotally mounted on said frame independently of said chute and arranged to swing in the slots in said chute when the chute is in operative position; and means mounting said chute on said frame, for shifting movement such that its elements move in planes parallel to the planes in which said arms swing and the chute moves between said operative position and a retracted position with said inlet spaced from said rollers.

2. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; a slotted, curved buckle chute whose inlet is normally placed for operation adjacent the discharge of a coating pair of said rollers; buckle stop arms pivotally mounted on said frame independently of said chute and arranged to swing in the slots in said chute when the chute is in operative position; and means mounting said chute on said frame, for pivotal movement such that its elements swing in planes parallel to the planes in which said arms swing and the chute swings between said operative position and a retracted position with said inlet spaced from said rollers.

3. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; a slotted, curved buckle chute whose inlet is normally placed for operation adjacent the discharge of a coating pair of said rollers; buckle stop arms pivotally mounted on said frame independently of said chute and arranged to swing in the slots in said chute when the chute is in operative position; and means slidably mounting said chute on said frame, for shifting movement such that its elements move in planes par-

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allel to the planes in which said arms swing and the chute moves between said operative position and a retracted position with said inlet spaced from said rollers.

4. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; two curved buckle chutes arranged one above the other to form a substantially cylindrical enclosure, when in operative position, the upper buckle chute having an inlet end and an attachment end; means pivotally connecting said attachment end to said frame for swinging movement of said chute between its operative position in which said inlet end is adjacent the discharge of one coacting pair of said rollers, and an open, access-permitting position in which the inlet end is remote from said rollers; means on said frame for stopping the swinging of said upper chute towards operative position at the correct location, and for properly positioning the inlet end thereof with respect to said coacting roller pair; a manually releasable spring pressed catch arranged on said frame to be brushed aside by said upper chute in moving into operative position, and urged by its spring into a position positively retaining said chute in operative position when the chute is in contact with said stopping means, the lower buckle chute having an inlet end and an exterior end and carrying catch abutment means at the latter end; means slidably mounting said lower chute on said frame for movement between its operative position in which its inlet end is adjacent the discharge of another coacting pair of said rollers and an open, access-permitting position in which its inlet end is remote from said rollers; means on said frame for stopping the sliding of said lower chute towards operative position at the correct location, and for properly positioning the inlet end thereof with respect to said other coacting roller pair; and a manually releasable spring pressed catch mounted on said frame and so urged as to be automatically engageable with said catch abutment means when the lower chute is in operative position, for firmly retaining the chute in operative position until manually released.

5. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; two slotted curved buckle chutes arranged one above the other to form a substantially cylindrical enclosure, when in operative position, two sets of buckle stop arms pivotally mounted on said frame independently of said chutes with their pivotal axes substantially coincident and located substantially centrally of said enclosure, one set of arms being arranged to swing in the slots in said upper chute and the other set in the slots of said lower chute when said chutes are in operative position, the upper buckle chute having an inlet end and an attachment end; means pivotally connecting said attachment end to said frame for swinging movement of said chute such that its elements move in planes parallel to the planes in which said arms swing and the chute moves between its operative position in which said inlet end is adjacent the discharge of one coacting pair of said rollers, and an open, access-permitting position in which the inlet end is remote from said rollers; means on said frame for stopping the swinging of said upper chute towards operative position at the correct location, and for properly positioning the inlet end thereof with respect to said coacting roller pair; a manually releasable spring pressed catch arranged on said frame to be brushed aside by said upper chute in moving into operative position, and urged by its spring into a position positively retaining said chute in operative position when the chute is in contact with said stopping means; the lower buckle chute having an inlet end and an exterior end and carrying catch abutment means at the latter end; means slidably mounting said lower chute on said frame for movement such that its elements move in planes parallel to the planes in which said arms swing

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and the chute moves between its operative position in which its inlet end is adjacent the discharge of another coacting pair of said rollers and an open, access-permitting position in which its inlet end is remote from said rollers; means on said frame for stopping the sliding of said lower chute towards operative position at the correct location, and for properly positioning the inlet end thereof with respect to said other coacting roller pair; and a manually releasable spring pressed catch mounted on said frame and so urged as to be automatically engageable with said catch abutment means when the lower chute is in operative position, for firmly retaining the assembly in chute operative position until manually released.

6. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on substantially fixed axes on the frame and providing an insertion pair and a withdrawal pair; a buckle chute whose inlet is normally positioned for operation opposite the discharge of the insertion pair and adjacent the nip of said withdrawal pair; and means mounting said buckle chute on said frame for pivotal movement about an axis parallel to the plane defined by the portion of a sheet of paper entering the chute and spaced from said plane a distance at least equal to the distance that the foot of the perpendicular from said axis to said plane is spaced from the chute inlet, said axis lying to the chute side of a plane passing through the inlet and perpendicular to said sheet-defined plane.

7. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; a slotted buckle chute whose inlet is normally placed for operation adjacent the discharge of a coacting pair of said rollers; buckle stop arms movably mounted on said frame independently of said chute and arranged to operate back and forth in the slots in said chute when the chute is inoperative position; and means mounting said chute on said frame, for shifting movement such that its elements move in planes parallel to the planes in which said arms move and the chute moves between said operative position and a retracted position with said inlet spaced from said rollers.

8. A folding machine of the buckle folding type comprising a frame; a plurality of folding rollers mounted on said frame; a buckle chute whose inlet is normally placed for operation adjacent the discharge of a coacting pair of said rollers; and means pivotally mounting said buckle chute on said frame for movement between said operative position and a retracted position with said inlet spaced from said rollers, the pivotal axis of said mounting being generally lower than the center of gravity of the chute for all positions and in a location such that the center of gravity passes over the axis in going from operative to retracted position and vice versa, and the weight of the chute tends to hold the chute either in operative position or retracted position when placed in either one.

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