

April 19, 1938.

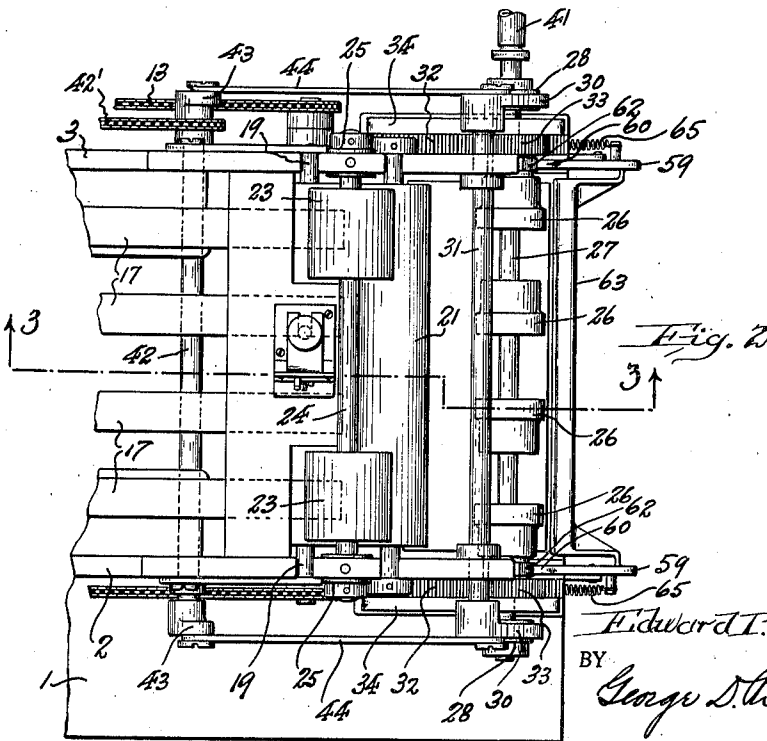
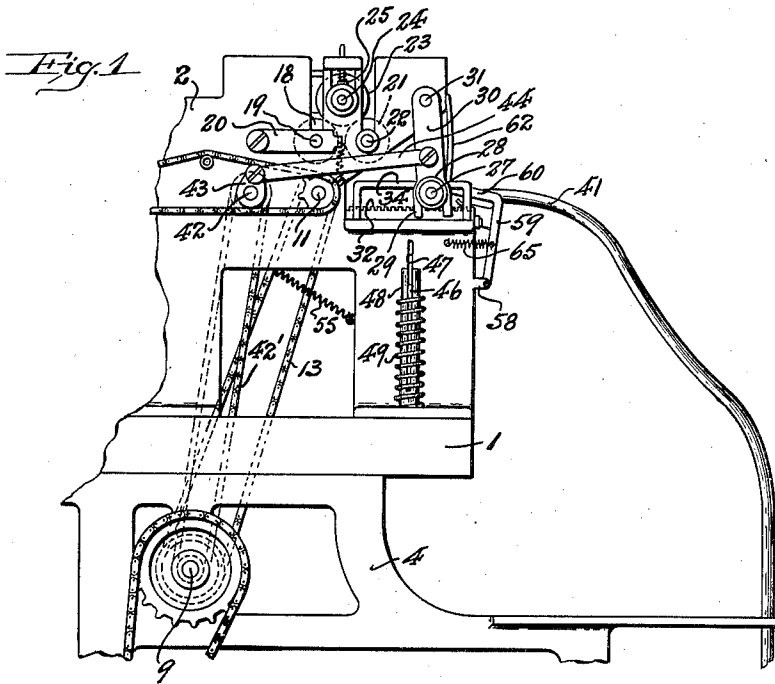
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SHEET FEEDING MECHANISM

Filed July 15, 1936

2 Sheets-Sheet 1



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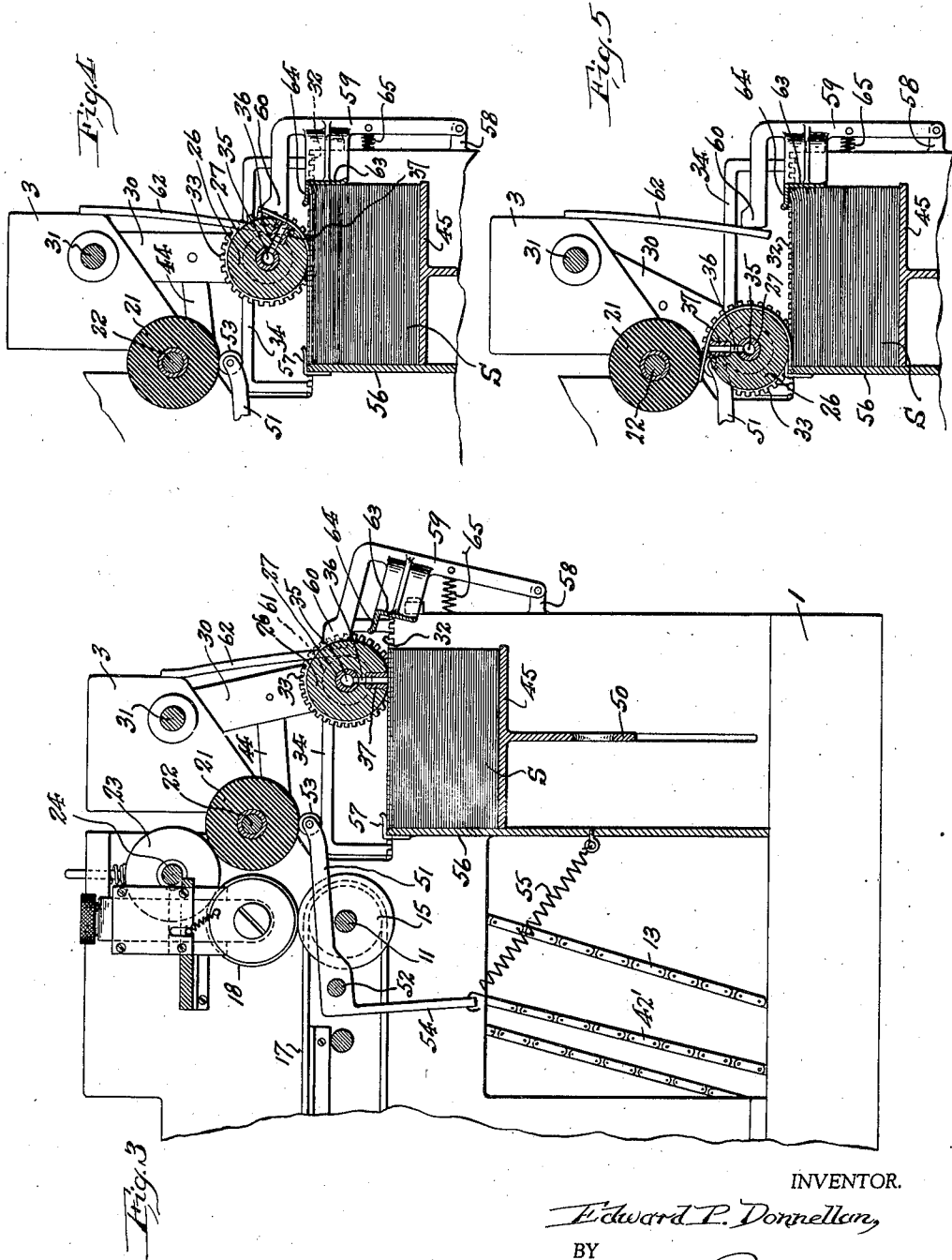
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2 Sheets-Sheet 2



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SHEET FEEDING MECHANISM

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Application July 15, 1936, Serial No. 90,683

7 Claims. (Cl. 271—27)

This invention relates, generally, to mechanism for feeding sheet material; and this invention has reference, more particularly, to divisional subject matter disclosed in my copending application for United States Letters Patent Serial No. 45,061, filed October 15th, 1935, of which this application is a continuation in part.

The present invention has for an object to provide a novel means for successively picking up and delivering from a stack or pile thereof unit sheets of material, paper money, labels, circulars or the like, and thereupon passing the same to handling mechanism; the pick up operation is such that each item or sheet is "peeled" from the supply stack or pile thereof, being thereby separated from the stack or pile with minimum risk of delivering more than one item or sheet at a time to other mechanism by which the items or sheets are to be handled or through which the same are to be passed. For example, the sheet feeding mechanism, according to this invention, may be utilized to deliver paper money or like items of sheet form to mechanism adapted to carry the same into operative relation to counting means, as shown in my aforesaid copending application; or the same may be utilized for delivering the items to any other mechanism adapted to act thereupon or to be acted upon thereby.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:—

Fig. 1 is a fragmentary side elevation of a machine equipped with the novel sheet feeding mechanism according to this invention; and Fig. 2 is a fragmentary plan view of the same, drawn on an enlarged scale. Fig. 3 is a longitudinal vertical section, taken on line 3—3 in Fig. 2; and Figs. 4 and 5 are fragmentary detail sectional views of the sheet feeding mechanism, respectively showing successive steps in the functional operation thereof.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

Referring to the drawings, the machine with which the sheet feeding means according to this invention is shown, for the purpose of illustrating the structure and mode of operation of the latter, comprises a base 1 having laterally spaced side plates 2 and 3 upstanding therefrom; said

base being supported by brackets 4 from a suitable standard means or frame. In a power driven machine, power from a suitable source is applied through suitable transmission means to a countershaft 9 which is journaled in and between said brackets 4. Journaled in and between the side plates 2 and 3 is a driven shaft 11 which is driven from said countershaft 9 by a chain and sprocket transmission 13. Fixed on said shaft 11 are grooved rollers or pulleys 15 over which are engaged and by which are operated a set of conveyer belts 17. Mounted above the rollers or pulleys 15 are feed rollers 18, the shafts 19 of which are carried in spring-controlled bearing brackets 20 so that said feed rollers are yieldably urged toward and into contact with the outer circumferences of the underlying driven rollers or pulleys 15. Arranged in advance of said feed rollers 18, in parallel relation thereto, is a take-over roller 21, the shaft 22 of which is journaled in and between the side plates 2—3. The feed rollers 18 are driven by contact with the rollers or pulleys 15 and, in turn, drive by contact the take-over roller 21 in the same direction through the medium of an intermediate transmission roller 23, the shaft 24 of which is journaled in spring-controlled bearings 25 operative to urge said transmission rollers 23 into mutual frictional contact with both the feed rollers 18 and the take-over roller 21. Preferably said feed rollers 18, take-over roller 21 and transmission rollers 23 are each made of rubber or like material having more or less resilient characteristics.

The side plates 2—3 are suitably cut away at their ends to provide clearance for the operative movements of the sheet feeding mechanism operative to successively pick up and deliver the sheets to the take-over roller 21 and thence to the feed rollers 18 and conveyer. The sheet feeding means comprises pick-up roll elements 26 which are fixed on a hollow transverse spindle 27. The ends of said spindle 27 are provided with peripherally grooved journal elements 28 rotatably mounted in the free forked ends 29 of oscillatable arms 30. These oscillatable arms 30 are respectively pivotally suspended from the respective side plates 2 and 3 by a fulcrum shaft 31 to which said arms are affixed. Secured to the side plates 2 and 3 are fixed longitudinally disposed toothed racks 32. Fixed on the spindle 27 of said pick-up roll elements 26 are pinions 33, the teeth of which respectively mesh with said racks 32. Spaced above and parallel to said racks 32 are guide bars 34 which engage the hubs of said pinions 33 so as

to guide the rectilinear inward and outward travel of the pick-up roll elements 26 toward and from the take-over roller 21. The spindle 27 is provided with an axial passage 35, open at one end thereof, and extending through the pick-up roll elements 26 are radial branch passages 36 communicating at their inner ends with said spindle passage 35 and terminating at their outer ends at the maximum circumferential faces of said pick-up roll elements. Preferably the outer end of said branch passages 36 are surrounded by resilient suction nozzle elements 37, the outer flared ends of which preferably project slightly beyond said circumferential faces of said pick-up roll elements. Said suction nozzles 37 are preferably made of soft rubber, and are adapted to effect a close air-tight contact with the items or sheets desired to be picked up and fed by the pick-up roller elements. Means (not shown) are provided for applying suction effect through a flexible conduit 41 to the spindle passage 35 and branch passage 36 and operative at the nozzle formed mouths which are outwardly presented at the circumferential faces of said pick-up roll elements. The means for producing properly timed oscillation of said arms 30, comprises a shaft 42 journaled in and between said side plates 2 and 3, and driven by a chain and sprocket transmission 42', or other suitable transmission means, from the countershaft 9. Fixed on and rotated by said shaft 42 are crank members 43 which are respectively connected by links 44 to the respective oscillatable arms 30.

Means are provided beneath the pick-up roll elements 26 and between the side plates 2 and 3 for supporting and presenting a pile or stack of sheets or items to be fed one by one to mechanism served by the sheet feeding devices. This means comprises a vertically movable carriage or platform 45, the same having laterally projecting arms 46 extending through vertical slots 47 provided in the side plates 2 and 3 and guided in vertically slotted guide posts 48 exteriorly of said side plates. Compression spring members 49 around said posts between the bases thereof and said arms 46 serve to yieldably thrust said carriage or platform 45 upwardly toward said pick-up roll elements. At its underside, said carriage or platform is provided with a slotted handle means 50 engageable by the hand of the machine attendant to depress the carriage or platform 45 for the reception of a stack or pile S of items or sheets to be subjected to manipulation by the sheet delivery mechanism.

Cooperative with the take-over roller 21 are yieldable presser pawls 51 for pressing a delivered item or sheet into operative engagement with the surface of said take-over roller. These presser pawls are pivotally mounted on a transverse fulcrum shaft 52 supported between the side plates 2 and 3, and are provided at their free ends with rollers 53 to engage the surface of said take-over roller. Each pawl 51 is provided at its fulcrumed end with a dependent arm 54, between which and a stationary point is connected a pull-spring 55 operative to yieldably swing the pawl and its roller 53 toward the take-over roller 21.

Bounding the inner side of the path of movement of said stack or pile supporting carriage or platform 45 is a transverse vertical partition plate 56, at and along the upper margin of which is secured a fixed clip plate 57, the free end portion of which overhangs and arrests the top of the stack or pile of items or sheets S. Pivotaly

connected to fulcrum ears 58, at the ends of the side plates 2 and 3, are upwardly extending arms 59 which terminate at their upper free ends in angular push-pieces 60. Said push-pieces 60 extend inwardly so that their extremities are aligned with and opposed to the circumferences of collars 61 carried by spindle 27 adjacent each pinion 33 thereof. Affixed to the upper portions of the side plate ends to depend therefrom, and lie between said push-pieces 60 and collars 61, are flexible straps or buffer members 62. Carried by said arms 59, so as to extend between the same and so as to be movable therewith, is a guard-plate 63 which abuts the outer side of the stack or pile of items or sheets 6. Said guard plate 63 is provided along its upper margin with an inwardly projecting horizontal keeper lip 64 which is adapted at proper times to overhang the outer transverse marginal portions of the top of said stack or pile 5.

The operation of the sheet feeding mechanism is as follows:

The stack or pile S is deposited upon the carriage or platform 45, the compression springs of which thrust upwardly the same to abut the topmost stem or sheet of the stack in contact with the pick-up roll elements 26. The pick-up roll elements are initially disposed in an outwardly moved position in which the suction passages 36 and nozzles 37 thereof are downwardly directed, with the latter operatively engaging the topmost item of the stack S along its outward marginal edge portion. When the pick-up roll elements are disposed in this initial position, the collars 61, which engage the push-pieces 60 of arms 59, have outwardly thrust said push-pieces 60 thereby moving said arms 59 to outswung position, so that the guard plate 63 is swung outwardly from the top of the stack S and the keeper lip 64 is removed from the topmost item or sheet of said stack, thus exposing the outer marginal edge portion of said topmost item or sheet to operative engagement by the suction nozzles 37 (see Fig. 3). Prior to the inward rolling movement of said pick-up roll elements 26, the suction means serving the same is timed to create suction effect through the air passages and nozzles, whereby said topmost item or sheet of stack S is caused to adhere to the pick-up roll elements. Following this, the timed operation of the crank members 43 effect, through the links 44, an inward swinging movement of the arms 30 to thereby move the pick-up roll elements 26 toward the take-over roller 21. As said pick-up roll elements are thus inwardly moved, the pinions 33 thereof will travel on the racks 32, thus imparting to the pick-up roll elements an anticlockwise rotation, whereby the adhering topmost item or sheet from stack S is rolled upwardly and over the inwardly moving pick-up roll elements, thus producing an effect that may be characterized as "peeling" the item or sheet from the stack S. As the pick-up roll elements are thus moved inwardly, the collars 61 are caused to travel away from the push-pieces 60 so that arms 59, under the tension of pull springs 65 which serve the same, swing inwardly, thereby carrying the guard plate 63 into engagement with the stack S and its keeper lip 64 into overlying engagement with the item or sheet underlying the picked up topmost sheet, so as to hold the former against any following movement or other displacement, while at the same time preventing any uptilting of the stack or pile when the pressure of said pick-

up roll elements 26 is removed from the top outer marginal portions thereof (see Fig. 4). By the inward rolling movement of said pick-up roll elements 26, the adhering item or sheet is carried inwardly and thus directed toward the take-over roller 21, and a tangentially projected margin thereof is finally presented between the under surface of said take-over roller and the rollers 53 of the presser pawls 51 (see Fig. 5). Once such projected edge of the item or sheet is thus engaged by the take-over roller 21, the operation of the air suction means serving the pick-up roll elements is so timed as to discontinue its suction effect, thereupon releasing the item or sheet from adherence to said pick-up roll elements so that the grip of the rotating take-over roller 21 and cooperative presser pawls functions to propel the item or sheet onward until the same is gripped between the rotating feed rollers 18 and the outer circumferences of the conveyer rollers or pulleys 15, which thereupon continue the forward movement of the item or sheet so that the same is delivered upon the forwardly moving courses of the conveyer belts 17, or to such other mechanism to which it is desired to successively deliver the items or sheet material. In the meantime, the continuing operation of the crank members 43 and links 44 operates to swing back and outwardly the arms 30, thereby moving the pick-up roll elements 26 outwardly with reversed rotative effect, so as to return the same to normal initial position and at the same time outswing the guard plate 63 and its guard lip 64 to expose the top of the stack S to the thus returned pick-up roll elements, whereupon the mechanism is ready for repetition of the described operations, such operations continuing so long as the machine is driven or until the stack S is exhausted.

In the accompanying drawings I have shown my present invention and have described the same in the above specification merely in a preferred form and by way of example, but obviously many alterations and variations may be made therein and in its component mechanisms and parts as well as in the mode of operation thereof, which will still be comprised within the spirit of my invention. Generally speaking, I desire it to be understood that I do not limit myself to any specific form or embodiment except in so far as is defined in the here following claims.

I claim:—

1. In a machine of the class described, means to pick up sheets of material successively from a yieldably supported stack thereof and deliver the same to sheet advancing means comprising, a cylindrical pick-up roll element having suction means timed to grasp and release a sheet, said roll corresponding substantially to the width of the sheets, means to cause a forward and backward rolling movement of said pick-up roll element across the stack pile whereby the exposed sheet of the stack pile is grasped adjacent one margin thereof and peeled from the stack pile by forward rolling movement of said element, said means including rack and pinion means and a cooperating guide means whereby said pick-up roll element moves in continuous contact with the sheet stack, said sheet advancing means including a rotatable take-over roller, and yieldable means cooperative with said latter roller to press a sheet into engagement therewith, forward rolling movement of said pick-up roll element being adapted to carry the grasped marginal portion of the picked up sheet into operative engagement

with and by said take-over roller and said pressing means.

2. In a machine of the class described, means to pick up sheets of material successively from a yieldably supported stack thereof and deliver the same to sheet advancing means comprising, a cylindrical pick-up roll element having suction means timed to grasp and release a sheet, said roll corresponding substantially to the width of the sheets, means to cause a forward and backward rolling movement of said pick-up roll element across the stack pile whereby the exposed sheet of the stack pile is grasped adjacent one margin thereof and peeled from the stack pile by forward rolling movement of said element, said means including rack and pinion means and a cooperating guide means whereby said pick-up roll element moves in continuous contact with the sheet stack, said sheet advancing means including a rotatable take-over roller, yieldable means cooperative with said latter roller to press a sheet into engagement therewith, forward rolling movement of said pick-up roll element being adapted to carry the grasped marginal portion of the picked up sheet into operative engagement with and by said take-over roller and said pressing means, a conveyer means beyond said take-over roller, and feed roller means cooperative with the receiving end of said conveyer means, said take-over roller being adapted to deliver an engaged sheet to said feed roller and conveyer means.

3. Sheet feeding mechanism, comprising a pick-up roll element having means to engage and hold and remove a sheet from a yieldably supported pile thereof, and means to roll said element across the stack to thereby separate a sheet therefrom by a peeling action and present an advanced marginal portion thereof in position to be taken over by a receiving means, and means synchronously movable with the pick-up roll element to engage the pile during separation of a sheet therefrom.

4. Sheet feeding mechanism, comprising a pick-up roll element, said roll element having suction means timed to grasp and release a sheet, means to initially position said roll element so as to grasp and hold an exposed sheet of a yieldably supported sheet pile adjacent to a marginal edge thereof and to roll said element across the stack to thereby separate said engaged sheet therefrom by a peeling action and thereupon present the grasped marginal edge of said separated sheet in position to be taken over by a receiving mechanism, and means movable synchronously with said roll element to engage and hold the remaining sheets of the pile during separation therefrom of the sheet manipulated by the roll element.

5. Sheet feeding mechanism, comprising a pick-up roll means having suction means timed to grasp and release a sheet, means to cause a forward and backward rolling movement of said pick-up roll means across a yieldably supported sheet pile whereby the exposed sheet thereof is grasped adjacent to its outer margin and peeled from the pile by forward rolling movement of said pick-up roll means, a take-over means to receive the peeled sheet from said pick-up roll means, and movable clamp means actuated by the forward and backward movement of said pick-up roll means adapted to engage and disengage the pile, said clamp means operating to hold the remaining sheets of the pile against displacement during separation of a sheet therefrom by said pick-up roll means.

6. Sheet feeding mechanism, comprising a pick-up roll means having suction means timed to grasp and release a sheet, means to cause a forward and backward rolling movement of said pick-up roll means across a yieldably supported sheet pile whereby the exposed sheet thereof is grasped adjacent to its outer margin and peeled from the pile by forward rolling movement of said pick-up roll means, movable clamp means actuated by the forward and backward movement of said pick-up roll means adapted to engage and disengage the pile, said clamp means operating to hold the remaining sheets of the pile against displacement during separation of a sheet therefrom by said pick-up roll means, a take-over roller, and means to press a sheet into engagement with said take-over roller, forward rolling movement of said pick-up roll means being adapted to carry the grasped marginal portion of the picked up sheet into operative engagement with and by said take-over roller.

7. Sheet feeding mechanism, comprising a pick-up roll means having suction means timed to grasp and release a sheet, means to cause a for-

ward and backward rolling movement of said pick-up roll means across a yieldably supported sheet pile whereby the exposed sheet thereof is grasped adjacent to its outer margin and peeled from the pile by forward rolling movement of said pick-up roll means, movable clamp means actuated to the forward and backward movement of said pick-up roll means adapted to engage and disengage the pile, said clamp means operating to hold the remaining sheets of the pile against displacement during separation of a sheet therefrom by said pick-up roll means, a take-over roller, means to press a sheet into engagement with said take-over roller, forward rolling movement of said pick-up roll means being adapted to carry the grasped marginal portion of the picked up sheet into operative engagement with and by said take-over roller, a conveyer means beyond said take-over roller, and feed roller means cooperative with the receiving end of said conveyer means, said take-over roller being adapted to deliver an engaged sheet to said feed roller and conveyer means.

EDWARD P. DONNELLAN.