Nov. 1, 1927. 1,647,819

G. W. SWIFT, JR

SHEET FEEDING MECHANISM

Filed Sept. 11, 1926 2 Sheets-Sheet 1

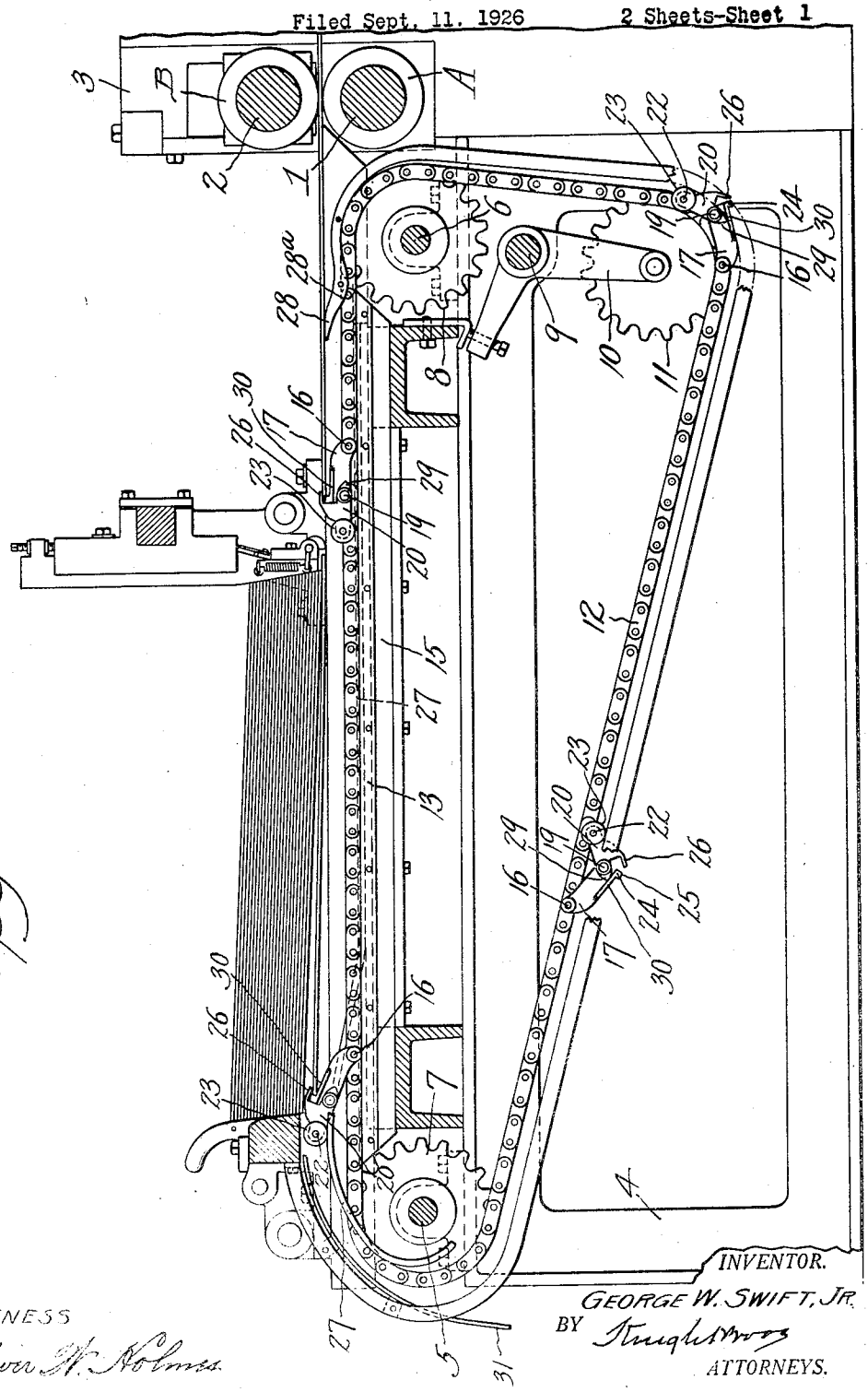


Fig. 1.

WITNESS
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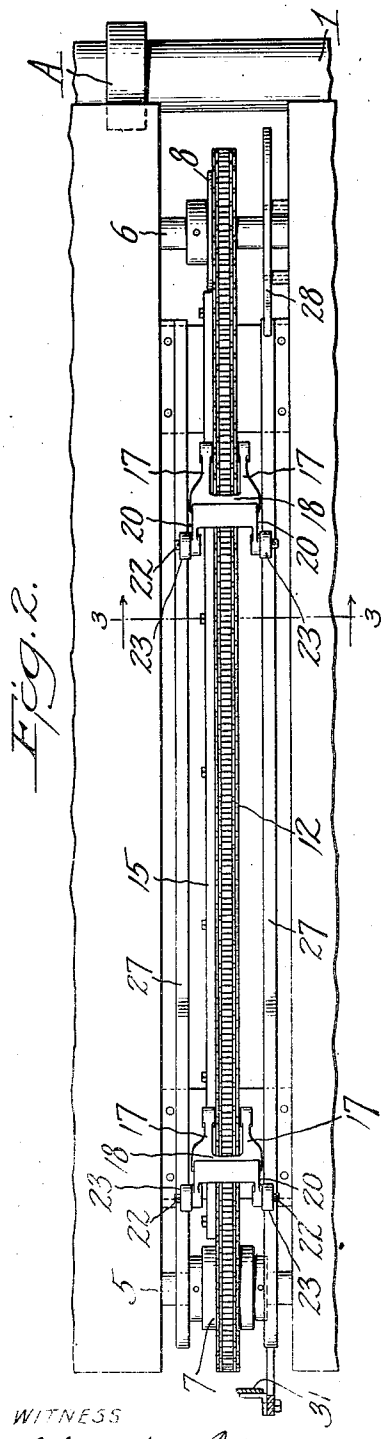


Fig. 2.

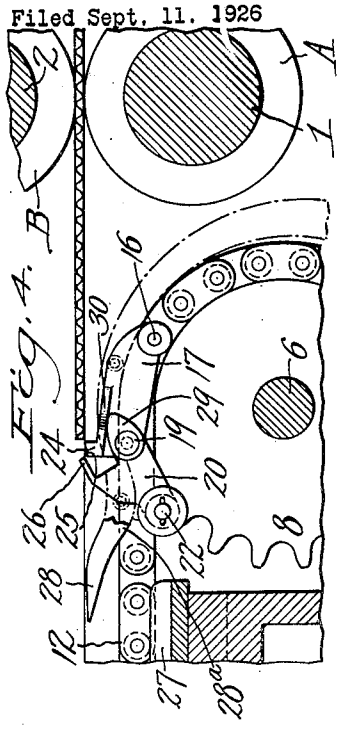


Fig. 4.

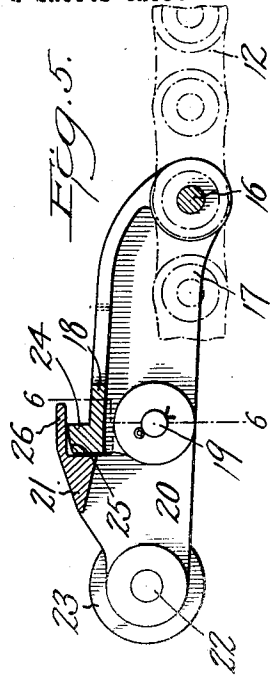


Fig. 5.

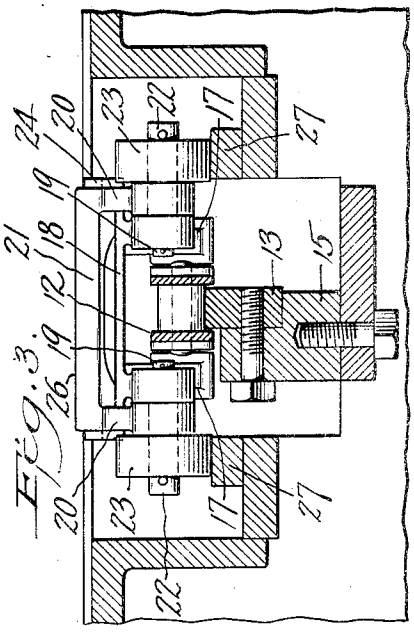


Fig. 3.

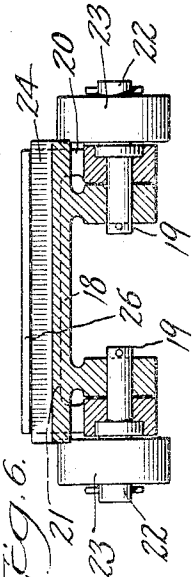


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MECHANISM.

Application filed September 11, 1926. Serial No. 134,839.

This invention relates to sheet feeding mechanism of a character which may be advantageously employed for feeding sheets or boards of stiff material such as that used in the manufacture of boxes, cartons and other containers.

The primary object of my invention is to provide an improved construction and arrangement of parts in feeding mechanism of this character which is more especially adaptable to a machine in which sheets are successively separated from the bottom of a pile or column of sheets and fed off to another machine which performs certain desired operations thereon.

Specific objects of invention will appear in the specification and be pointed out in the appended claims, reference being had to the accompanying drawings which show an embodiment of my invention suitable for a slotting or blanking-out machine.

In the drawings,

Figure 1 is a side elevation of my improved sheet feeding mechanism, parts being broken away and parts being shown in section;

Figure 2 is a top plan view of the same with portions removed;

Figure 3 is a transverse section on an enlarged scale corresponding to the line 3—3, of Figure 2;

Figure 4 is a fragmentary side elevation of the conveyor showing one of the grippers at the point of release, parts being broken away and parts shown in section;

Figure 5 is a vertical longitudinal section of one of the grippers in closed position, parts being shown in elevation, and

Figure 6 is a transverse section on the line 6—6, of Figure 5.

In my copending application Serial No. 100,909, filed April 9, 1926, for sheet feeding means, I have shown and described a feeding machine comprising a feed table or support over which sheets are fed, guides forming a hopper for supporting a pile or column of sheets above the table or support, means for successively separating the sheets from the bottom of the pile or column, a delivery throat through which the sheets are passed, and feeding mechanism for engaging the successively separated sheets and passing them through the delivery throat. In the drawings of that application, the mechanism is illustrated as forming part of a slotting or blanking out machine in which knurled feed rollers constitute the feed in rolls of a slotting or blanking out machine and also the delivery rolls of the feeding machine. These cooperating rolls, A, B are shown in Figure 1 of the drawings in the present application, said rolls being mounted in spaced relation upon the shafts 1 and 2 which are suitably journalled in machine side frames 3, 3 only one of said side frames being shown in Figure 1 of the present application. These intermeshing feed shafts 1 and 2 may be driven by any suitable means such for example, as by gearing with the slotting or blanking-out machine of which they may form a part.

Sheet conveyor mechanism.

Mounted upon a main frame 4 as shown in dotted lines in Figure 1, are paired bearings in which are journalled parallel sprocket wheel shafts 5 and 6. Keyed to these shafts are sprocket wheels 7 and 8. Adjustably mounted on a stay shaft 9 is a sprocket carrying arm 10 in the outer end of which is journalled a sprocket wheel 11. Running over the sprocket wheels 7, 8 and 11, is an endless conveyor chain 12 which as shown in Figure 3 is supported by a longitudinal track-bar 13, said track-bar extending substantially across the space between said sprocket wheels 7 and 8. As shown in Figure 3, the track-bar 13 is seated in an angular recess formed in a central longitudinal member 15 of the main frame. Connected with the conveyor chain 12 according to the present embodiment of my invention, are sheet-propelling devices adapted to loosely but positively confine the rear edges of sheets which are separately and successively removed from the bottom of the pile. Each of said devices comprises a sheet-engaging member or pusher which is adapted to push a sheet forward and a sheet-confining or retaining member which is articulately connected thereto and thereby adapted to be moved to and fro between a position in which it retains a sheet against displacement from engagement with the sheet-propelling member and a position in which said sheet is left unhampered to move out of engagement with said sheet-propelling member. The details of one of these

sheet-propelling devices are shown in Figures 3, 5 and 6. Thus, upon the oppositely-extended ends of one of the pintles 16 of chain 12, are pivotally mounted the laterally-spaced arms 17 of one of a sheet-engaging member, said arms 17 being integrally connected by a transverse top plate 18. Said arms 17 are pivotally connected by pins 19 to the corresponding arms 20 of a sheet-confining or retaining member, said arms 20 being preferably integrally connected by a cross piece 21 and each provided with a pin 22 for journalling a cam roller 23. Presented upwardly from said top plate 18 of the sheet-propelling member is a lug or shoulder 24 which is provided with a rearwardly beveled upper surface 25 to accommodate the to and fro movements of a flange or plate 26 which is presented forwardly from the cross piece 21 of the sheet-confining member. Said flange 26 in its sheet-confining position, is adapted to positively retain the rear edge of a sheet in engagement with the lug or shoulder 24.

Operating cams.

By an inspection of Figures 1 and 2, it will be seen that two parallel cam-tracks have been provided for imparting relative movements to the members of each sheet-propelling device to confine the rear edge of a sheet while said sheet is being propelled thereby while a single additional cam-track has been arranged to constrain the movements of said members after a sheet has been released therefrom and during their return to position in which they engage the rear edge of the next sheet to be fed.

Referring to Figures 1, 2, and 3 of the drawings, it will be seen that the parallel cam-tracks 27, 27, have their left hand ends disposed slightly below and to the left of the axis of sprocket wheel shaft 5 and nearer to said axis than the links of chains 12 passing around the sprocket wheel 7. From this point, said cam-tracks extend outwardly and upwardly around the axis of shaft 5, and above the plane of the horizontal path of chain 12 reaching their highest elevation at a point adjacent to the rear edge of the pile of sheets as shown in Figure 1. From this summit said cam-tracks drop away on an incline to a plane below the horizontal path of said chain 12 and terminate at their forward ends adjacent to the sprocket wheel 8. It will be understood from this description that as the sheet-propelling members pass around the periphery of sprocket wheel 7, the cam rollers 23 are brought into engagement with the depending ends of cam-tracks 27 and become gradually displaced thereby until as said members reach the position shown in the upper left hand portion of Figure 1, they are fully extended with respect to each other and together are tilted with respect to the upper horizontal path of chain 12. It is just prior to assuming this position that the flange 26 is moved into position to overhang the rear edge of the bottom sheet which has become partially separated from the pile in the manner fully shown and described in my above identified application Serial No. 100,909. The subsequent forward movement of the lug or shoulder 24 toward the right thereupon completes the separation of the sheet and delivers the forward edge thereof to feed rollers A and B.

Referring now to Figures 1, 2, and 4, it will be seen that a cam-track 28 has one end thereof disposed above the right hand end of one of the parallel cam-tracks 27 and in suitable position to have its inner edge engage the cam roller on that side as it leaves the cam-track 27. Immediately after leaving the cam-track 27, said cam roller is depressed by a downwardly deviating portion 28^a of cam-track 28 in such a way as to flex the sheet-propelling members as shown in Figure 4 for the purpose of releasing the rear edge of the sheet. Thereupon, said sheet continues its forward movement under the action of feed rolls A and B. As shown in Figure 1, that portion of cam-track 28 which extends downwardly between sprocket wheels 8 and 11, deviates gradually from the path of chain 12. Being extended in a circular arc around and outside of the periphery of sprocket wheel 11, said track-bar 28 is inclined upwardly toward the sprocket wheel 7 around which it extends in an arc and terminates adjacent to the summit of track-bars 27, 27. By an inspection of Figure 4 of the drawings, it will be seen that as the rollers 23 drop from the cam-tracks 27, 27, a relative movement of the sheet-propelling members about the chain pintle 19 is limited by an arm or lug 29 which is integral with the member 20 and comes into positive engagement with a web or plate 30 which is integrally formed with member 18. An arcuate strap 31 which, as shown in the left hand portion of Figure 1, extends upwardly and around the periphery of sprocket wheel 7, is adapted to slidably engage the gripper flange 26 and thereby to gradually straighten out the flexed sheet-propelling members as they approach sheet-engaging position.

I claim:

1. In a machine of the character described, the combination with means for supporting a pile of sheets with the rear of the pile in a higher plane than the front of the pile, of a conveyor movable across the bottom of said pile of sheets, a sheet-engaging member movably connected to said conveyor, means for elevating said member to engage the rear edge of the bottom sheet in said pile and

lowering it to draw said rear edge into the fixed plane of travel extending thru the forward edge of said bottom sheet.

2. In sheet feeding mechanism, the combination with a sheet stacking hopper from the bottom of which sheets are successively separated, of articulately connected sheet-engaging members, means connected to said members for moving them across the bottom of said hopper, means for moving said members relatively to each other to engage the rear edge of the bottom sheet in said hopper, and means for operating said members to release the sheet after they have passed beyond said hopper.

3. In sheet feeding mechanism, the combination with a sheet stacking hopper from the bottom of which sheets are successively separated, of articulately connected members movable across the bottom of said hopper, means for imparting relative movements to said members for positively engaging the rear edge of the bottom sheet in said hopper, and means for imparting other relative movements to said members for releasing said rear edge of the sheet.

4. In sheet feeding mechanism, the combination with a sheet stacking hopper from the bottom of which sheets are successively separated, of articulately connected sheet-engaging members, means connected to the outer end of one of said members, for moving them across the bottom of said hopper, means operating upon the outer end of the other of said members, for closing them upon the rear edge of the bottom sheet in said hopper, and means for opening said members to release said sheet.

5. In a machine of the character described, the combination with means for supporting a pile of sheets, of means for separating sheets from the bottom of said pile, an endless conveyor movable across the bottom of said pile of sheets, pivotally connected sheet-engaging members connected to said endless conveyor, means for operating said members to engage a sheet, and means for operating said members to release said sheet.

6. In a machine of the character described, the combination with means for supporting a pile of sheets, of means for separating sheets from the bottom of said pile, an endless conveyor movable across the bottom of said pile of sheets, a sheet-engaging member pivotally connected at one end to said endless conveyor, a second sheet engaging member pivotally connected to the other end of the first-mentioned member, and means operating upon the second-mentioned member for imparting relative movements to said members, said members being provided with sheet-engaging portions adapted to be opened and closed by the relative movements between said members.

7. In a machine of the character described, the combination with means for supporting a pile of sheets, of pivotally connected sheet-engaging members movable below said pile supporting means, said members being adapted by their relative pivotal movements to engage and release a sheet, means connected to the outer end of one of said members for moving them below said pile supporting means, and means operating upon the outer end of the other member for imparting the relative movements to said members for gripping and releasing the bottom sheet of said pile.

8. In sheet feeding mechanism of the character described, the combination with an endless conveyor, of a sheet-engaging member pivotally connected at one end to said endless conveyor, a second sheet-engaging member pivotally connected at one end to the other end of the first-mentioned member, a cam roller journalled in the other end of the second-mentioned member, and cam-tracks extending adjacent the path traveled over by said members for successively engaging said cam roller and moving said members into and out of sheet engaging position.

9. In sheet feeding mechanism of the character described, the combination with an endless conveyor, of a member pivotally connected to said endless conveyor, said member being provided with an upwardly-presented sheet engaging lug, a second member pivotally connected to the first-mentioned member, a cam roller journalled in the second-mentioned member, a flange carried by said second-mentioned member and movable into and out of sheet-retaining position with respect to said lug of the first-mentioned member, and cam-tracks extending adjacent the path traveled over by said members for engaging said cam roller.

10. In sheet feeding mechanism of the character described, the combination with an endless conveyor, of a sheet-engaging member pivotally connected at one end to said endless conveyor, a second sheet-engaging member pivotally connected at one end to the other end of the first-mentioned member said members being provided with sheet-engaging portions adjacent their pivotally connected ends, a cam roller journalled in the other end of the second-mentioned member, a cam-track arranged to engage said roller for imparting a relative movement to said members for engaging a sheet, and another cam-track arranged to engage said roller for moving said members to release said sheet.

11. In sheet feeding mechanism of the character described, the combination with an endless conveyor, of a sheet-engaging member pivotally connected at one end to said endless conveyor, said member being pro-

vided with a rearwardly beveled upwardly presented sheet-engaging lug, a second sheet-engaging member pivotally connected at one end to the other end of the first-mentioned member, a cam roller journalled in the other end of the second-mentioned member, a forwardly presented flange carried by said second mentioned member and movable into and out of position to retain a sheet in engagement with the sheet-engaging portion of the first-mentioned member, and cam-tracks extending adjacent the path traveled over by said members for successively engaging said cam roller.

12. In sheet feeding mechanism of the character described, the combination with an endless belt, of a sheet-engaging member pivotally connected at one end to said endless belt, a second sheet-engaging member pivotally connected at one end to the other end of the first-mentioned member, a cam roller journalled in one of said members, means for operating said cam roller to move said members into sheet-engaging position and retain them in such position during a predetermined period of travel, and means for operating said cam roller to move said members to sheet-releasing position and constrain their movements during their return to initial position.

13. In sheet feeding mechanism of the character described, the combination with an endless belt, of a sheet-engaging member having laterally spaced arms pivotally connected at one end to said endless belt, a second sheet-engaging member having laterally spaced arms pivotally connected respectively to the arms of the first-mentioned member, cam rollers journalled in said arms of the second-mentioned member, cams arranged on opposite sides of said endless belt for operating said cam rollers to move said members into sheet-engaging position, and another cam arranged to engage one of said cam rollers for moving said members into sheet-releasing position.

14. In sheet feeding mechanism of the character described, the combination with an endless belt, of a sheet-engaging member having laterally spaced arms pivoted at one end to the oppositely projecting ends of a pintle carried by said endless belt, a second sheet-engaging member having laterally spaced arms pivotally connected respectively to the other ends of said arms of the first-mentioned member, cam rollers journalled in the outer ends of said arms of the second-mentioned member, cam-tracks extending adjacent to a portion of the path traveled over by said members and engaging said cam rollers for moving said members into sheet-engaging position and retaining them in such position during a predetermined period of travel, and another cam-track extending adjacent to another portion of said path for moving said members into sheet-releasing position and constraining their movements during their return to initial position.

15. In sheet feeding mechanism of the character described, the combination with an endless belt, of a sheet-engaging member having laterally spaced arms pivoted at one end to the oppositely projecting ends of a pintle carried by said endless belt, a second sheet-engaging member having laterally spaced arms pivotally connected respectively to the other ends of said arms of the first-mentioned member, cam rollers journalled in said arms of the second-mentioned member, said members being movable into and out of sheet-engaging position by the displacement of said cam rollers, cam-tracks extending adjacent to a portion of the path traveled over by said members and on opposite sides of said endless belt, said cam-tracks operating said cam rollers for moving said members to sheet-engaging position and retaining them in said position during a predetermined period of travel, and a second cam-track extending adjacent to the remainder of said path for moving said members to sheet-releasing position and constraining their movements during their return to initial position in their path of travel.

16. In sheet feeding mechanism of the character described, the combination with an endless chain, of a sheet-engaging member having laterally spaced arms pivoted to the oppositely projecting ends of a pintle of said endless chain, a second sheet-engaging member having laterally spaced arms pivotally connected to the arms of the first-mentioned member, cam rollers journalled in the arms of the second-mentioned member, and cam-tracks extending adjacent to said endless chain for operating said cam rollers.

17. In a machine of the character described, the combination with articulately connected sheet-feeding members, one of said members being provided with a sheet-engaging shoulder and the other of said members being provided with a flange movable into and out of position in which it is adapted to restrain one edge of a sheet from being displaced from the path of said shoulder, and means for imparting relative movements to said members whereby said flange is moved into sheet-restrainng position with respect to said shoulder for the sheet-feeding operation and out of said sheet-restraining position to permit a divergence of motion between said shoulder and the rear edge of said sheet.

18. In a machine of the character described, the combination with articulately connected sheet-feeding members, one of said members being provided with a sheet-engaging shoulder and the other of said members being provided with a flange movable into and out of position to retain the rear edge of a sheet in engagement with said shoulder,

means for imparting relative movement to said members for moving said flange into sheet-retaining position, and other means for imparting relative movements thereto for moving said flange out of said position to permit the rear edge of said sheet to move out of engagement with said shoulder.

19. In a machine of the character described, the combination with articulately connected sheet-feeding members, one of said members being provided with a sheet-engaging shoulder and the other of said members being provided with a flange movable into and out of position in which it overhangs said shoulder for preventing lateral displacement of the rear edge of a sheet from before said shoulder. means for continuously moving said members before, during, and after their engagement with said sheet, means for straightening out said members with respect to their axis of articulation to adapt them to engage said sheet, and means for flexing said members for releasing said sheet.

20. In a machine of the character described, the combination with a continuously-movable endless belt, of a pair of sheet-feeding links pivotally connected at adjoining ends and having the other end of one of the links pivotally connected to said endless belt, said links being provided with sheet-engaging portions movable into sheet-engaging position by the extension of said links on their pivotal connection and out of sheet-engaging position by the flexing of said links, means for straightening said links and holding them in extended relation during the sheet-feeding movements, and means for flexing said links for releasing said sheet.

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