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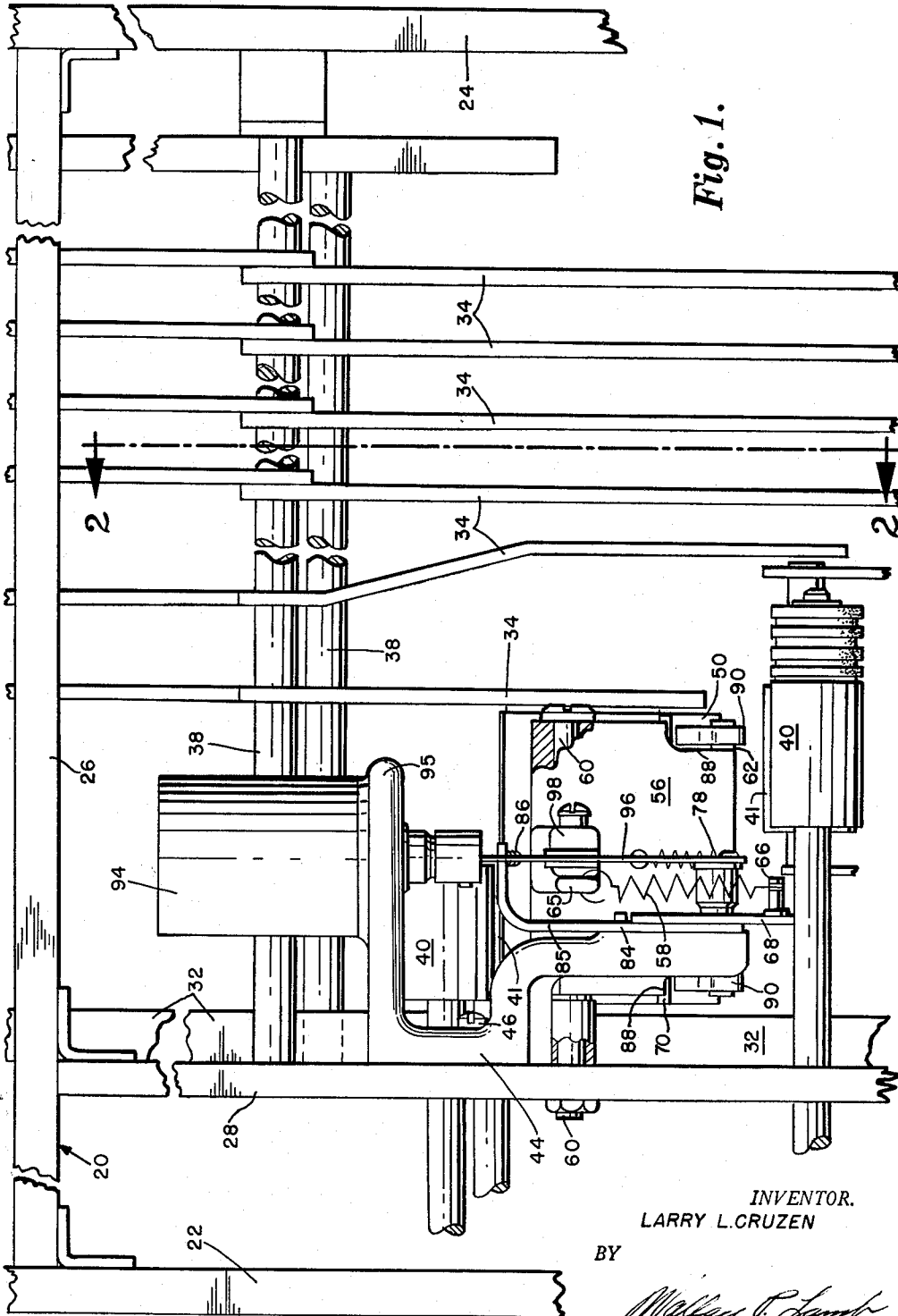
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3,098,648

SHEET STOPPING MECHANISM

Filed March 16, 1961

4 Sheets-Sheet 1



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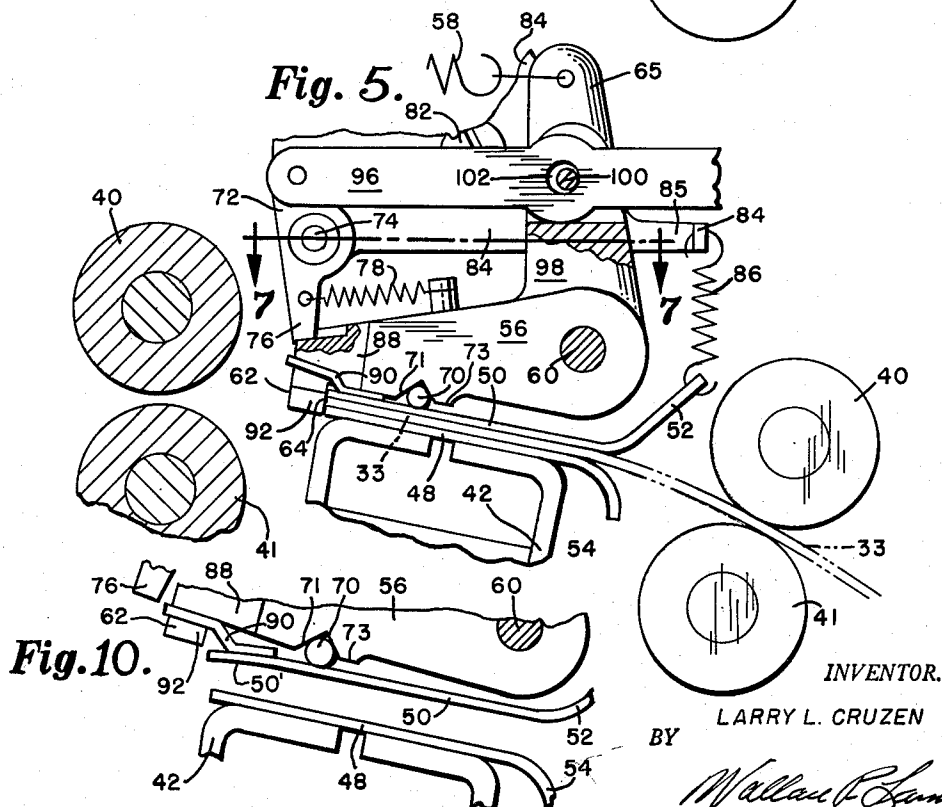
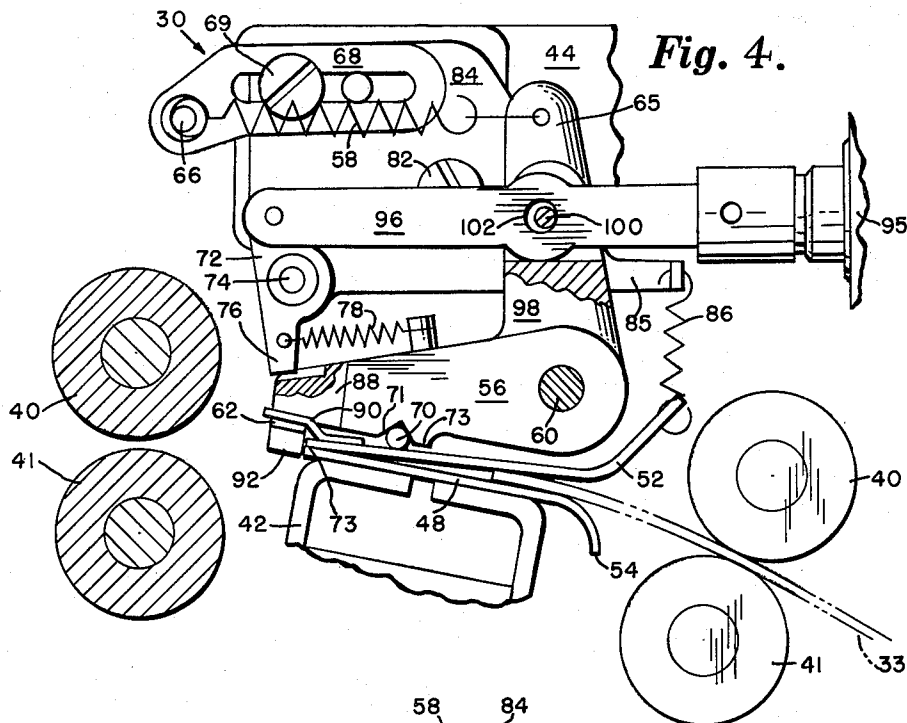
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4 Sheets-Sheet 3



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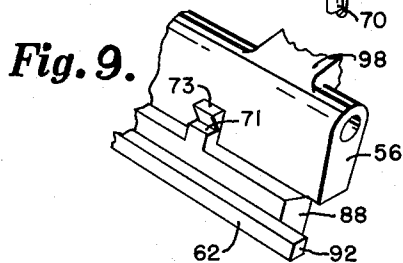
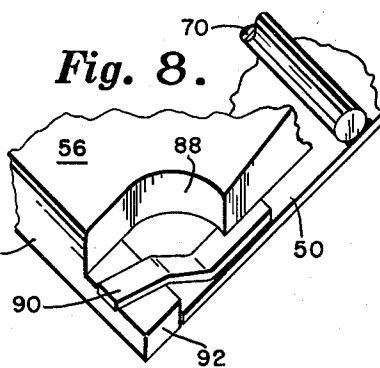
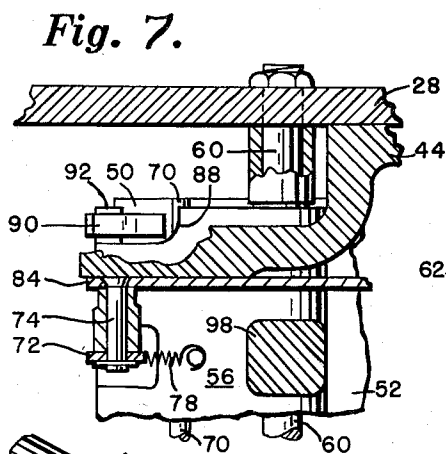
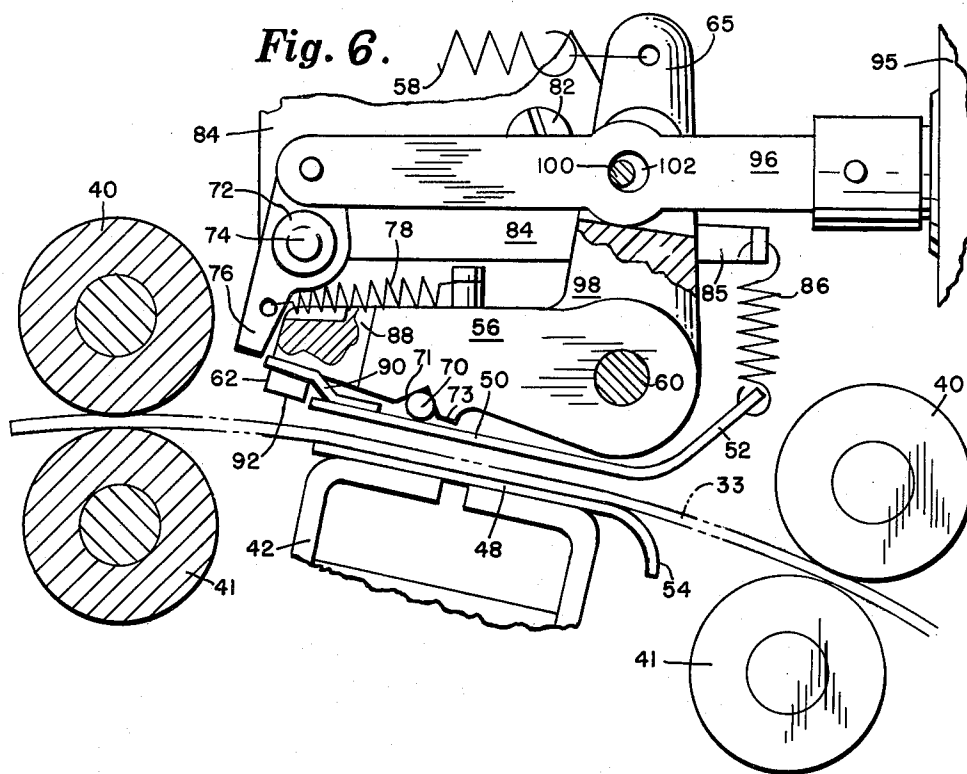
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SHEET STOPPING MECHANISM

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4 Sheets-Sheet 4



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3,098,648

SHEET STOPPING MECHANISM

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2 Claims. (Cl. 271-46)

This invention relates generally to high velocity sheet transporting apparatus and particularly to a sheet brake mechanism therefor.

One of the objects of my invention is to provide for high velocity sheet transporting apparatus, an improved brake mechanism for stopping a sheet at a station of the apparatus.

Another object of the invention is to provide for a high velocity sheet transporting apparatus, an improved card brake mechanism that will stop a sheet without afflicting appreciable damage thereto.

Another object of the invention is to provide an improved sheet brake mechanism of a character which will decelerate the sheet in a manner to effect smooth stopping of the card.

A further object of the invention resides in the provision of a brake mechanism of the above mentioned character embodying a quick release of the brake mechanism.

Other objects of the invention will become apparent from the following description, taken in connection with the accompanying drawings in which:

FIG. 1 is a fragmentary plan view of a sheet transporting apparatus and my sheet braking mechanism associated therewith;

FIG. 2 is a side view partly broken away and showing the operating parts in their normal or effective braking positions;

FIG. 3 is a vertical cross sectional view, partly in elevation, and taken along the line 3-3 of FIG. 2;

FIG. 4 is a vertical sectional view partly in elevation, taken along the line 4-4 of FIG. 3 and showing certain operating parts of the braking mechanism in the positions they assume at the beginning of sheet deceleration;

FIG. 5 is a view similar to FIG. 4, showing the positions of the brake mechanism operating parts when the sheet has been brought to a stop;

FIG. 6 is another view, similar to FIG. 4, showing the operating parts in the positions they assume to release the sheet;

FIG. 7 is a detail sectional view, taken along the line 7-7 of FIG. 5;

FIG. 8 is a fragmentary perspective view;

FIG. 9 is another fragmentary perspective view, and

FIG. 10 is a fragmentary side view of a modification.

Referring to the drawings by characters of reference there is shown a fragment of a sheet or ledger card transport apparatus including a frame type supporting structure 20 having oppositely disposed side plates 22 and 24 rigidly connected together by suitable cross members 26. Rigidly mounted on the frame structure 20, between the side plates 22 and 24, there is an upright supporting plate 28 on which my sheet brake mechanism, designated generally by the numeral 30, is mounted. Welded or otherwise suitably secured to the inner face of the mounting plate 28 there is a channel guide member 32 for side edge guiding of the sheets, one of which is shown in dot and dash lines and designated by numeral 33, FIGS. 4, 5 and 6. On the other side of the brake mechanism 30 from guide member 32, a number of laterally spaced upper guide members 34 and a number of similar laterally spaced lower guide members 36 cooperate with each other and with side edge guide mem-

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ber 32 to provide support and guidance for the sheets 33. As shown, the guide members 32, 34, and 36 guide the sheet through a desired path of travel including a sheet stopping station where the guideway is interrupted to receive my sheet brake mechanism 30. The guideway forming rails 34 and 36 may be supported and suitably spaced apart on cross rods 38 which may be mounted at the opposite ends thereof in plate 28 and side plate 24. Suitably spaced along the sheet guideway are pairs of sheet feeding rollers including upper drive rollers 40 and lower pressure rollers 41.

My sheet braking mechanism 30 has a lower supporting member or anvil 42 and an upper supporting member or bracket 44. The supporting member 42 and the bracket 44 are both mounted on the plate 28, respectively above and below the sheet guideway, the bracket being rigidly secured by screws 46 to the inner face of the plate 28.

As is shown more clearly in FIG. 2, the supporting member 42 has a brake member or plate 48 affixed flat to the top thereof such that the upper surface of plate 48 substantially aligns with the upper edges of the lower guideway forming rails 36. In general, the sheet braking mechanism comprises the stationary braking plate 48 and a floating pressure plate 50, the latter overlying the former in broadside relationship thereto. The forward edges of the plates 48 and 50, with respect to the direction of travel of the sheets, are flared outwardly away from each other, as at 52 and 54 respectively, to form a guide or pilot entrance for directing the leading edge of a sheet between the brake plates.

Overlying the pressure plate 50 there is a movable thrust transmitting member 56 which operatively connects the pressure plate 50 with a thrust member or helical coil spring 58 that is adjustably tensioned and applies the braking force to decelerate a sheet passing between plates 48 and 50. Normally, the force exerted by the spring 58 holds the pressure plate 50 flat against the cooperating brake plate 48, as shown in FIG. 2.

As seen in the plan view of FIG. 1, the thrust transmitting member 56 is preferably of general rectangular shape and is pivoted on a fixed shaft 60 which extends transversely of the pressure plate 50, the shaft being mounted at one end thereof in and to the bracket 44. From the shaft 60, adjacent the forward edge of the pressure plate 50, the thrust transmitting member extends rearwardly and has a free end overhanging the rear edge of the pressure plate. On the free end of the force transmitting member 56, I provide a sheet stop member 62 in the form of a depending flange which normally overlies and closes the sheet exit, as at 64, of the brake plates 48 and 50 providing a bumper for the leading edge of a sheet. The thrust transmitting member 56 includes an upwardly extending lever arm 65 which is connected to one end of the spring 58. The other end of the spring 58 is preferably anchored by a pin 66 to an adjustment member 68 which is securable in desired adjusted position to the bracket 44, by a screw 69.

In order to receive a sheet between plates 48 and 50, the pressure plate 50 is fulcrumed on the underside of the force transmitting member 56, the plate being provided with a bearing member or pin 70 engaging in a fulcrum or socket 71 in the force transmitting member. As shown, the pin 70 extends transversely with respect to the sheet guideway or parallel with the shaft 60, and may be welded, or be otherwise secured onto the upper surface of the pressure plate 50. In addition to functioning as a bearing member, the pin 70 also functions as a locator in cooperation with the socket 71 to locate the pressure plate 50 against movement fore and aft. The pin receiving socket 71 (see FIG. 9) is preferably a V-shaped socket formed in a boss 73 on the underside of the force transmitting mem-

ber 56, the boss being located substantially midway of the side edges of member 56. The pin 70 is located closer to the rear edge of the pressure plate 50 than to the front edge to provide a leverage advantage at the sheet entrance to the plates 48 and 50. That is, the lever arm from the fulcrum pin 70 to the forward edge of the pressure plate 60 is greater than the distance from the pin 70 to the rear edge of the pressure plate 50 so that the effective braking force on a sheet passing under plate 50 gradually increases and reaches a maximum when the sheet passes under the pin 70. The rear edge of the pressure plate 50 fulcrums, as at 73, on the plate 48, the pressure plate being pivoted by the entrance of a sheet between the plates, as illustrated in FIG. 4.

In order to insure that the thrust transmitting member 56 will normally remain in brake applying position against the force of a sheet traveling at high velocity as the braking action is applied thereto, I provide a latch member 72 which normally latches the thrust transmitting member in its effective or "down" position, as shown in FIG. 2. The latch member 72 is pivoted on a stub shaft 74, directly above the free end of the thrust transmitting member 56 and has a downwardly directed latch arm 76, the lower end of which engages the upper surface of the thrust transmitting member 56. A spring 78 urges the latch member 72 to latched position. As shown more clearly in FIG. 7, the stub shaft 74 is fixed at one end thereof to a sheet metal bracket 84 which in turn is adjustably secured to the main bracket 44 by screws 82.

An extension 85 of the sheet metal bracket 82 overlies the forward end of the pressure plate 50 and provides an anchor for a coil spring 86 which is connected to the forward end of the pressure plate and is adapted to raise this end of the plate when the braking force of spring 58 on the pressure plate is overcome. At its rearward end, the thrust transmitting member 56 is formed with a pair of clearance recesses 88, one at each of its rear corners, to respectively receive extension members 90 of the pressure plate 50 which extend upwardly and rearwardly to rest on lugs 92 which may be end extensions of the stop flange 62. When the braking action is released by the overcoming of spring 58, the force transmitting member lugs 92 and the spring 86 raise the pressure plate 50 upwardly and away from the brake plate 48, as shown in FIG. 6. Thus the pressure plate 50 is mounted to float above its cooperating brake plate 48, eliminating the need for critical alignment of the thrust transmitting member 56 and the plate 48.

A solenoid 94, mounted on an arm 95 of the bracket 44 is provided for tripping the latch member 72 and also for overcoming the spring 58 to release the pressure plate 50. The solenoid 94 is operatively connected to the latch member 72 by a link 96 which has one end thereof pivotally connected to the armature of the solenoid 94 and the other end pivotally connected to an upwardly directed arm of the latch member 92. Intermediate its ends, the link 96 is received in the bifurcated upper end of an arm 98 of the thrust transmitting member 56 which arm carries a transverse pin 100, received in an oversize hole 102 provided in the link 96. The limited lost motion connected between the link 96 and the thrust transmitting member pin 100 by reason of the oversize hole 102 allows the solenoid 94, when energized, to first overcome the relatively light load of tripping the latch member 92 before acting to overcome the relatively heavy spring 58 to release the brake.

Operation

Assuming that the operating parts of the brake mechanism are in their normal positions, as shown in FIG. 2, as they would be following de-energization of the solenoid 94, it will be seen by reference to FIG. 4, that as a sheet or ledger card enters between the brake plates 48 and 50, the sheet or card forces the pressure plate 50 to pivot counterclockwise on its fulcrum 71 against the force of

spring 58. The force exerted by the fast traveling sheet is capable of pivoting the pressure plate 50 against the force of spring 58 because of the relatively long lever arm of the pressure plate 50 from the bearing pin 70 to the forward end of the pressure plate, and because of the adjusted force exerted by spring 58. As a consequence the minimum effective braking force of spring 58 is applied to the sheet at the entrance between the brake plates 48 and 50, but as the sheet proceeds further along its path of travel, the effective leverage arm of pressure plate 50 decreases with corresponding increase in the effective braking force of the spring 58. By this arrangement, as a sheet or card proceeds along its path of travel between the braking plates 48 and 50, deceleration of the sheet or card is effected at an increasing rate of deceleration until the sheet or card reaches the fulcrum pin 70 where the maximum force of the spring 58 is effective on the braking action. As the sheet or card proceeds past the fulcrum pin 70, the pressure plate 50 is caused to pivot clockwise about fulcrum pin 70 to the position shown in FIG. 5. Thus, it will be seen that a sheet passing between the plates 48 and 50 causes the pressure plate 50 to pivot first in a counterclockwise direction about fulcrum 73 and then in a clockwise direction about fulcrum 70. Adjustment of the spring 58 is made such that the sheet or card will proceed until its leading edge engages and is stopped by the stop member 62. Following the stopping of the card, the solenoid 94 is energized and trips the latch member 72 and shortly thereafter pivots lever arm 65. The pivoting of lever arm 65 overcomes the applied braking force of spring 58 and at the same time pivots the thrust transmitting member 56 clockwise away from the pressure plate 50, and when the stop member 62 clears the exit of the brake plates 48 and 50, the feed rollers 40, 41 become effective to remove the card from the brake plates 48 and 50. As the thrust transmitting member 56 pivots clockwise under the influence of the solenoid 94, the pressure plate 50 is lifted at its rearward end by the lugs 92 and at its forward end by spring 86, the pressure plate moving upwardly to the position shown in FIG. 6, suspended below the force transmitting member 56. When this occurs, the pressure plate 50 has moved to its floating, brake release position. Upon deenergization of the solenoid 94, the spring 58 overcomes the relatively light spring 86, returning the operating parts to their normal positions shown in FIG. 2. With particular reference to FIG. 9, it will be seen that the boss 73 in which the socket 71 is formed to receive pin 70 is made relatively narrow as compared to the width of the pressure plate 50 to allow for transverse canting of the plate and thus assure that the plate will always seat flat against its cooperating brake plate 48.

In the modification of FIG. 10, the construction of the brake device is similar to the previously described device and therefore like parts are designated by like reference characters. In the modification, instead of the pressure plate 50 being flat throughout its entire length or fore and aft, a rear portion of the plate, as at 50', is slightly bent or curved downwardly toward the cooperating brake plate 54 such that the rear edge of the plate 50 is offset from the broadside of the plate toward and fulcrumed on the other plate 48. As a consequence, the point of optimum effective braking force is shifted from the fulcrum pin 70 to the rear end of pressure plate 50. This has the advantage of making the adjustment of spring 58 less critical on adjusting the spring force to achieve travel of a sheet to the stop 62 without damage to the leading edge of the sheet.

While I have shown and described my sheet brake mechanism in considerable detail, it will be apparent to those skilled in the art that many variations may be made therein without departing from the spirit or scope of the invention.

What is claimed is:

1. In a sheet braking mechanism for a sheet stop station of a high velocity sheet transporting apparatus, supporting

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means, a pair of cooperating brake plates in opposed broadside relationship, said plates having corresponding forward edges forming an entrance to receive a sheet edgewise and having opposite corresponding rear edges forming an exit, a movable fulcrum member overlying one of said plates and movable toward and away from the other of said plates, said one plate fulcrumed on said fulcrum member between and closer to the exit than to the entrance of the plates and also having its rear edge fulcrumed on said supporting means, yieldable brake force exerting means acting on said movable fulcrum member and normally holding said plates together, said rear edge of said one plate offset from the plane of said one plate toward said other plate to apply the optimum effective braking force of said force exerting means at the said rear edge of said one plate.

2. In a sheet braking mechanism for a sheet stop station of a high velocity sheet transporting apparatus, a stationary brake plate, a retractable brake plate in opposed broadside relationship to said stationary brake plate, said brake plates having corresponding forward edges defining an entrance to receive a sheet edgewise and having opposite corresponding rear edges forming a sheet exit, a retractable stop member closing said exit, a movable

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fulcrum member overlying said movable plate and movable toward and away from said stationary plate, said movable plate fulcrumed on said movable fulcrum member between and closer to the sheet exit than to the sheet entrance, yieldable thrust means acting on said fulcrum member and normally holding said movable plate against said stationary plate, said movable plate having a curved portion along the rear edge thereof with the concave surface toward said stationary plate and the rear edge offset from the plane of said movable plate to space the latter from said stationary plate between said fulcrum member and the rear edge of said stationary plate.

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