April 22, 1952 R. J. VAN SCHIE 2,593,814

MACHINE FOR FEEDING SHEETS FROM THE TOP OF A STACK OF STIFF SHEETS

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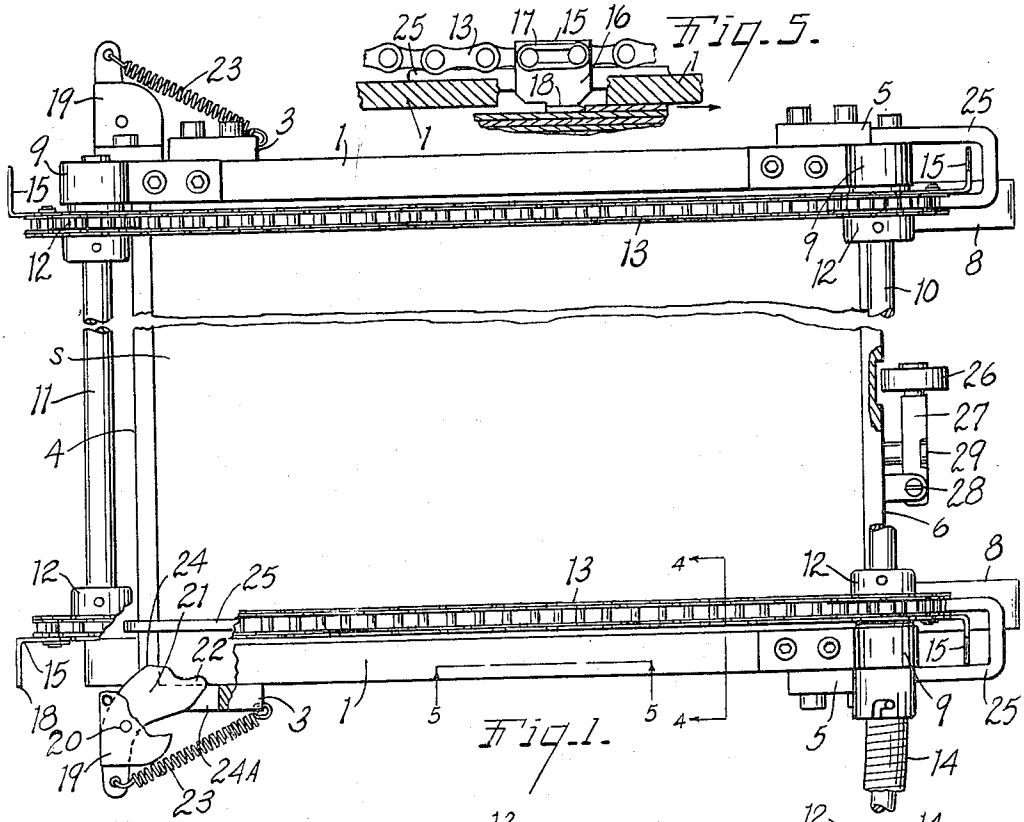


Fig. 1.

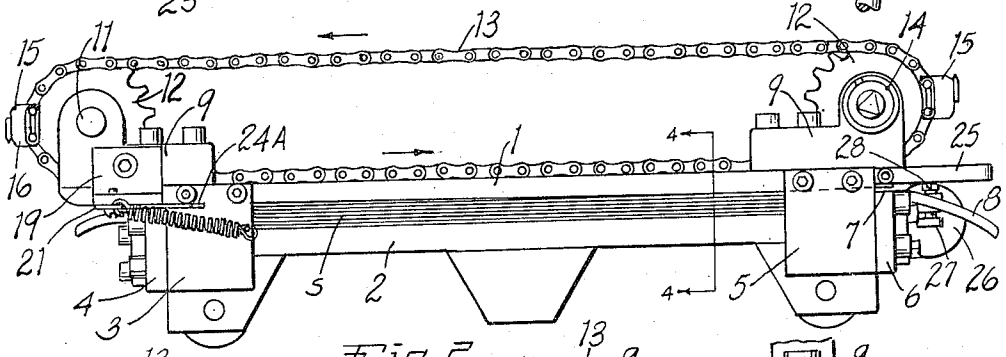


Fig. 2.

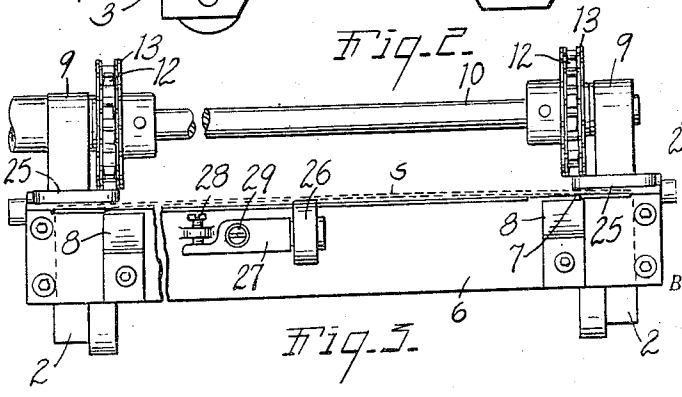


Fig. 3.

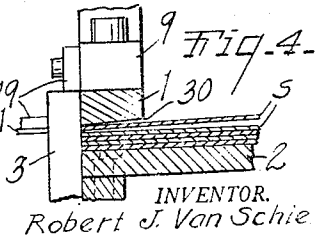


Fig. 4.

Fig. 5.

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MACHINE FOR FEEDING SHEETS FROM THE TOP OF A STACK OF STIFF SHEETS

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Application March 17, 1950, Serial No. 150,294

12 Claims. (Cl. 214—8.5)

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This invention relates to improvements in a machine for feeding sheets from the top of a stack of stiff sheets.

The principal objects of this invention are:

First, to provide a machine which will separate the top sheet from a stack of sheets and deliver the sheet horizontally from the stack, the machine being of simple construction and operative to automatically readjust itself to consecutively feed a series of the sheets until the stack is exhausted.

Second, to provide a gravity fed sheet feeding device which is operative to slide the top sheet of a stack off of the stack with a minimum of scratching of the sub-adjacent sheet.

Third, to provide a sheet feeding mechanism having a minimum number of parts and weight.

Fourth, to provide a sheet feeding mechanism which is supported directly upon the top sheet of a stack of sheets to be fed and which has an automatically operative leveling device for maintaining the machine approximately level as the sheet is fed therefrom.

Fifth, to provide a sheet feeding mechanism with means for separating the transverse edges of the top sheet of a stack from the sub-adjacent sheet to prevent scratching.

Other objects and advantages relating to details of my invention will be apparent from a consideration of the following description and claims and the attached drawings, of which there is one sheet.

Fig. 1 is a plan view, partially broken away, of my machine operatively positioned on top of a stack of sheets to be fed.

Fig. 2 is a side elevational view of the machine as illustrated in Fig. 1.

Fig. 3 is an elevational view of the front or delivery end of the machine.

Fig. 4 is a fragmentary vertical cross sectional view taken along the plane of the line 4—4 in Figs. 1 and 2.

Fig. 5 is a fragmentary vertical longitudinal cross sectional view through a portion of the machine taken along the plane of the line 5—5 in Fig. 1.

My present machine constitutes an improvement and a simplification of a machine for the similar purpose as disclosed and claimed in my co-pending application, Ser. No. 139,384, filed January 19, 1950, for Machine for Feeding Sheets From the Top of a Stack of Metal or Other Substantially Stiff Sheets.

My present machine consists of a pair of side rails 1 adapted to rest upon the top sheet of a

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stack of sheets indicated at S, the stack preferably being positioned on a pallet or other support 2 for convenience in handling. The ends of the side rails 1 have depending guide blocks or plates 3 bolted to the outer sides of their rear ends to lap alongside of the stack of sheets and serve as guides as the machine is lowered upon the removal of each successive sheet. A rear cross bar 4 is bolted to the rear edges of the plates 3 to join the rear ends of the side rails together and attention is called to the fact that the upper edge of the rear cross bar 4 is spaced vertically below the under surface of the side rails 1 by a distance at least equal to the thickness of the sheets to be fed by the machine.

The front ends of the side rails 1 have depending guide plates 5 secured to the outer sides thereof in much the same fashion as the plates 3 and a front cross bar 6 is secured to the front edges of the plates 5 to joint the front ends of the side rails. It will be noted that the upper edge of the front cross bar 6 is spaced below the lower edge of the side rails 1 by a distance at least as great as the thickness of the sheets S, thus providing a throat 7 through which the top sheet is fed from the machine. The throat is not as wide as the thickness of two sheets and thus serves as a stop to prevent the feeding of more than one sheet at a time when single sheet feed is desired. The front cross bar 6 is further provided with inclined guide shoes 8 for supporting and guiding the trailing edge of each sheet as it leaves the machine.

Four bearing brackets 9 are secured one to each end of the side rails 1 on the upper sides thereof and the brackets form bearings for the front drive shaft 10 and rear idle shaft 11. The shafts are positioned substantially above the tops of the side rails 1 and 2 and are each provided with a pair of sprockets 12 around which a pair of chains 13 are trained. The forward driving shaft 10 is provided with a releasable socket connection for a flexible shaft illustrated at 14 by means of which the chains and shafts may be rotated from a remotely located power source.

Each of the chains 13 is rotatable in a plane spaced laterally inwardly from the side rails 1 and each chain is provided with a pair of feed dogs 15. The dogs 15 are preferably secured at equal intervals along the chains and are necessarily secured in the same relative positions on the two chains so that the dogs are advanced by the chains in pairs in the direction indicated by the arrows in Fig. 2. The dogs 15 consist of

plates 16 removably secured to two of the pins of the chains by clips 17. Each of the plates 16 has a laterally outwardly turned sheet engaging finger 18 and it will be noted by reference to Fig. 5 that the leading edge of the finger 18 is sharpened to a knife edge to engage and bite into the rear edge of the sheet being fed. Desirably, the thickness of the sheet feeding fingers 18 is approximately equal to the thickness of the sheet to be fed.

The lateral outwardly turned feeding fingers 18 are successively advanced by the chains through the slots between the top of the rear cross bar 4 and the rear ends of the side rails 1 so that during the forward feeding motion of each finger, the fingers are retained vertically between the under surface of the side rails 1 and the top surface of the next succeeding sheet of the stack. The fingers and dogs 15 are thus restrained against twisting or cocking and are effectively held in feeding engagement with the top sheet.

Since the entire weight of the feeding mechanism is supported by engagement of the side rails 1 with the stack of sheets, it will be apparent that as the top sheet is advanced over one half the longitudinal length of the sheets, the rear end of the mechanism will be overbalanced and will tend to tilt downwardly, thus cocking the front end of the machine upwardly and placing a disproportionate share of the weight of the machine on the front end of the stack. In order to overcome this tendency of the machine to first balance and then teeter on the top sheet as it is fed outwardly, the rear bearing brackets 9 are provided with angular shaped brackets 19 having flanges which project laterally outwardly to the sides of the side rails. Pivotally connected to the under sides of these flanges as by the pivot pins 20 are the flat supporting fingers 21. The fingers 21 have inner nose portions 22 which are constantly urged inwardly into lapping engagement with the second sheet of the stack by the action of the springs 23. Thus, when the top sheet is moved forwardly away from the nose portions 22, the fingers swing inwardly between the second sheet and the under surface of the side rails 1 to support the rear end of the machine in level position. The supporting fingers 21 are shaped to provide release tongues 24 which are engaged with the incoming feed fingers 18 to move the supporting fingers outwardly from the sides of the sheets and permit the rear end of the machine to settle onto the next succeeding top sheet just prior to engagement of the feeding fingers with the new top sheet. The depending plates 3 at the rear of the side rails are slotted as at 24A to accommodate the movement of the fingers 21.

Although not absolutely essential to the successful operation of the machine, I provide support rails 25 for supporting the lower reaches of the chains 13. The rear ends of the support rails 25 are bent downwardly and secured to the rear cross bar 4, while the front ends of the support rails are bent laterally outwardly and then backwardly along the outside of the side rails so as not to obstruct the delivery throat 7 or the path of the feed fingers 18.

Since most sheet metal in its raw or unprocessed form has a certain amount of roughness along its edges, and since the weight of my machine is supported directly upon the top sheet of the stack, there is a tendency for the rough edge of the top sheet to scratch or mar the surface of the next succeeding sheet as it is translated thereacross. In order to overcome this tendency, I

have provided a roller 26 which is rotatably mounted on the pivot arm 27, approximately in the transverse center of the front cross bar 6. A screw 28 is operative to adjust the arm 27 about its pivot 29 and raise the upper rim of the roller 26 slightly above the level of the second sheet of the stack. Thus, as the top sheet is moved forwardly through the throat 7, it is bowed upwardly in the middle as indicated by the dotted lines in Fig. 3 and substantially the entire transverse edges of the top sheet are spaced from the subadjacent sheet, thus eliminating scratching. In order to permit this bowing of the top sheet, the under surfaces of the side rails 1 are inwardly and upwardly beveled as is most clearly illustrated at 30 in Fig. 4.

I have thus described a highly practical form of my sheet feeding machine which is extremely light and simple to construct. I have not attempted to describe modifications or adaptations of the machine, as it is believed that this disclosure will permit persons skilled in the art to adapt my invention to various forms of sheet feeding mechanisms as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A machine for successively and horizontally feeding the top sheet from a stack of sheets comprising, a frame having longitudinal side rails positioned to rest upon the side edges of said top sheet, front and rear cross members connecting said side rails and positioned to lie along the front and rear sides of said stack, said cross members having their upper surfaces spaced below the under surfaces of said side rails by a distance not substantially greater than the thickness of the individual sheets to be fed, depending side plates on the outsides of said side rails arranged to engage the sides of said stack and locate said frame thereover, said side plates forming the connection between said rails and said cross members, transversely extending shafts rotatably mounted above the front and rear of said frame and each having sprockets near each end thereof, a pair of feed chains trained around said sprockets with their lower reaches positioned above the bottom of said side rails, feed dogs secured in pairs to said chains and projecting below the lower reaches of the chains to the level of the top sheet of said stack, laterally outwardly turned feed fingers on the ends of said dogs and having sharpened leading edges arranged to project and be translated underneath said side rails, spring pressed support fingers carried at the rear of said side rails and swingable in lapped relationship with the bottoms of said rails into the space vacated by the rear edge of each successive top sheet to support the rear of said frame from each successive sheet, release tongues on said support fingers positioned to be engaged by said feed fingers to retract said support fingers prior to engagement of said feed fingers with said top sheet to permit the rear ends of said rails to drop onto each successive sheet, and a vertically adjustable roller positioned intermediate of the ends of the front cross member of said frame to engage and raise the middle portion of each successive top sheet as it is fed forwardly from said machine.

2. A machine for successively and horizontally feeding the top sheet from a stack of sheets comprising, a frame having longitudinal side rails positioned to rest upon the side edges of said top sheet, front and rear cross members connecting

said side rails and positioned to lie along the front and rear sides of said stack, said cross members having their upper surfaces spaced below the under surfaces of said side rails by a distance not substantially greater than the thickness of the individual sheets to be fed, depending side plates on the outsides of said side rails arranged to engage the sides of said stack and locate said frame thereover, transversely extending shafts rotatably mounted above the front and rear of said frame and each having sprockets near each end thereof, a pair of feed chains trained around said sprockets with their lower reaches positioned above the bottom of said side rails, feed dogs secured in pairs to said chains and projecting below the lower reaches of the chains to the level of the top sheet of said stack, laterally outwardly turned feed fingers on the ends of said dogs and arranged to project and be translated underneath said side rails, spring pressed support fingers carried at the rear of said side rails and swingable in lapped relationship with the bottoms of said rails into the space vacated by the rear edge of each successive top sheet to support the rear of said frame from each successive sheet, release tongues on said support fingers positioned to be engaged by said feed fingers to retract said support fingers prior to engagement of said feed fingers with said top sheet to permit the rear ends of said rails to drop onto each successive sheet, and a roller positioned intermediate of the ends of the front cross member of said frame to engage and raise the middle portion of each successive top sheet as it is fed forwardly from said machine.

3. A machine for successively feeding the top sheet from a stack of sheets comprising, a frame having longitudinal side rails positioned to rest upon the side edges of said top sheet, front and rear cross members connecting said side rails, said front cross member having its upper surface spaced below the under surfaces of said side rails by a distance not substantially greater than the thickness of the individual sheets to be fed, depending side plates on the outsides of said side rails arranged to engage the sides of said stack and locate said frame thereover, transversely extending shafts rotatably mounted above the front and rear of said frame and each having sprockets near each end, a pair of feed chains trained around said sprockets with their lower reaches positioned above the bottom of said side rails and longitudinally alongside thereof, feed dogs secured in pairs to said chains and projecting below the lower reaches of the chains to the level of the top sheet of said stack, lateral turned feed fingers on the ends of said dogs and having sharpened leading edges arranged to project and be translated underneath said side rails, spring pressed support fingers carried at the rear of said side rails and swingable in lapped relationship with the bottoms of said rails into the space vacated by the rear edge of each successive top sheet, release tongues on said support fingers positioned to be engaged by said feed fingers to retract said support fingers prior to engagement of said feed fingers with said top sheet, and a vertically adjustable lift member positioned intermediate of the ends of the front cross member of said frame to engage and raise the middle portion of each successive top sheet as it is fed forwardly from said machine.

4. A machine for successively feeding the top sheet from a stack of sheets comprising, a frame having longitudinal side rails positioned to rest

upon the side edges of said top sheet, front and rear cross members connecting said side rails, said front cross member having its upper surface spaced below the under surfaces of said side rails by a distance not substantially greater than the thickness of the individual sheets to be fed, depending side plates on the outsides of said side rails arranged to engage the sides of said stack and locate said frame thereover, transversely extending shafts rotatably mounted above the front and rear of said frame and each having sprockets near each end, a pair of feed chains trained around said sprockets with their lower reaches positioned above the bottom of said side rails and longitudinally alongside thereof, feed dogs secured in pairs to said chains and projecting below the lower reaches of the chains to the level of the top sheet of said stack, laterally turned feed fingers on the ends of said dogs and arranged to project and be translated underneath said side rails, spring pressed support fingers carried at the rear of said side rails and swingable in lapped relationship with the bottoms of said rails into the space vacated by the rear edge of each successive top sheet, and release tongues on said support fingers positioned to be engaged by said feed fingers to retract said support fingers prior to engagement of said feed fingers with said top sheet.

5. A machine for successively feeding the top sheet from a stack of sheets comprising, a frame having longitudinal side rails positioned to rest upon said top sheet along laterally spaced lines, front and rear cross members connecting said side rails, a stop on the front of said frame adapted to be positioned in front of said stack and having its upper surface spaced below the under surfaces of said side rails by a distance not substantially greater than the thickness of the individual sheets to be fed, depending side plates on the outsides of said side rails arranged to engage the sides of said stack and locate said frame thereover, transversely extending shafts rotatably mounted above the front and rear of said frame, sprockets mounted toward each end of said shafts, a pair of chains trained over said sprockets with their lower reaches positioned above the bottom of said side rails and extending longitudinally therealong, feed dogs secured to said chains and projecting below the lower reaches of the chains to the level of the top sheet of said stack, laterally turned feed fingers on the ends of said dogs and arranged to project and be simultaneously translated underneath said side rails, the under surfaces of said rails being beveled upwardly and inwardly of said frame, and a vertically adjustable roller positioned intermediate of the ends of the front cross member of said frame to engage and raise the middle portion of each successive top sheet as it is fed forwardly from said machine.

6. A machine for successively feeding the top sheet from a stack of sheets comprising, a frame having longitudinal side rails positioned to rest upon said top sheet along laterally spaced lines, front and rear cross members connecting said side rails, a stop on the front of said frame adapted to be positioned in front of said stack and having its upper surface spaced below the under surfaces of said side rails by a distance not substantially greater than the thickness of the individual sheets to be fed, depending side plates on the outsides of said side rails arranged to engage the sides of said stack and locate said frame thereover, transversely extending shafts

rotatably mounted above the front and rear of said frame, sprockets mounted toward each end of said shafts, a pair of chains trained over said sprockets with their lower reaches positioned above the bottom of said side rails and extending longitudinally therealong, feed dogs secured to said chains and projecting below the lower reaches of the chains to the level of the top sheet of said stack, laterally turned feed fingers on the ends of said dogs and arranged to project and be simultaneously translated underneath said side rails, the under surfaces of said rails being beveled upwardly and inwardly of said frame, and a lift member positioned intermediate of the ends of the front cross member of said frame to engage and raise the middle portion of each successive top sheet as it is fed forwardly from said machine.

7. In a machine for feeding sheets from the top of a stack, the combination of a frame adapted to be positioned on top of the stack, side rails on said frame adapted to engage the top sheet of the stack along laterally spaced lines to floatingly support the frame thereon, said frame being provided with depending members engageable with the sides of the stack for maintaining the frame thereon, sheet discharge means adapted to successively engage the top sheet of the stack at the rear edge thereof and vertically between said side rails and the sub-adjacent sheet, means for advancing said discharge means, means carried by said frame for retainingly engaging the edge of the sub-adjacent sheet at the discharge side of said frame, and a lift element carried on said frame along the discharge side thereof and engageable with the under side of the sheet being discharged to bow said sheet upwardly.

8. In a machine for feeding sheets from the top of a stack, the combination of a frame adapted to be positioned on top of the stack, side rails on said frame adapted to engage the top sheet of the stack along laterally spaced lines to floatingly support the frame thereon, said frame being provided with depending members engageable with the sides of the stack for maintaining the frame thereon, sheet discharge means adapted to successively engage the top sheet of the stack at the rear edge thereof and vertically between said side rails and the sub-adjacent sheet, means for advancing said discharge means, and means carried by said frame for retainingly engaging the edge of the sub-adjacent sheet at the discharge side of said frame.

9. In a machine for feeding sheets from the top of a stack, the combination of a frame adapted to be positioned on top of the stack, side rails on said frame adapted to engage the side edges of the top sheet of the stack to floatingly support the frame thereon, said frame being provided with depending members engageable with the sides of the stack for maintaining the frame thereon, sheet discharge means adapted to successively engage the top sheet of the stack at the rear edge thereof and vertically between said side rails and the sub-adjacent sheet, means for advancing said discharge means, means carried by said frame for retainingly engaging the edge of the sub-adjacent sheet at the discharge side of said frame, a lift element carried on said frame along the discharge side thereof and engageable with the under side of the sheet being discharged to bow said sheet upwardly, and laterally movable support elements on said frame movable between said side rails and the sub-adjacent sheet into the space vacated by the rear edge of the top sheet as it initially moves forward, said support elements having a timed driving engagement with said means for advancing said discharge means for retracting said support elements from said space subsequent to the complete discharge of said top sheet from the stack.

10. In a machine for feeding sheets from the top of a stack, the combination of a frame adapted to be positioned on top of the stack, side rails on said frame adapted to engage the side edges of the top sheet of the stack to floatingly support the frame thereon, said frame being provided with depending members engageable with the sides of the stack for maintaining the frame thereon, sheet discharge means adapted to successively engage the top sheet of the stack at the rear edge thereof and vertically between said side rails and the sub-adjacent sheet, means for advancing said discharge means, means carried by said frame for retainingly engaging the edge of the sub-adjacent sheet at the discharge side of said frame, and laterally movable support elements on said frame movable between said side rails and the sub-adjacent sheet into the space vacated by the rear edge of the top sheet as it initially moves forward, said support elements having a timed driving engagement with said means for advancing said discharging means for retracting said support elements from said space subsequent to the complete discharge of said top sheet from the stack.

11. In a machine for feeding sheets from the top of a stack, the combination of a frame disposed upon the stack, side rails on said frame engageable with the edges of the top sheet of the stack to floatingly support said frame, and a pair of endless conveyors mounted on said frame and provided with sheet engaging fingers positioned to be translated in lapped relationship between the under surfaces of said side rails and the second sheet of the stack to feed the top sheet laterally off of the stack.

12. In a machine for feeding sheets from the top of a stack, the combination of a frame disposed upon the stack, side rails on said frame engageable with the top sheet of the stack thereof along laterally spaced lines to floatingly support said frame, and a pair of endless conveyors mounted on said frame and provided with sheet engaging fingers positioned to be translated in lapped relationship between the under surfaces of said side rails and the second sheet of the stack to feed the top sheet laterally off of the stack.

ROBERT J. VAN SCHIE.

No references cited.