

Aug. 29, 1933.

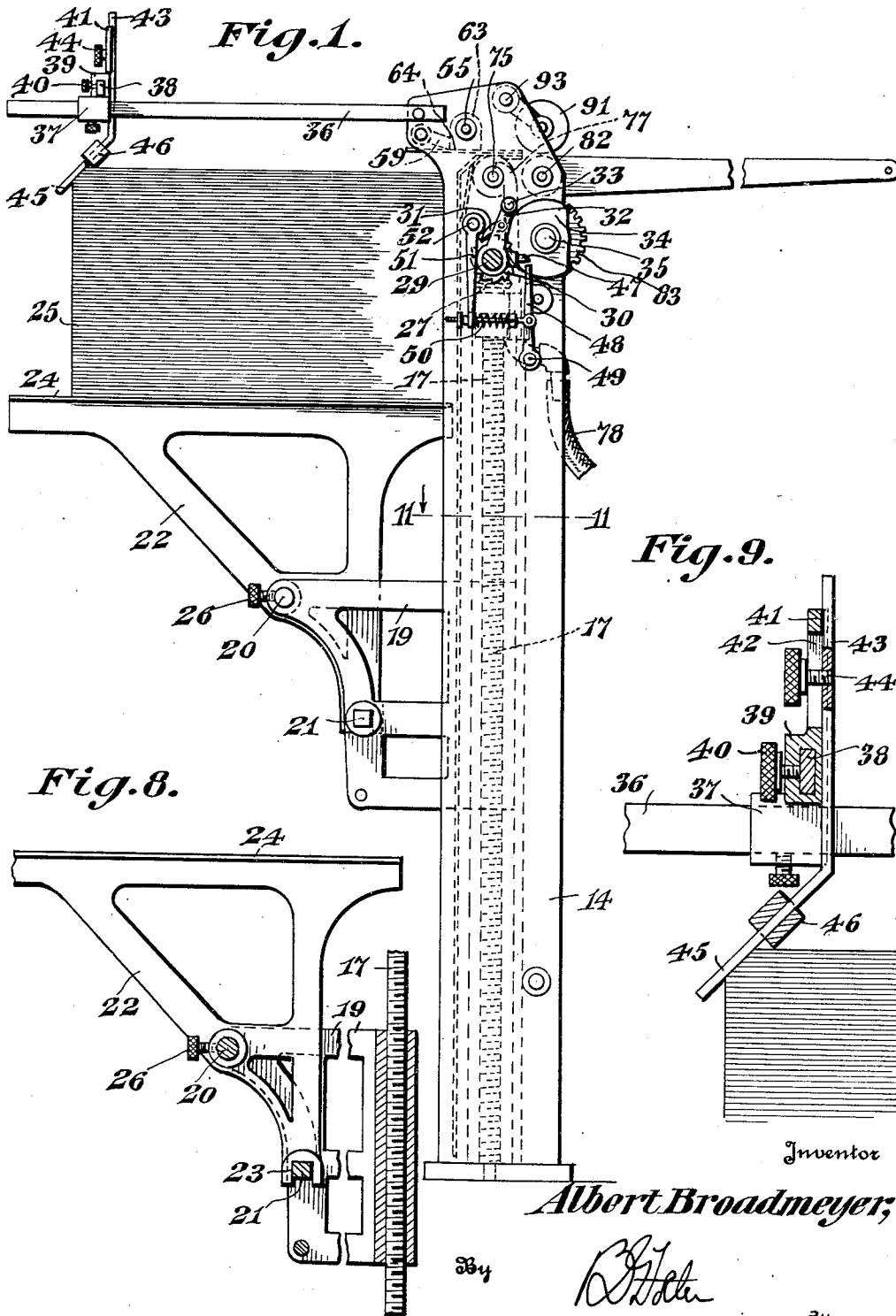
A. BROADMEYER

1,924,908

SHEET FEEDING MECHANISM

Filed Aug. 6, 1930

5 Sheets-Sheet 1



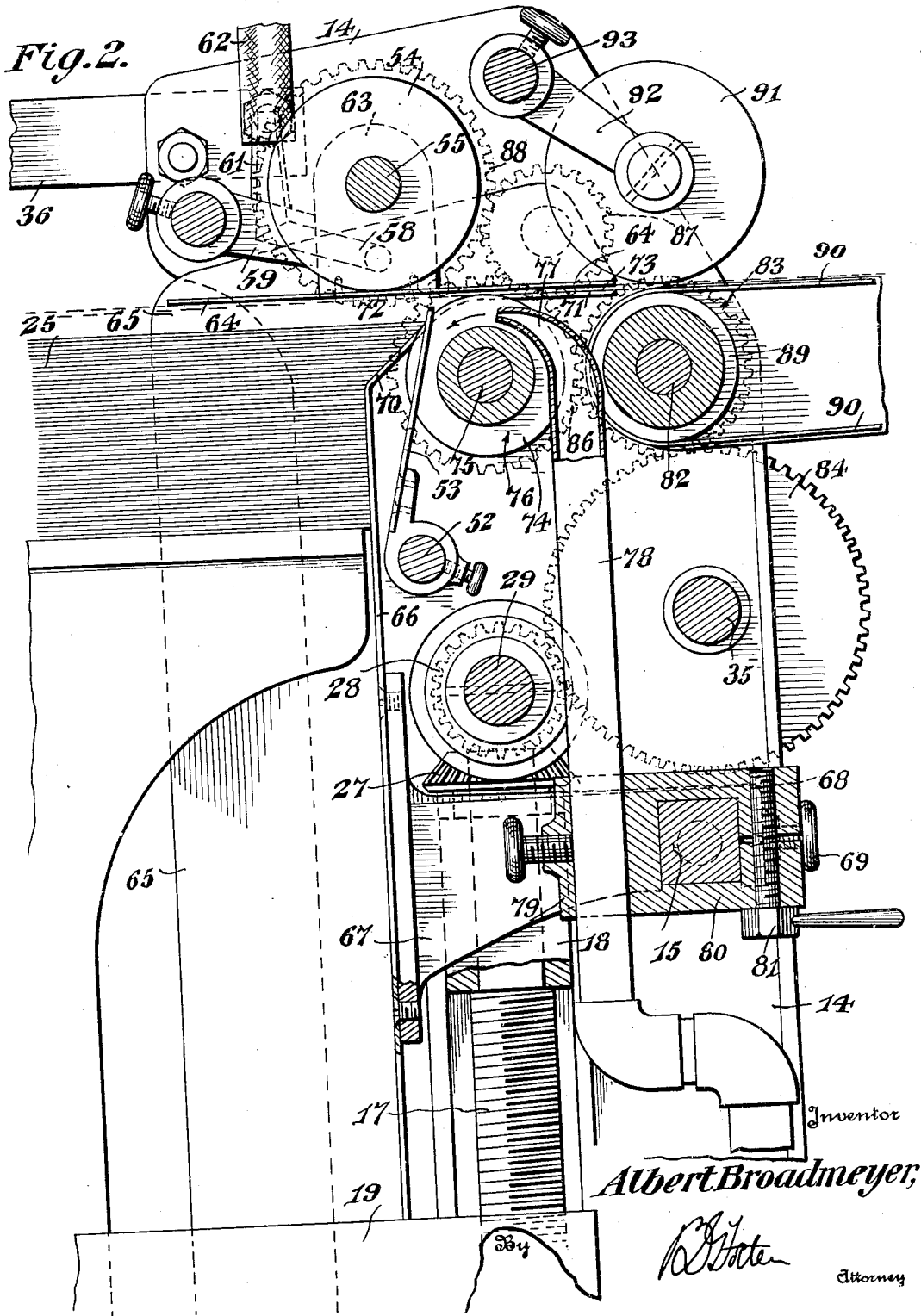
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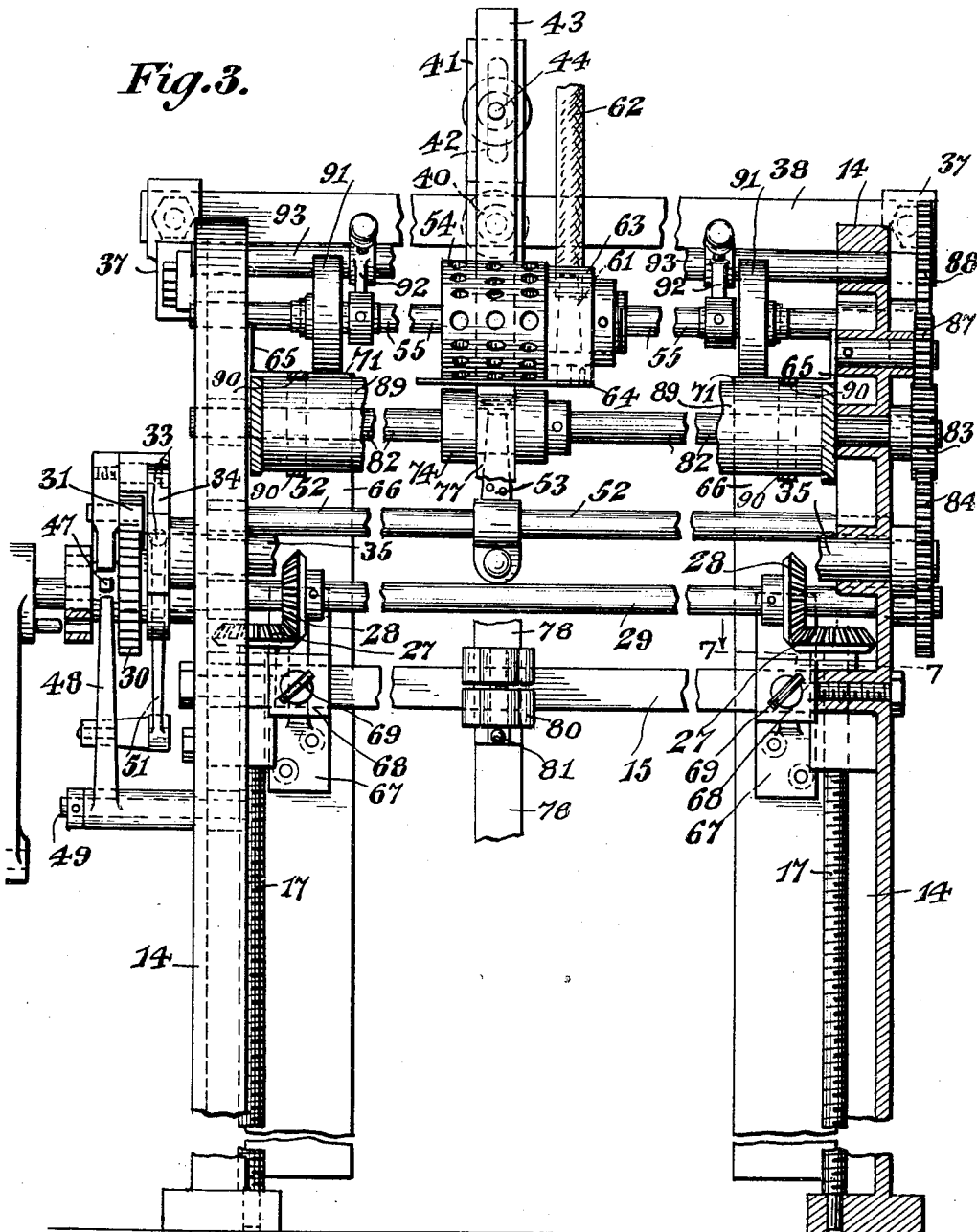
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Fig. 3.



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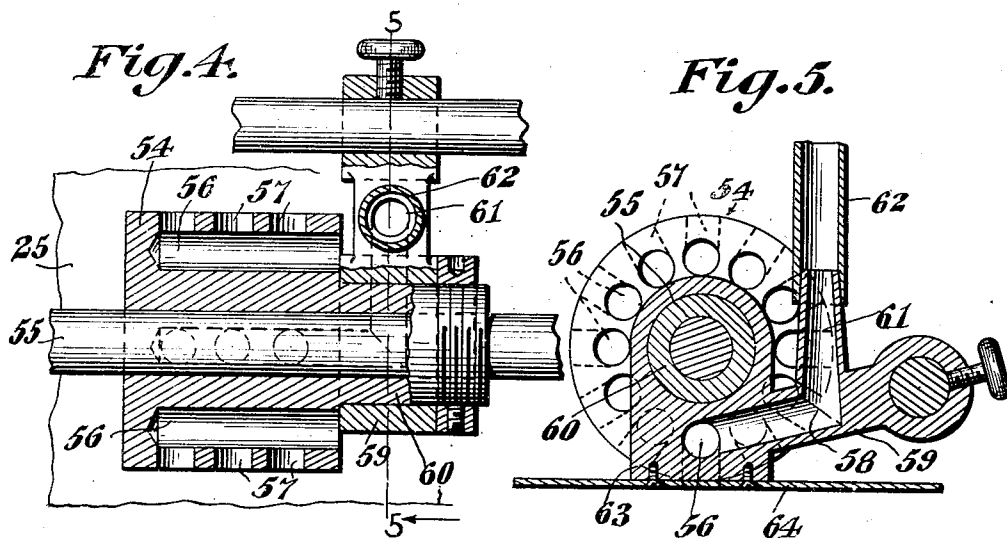
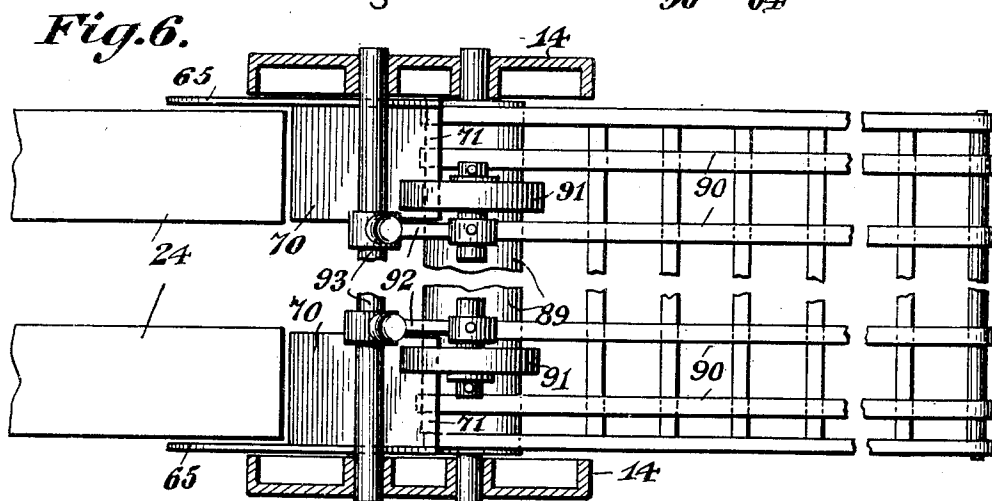
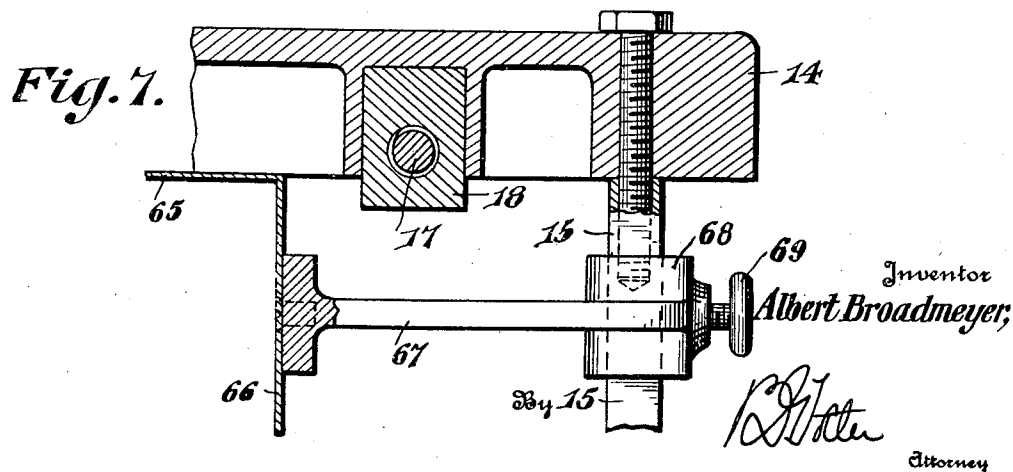
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SHEET FEEDING MECHANISM

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Fig. 10.

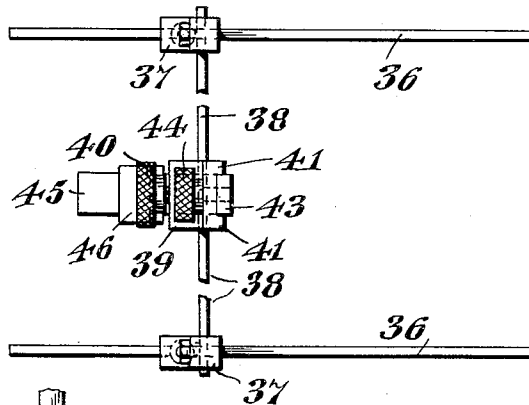


Fig. 11.

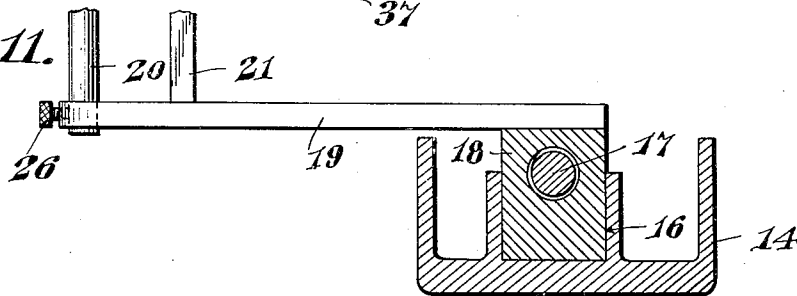


Fig. 12.

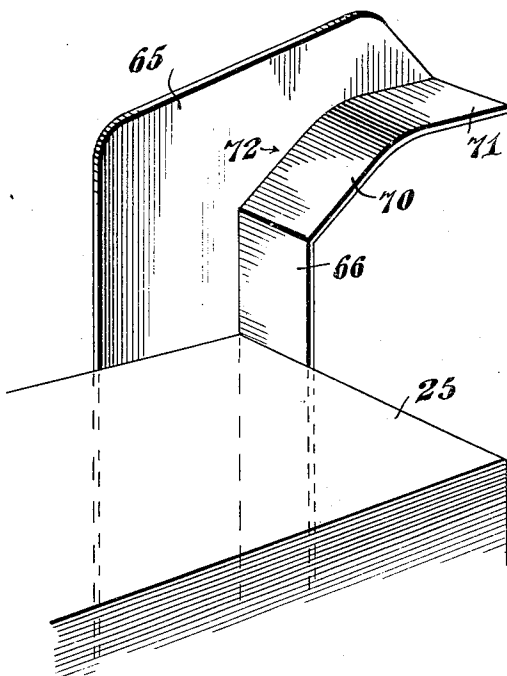
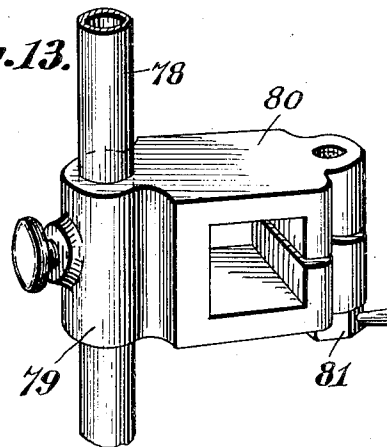


Fig. 13.



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UNITED STATES PATENT OFFICE

1,924,908

SHEET FEEDING MECHANISM

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Application August 6, 1930. Serial No. 473,445

13 Claims. (Cl. 271—28)

One of the objects of the present invention is to provide a relatively small and compact machine of a novel character that is designed for small sheets or cards, though there are features involved that are useful in other relations.

More particularly a light and simple support for the pile is provided that is easily adjustable to the area of the sheets or cards.

Another and important object is to provide a novel mechanism that will separate sheets which adhere to those being fed and return them for later feeding.

A still further object is to provide novel mechanism for controlling the elevation of the support and for positioning the sheets so that they will be more available to the delivering device and to the air blast separating them from the underlying sheets.

In the accompanying drawings:

Figure 1 is a side elevation of an embodiment of the invention that is at present considered the preferable one.

Figure 2 is a vertical sectional view there-through.

Figure 3 is a rear elevation of the structure.

Figure 4 is a detail horizontal sectional view through the suction head or roller.

Figure 5 is a sectional view on the line 5—5 of Figure 4.

Figure 6 is a plan view of a portion of the mechanism, parts being shown in section.

Figure 7 is a horizontal sectional view showing one of the guides and its mounting and is taken substantially on the line 7—7 of Figure 3.

Figure 8 is a vertical sectional view through the paper support and showing one of the supporting brackets in elevation.

Figure 9 is a detail sectional view of the means for pushing the uppermost sheets rearwardly.

Figure 10 is a plan view of the same.

Figure 11 is a detail sectional view substantially on the line 11—11 of Figure 1, and showing the guideway and a portion of the carriage that operates therein.

Figure 12 is a detail perspective view of one of the guides and indicating the manner in which the pile is associated therewith.

Figure 13 is a perspective view of the holding device for the blast nozzle.

In the embodiment disclosed, a frame is employed, including side standards 14 connected by suitable cross bars, one of which is square in cross section, and designated 15. Each standard, as shown in Figure 11, is provided with inset

longitudinal flanges, certain of which define a guideway 16. Vertical screws 17 are located in said guideways and are rotatably mounted.

On the screws and having threaded engagement therewith, are sleeves 18 carrying outstanding brackets 19 that are connected by cross rods 20 and 21, the latter being preferably square in cross section. These sleeves 18, brackets 19 and cross rods 20 and 21 constitute a vertically movable carriage, forming a part of the support for the pile of sheets to be fed. Mounted on the cross rods 20 and 21 are brackets 22, the cross rod 20 extending through openings in the brackets, and the cross rod 21 being engaged in notches 23 formed in the lower ends of the brackets. The tops of these brackets are provided with horizontal flanges or strips 24, constituting platforms on which the pile of sheets or cards, shown at 25, rest. The brackets being slidably mounted on the rods, are thus adjustable toward and from each other, so that the platform, or what may be termed the table, can be adjusted to the cross sectional area of the pile of sheets. These brackets may be held by any suitable means, as for example, set screws 26 threaded therein and engaging the cross rod 21.

The upper ends of the screws 17 are provided with beveled gears 27 engaged by other beveled gears 28 on a horizontal cross shaft 29. This cross shaft extends beyond one of the standards 14 and is provided with ratchet mechanism, by which it is turned. To this end said shaft 29 (see Figure 1), is provided with the usual ratchet wheel 30 adapted to be engaged by a pawl 31 mounted on a pawl carrier 32 that swings on the shaft 29 alongside the ratchet wheel. The pawl carrier 32 is provided at its free end with a roller 33 that rides the periphery of a cam 34 on a drive shaft 35 journaled in the standards 14 parallel to the shaft 29. Therefore when the pawl carrier is free and the shaft 35 is rotating, the cam 34 will cause the carrier 32 to oscillate, permitting the pawl 31 to alternately ride over the teeth of the ratchet wheel 30, and then causing said pawl to engage the teeth and turn the ratchet wheel and shaft 29, thus turning the screws 17 and elevating the pile support.

Mounted over the pile support and carried by the frame, is a rearwardly extending arm 36. This arm has adjustably mounted thereon a collar 37 which carries a transversely disposed arm or bar 38. Slidably mounted on the bar 38 is a bracket 39 that can be held by a set screw 40, the bracket having an upstanding portion 41 provided with a longitudinal slot 42. Lying against the portion

41 is a vertical bar 43 carrying a holding screw 44 that passes through the slot 42. The lower end of this bar is forwardly and downwardly inclined as shown at 45, and has a stop enlargement 46 thereon. It will be noted by reference to Figures 1 and 9 that when the pile is moved upwardly by the elevation of the pile support, the front corner of the pile will strike the lower inclined portion 45 of the bar, thereby forcing the uppermost sheets rearwardly. This rearward movement controls the operation of the ratchet mechanism by the following means.

The pawl carrier 32, as shown in Figure 1, has a rearwardly extending stop finger 47, and a holding device or detent finger 48, pivoted at 49, is adapted to move to and from a position beneath the said finger. This detent 48 has an extensible yielding connection 50 with a depending arm 51 on a rock shaft 52. The rock shaft extends across the frame behind the pile, and as shown in Figure 2, carries an upstanding governor finger 53 that is located in the path of the uppermost sheets pushed rearwardly. The arrangement therefore is such that when the pile has been elevated and the sheets pushed rearwardly, they will in turn press the arm 53 rearwardly, thereby rocking the shaft 52, swinging the arm 51 forwardly, and through the link 50, causing the detent 48 to move to a position beneath the finger 47. When so positioned, the roller 33 of the pawl carrier 32 cannot follow the depressed portion of the cam 34 and therefore the pawl 31 cannot ride over the teeth of the ratchet wheel 30. The means for elevating the table is therefore held inactive. When sheets, however, are fed from the top of the pile and the surface is lowered, then the arm 53 can swing forwardly, as a consequence of which the detent 48 will move from under the finger 47, allowing the pawl carrier 32 to operate and be operated by the cam, thus turning the screws and elevating the table until another lot of sheets has been pushed rearwardly sufficiently to again swing the arm 53 rearwardly.

The means for feeding the sheets or delivering them from the top of the pile is preferably a rotary suction head or roller 54 carried by a shaft 55. This roller may be of any desired construction, but preferably, as shown in Figures 4 and 5, consists of a series of longitudinal passageways 56 connecting respectively with sets of peripheral ports 57 in the roller. The passageways 56 open through one end of the head, and when in their lowermost positions connect with a suction passageway 58 formed in a collar 59 on the hub 60 of the suction roller. This passageway 58 extends into a nipple 61, to which is connected an exhaust pipe 62 leading to the intake of a suction fan or other vacuum creating means (not shown). The collar 59 is also provided with a depending enlargement 63, to the bottom of which is secured a horizontal plate 64 having an opening, into which the lower side of the suction head or roll 54 extends. This roll, it will be noted, is located directly above the rear portion of the top of the pile, which has been displaced by the device 45.

In order to keep the pile and the sheets thereof in proper position, upright guides are mounted at the rear corners of the pile. These guides are preferably in the form of angle pieces having side flanges 65 and rear flanges 66. In the angles the rear corners of the pile are located. The guides are supported on brackets 67 secured to the rear flanges 66 and having yokes 68 that embrace the square frame rod 15, to which they are secured by suitable set screws 69. The corner guides are

thus laterally adjustable so that they can be placed in proper position when the pile supporting brackets are adjusted. At their upper ends these guides are provided with upwardly and rearwardly inclined portions 70 from which extend horizontal portions 71 that underlie the plate 64 and form an entrance throat 72 and a guideway 73 (see Figure 2). It is into this throat 72 that the upper sheets of the pile are pushed by the device 45.

Cooperating with the suction head or roll 54, but operating in a reverse relation thereto, is a sheet separating and returning roll 74 mounted on a shaft 75, and preferably having a rubber-covered periphery or other friction forming surface. This roller 74 is located in rear of the pile below and slightly in rear of the suction roll 54 and is so positioned that its periphery will operate in the throat 72. It is provided with a peripheral groove 76, in which the arm 53 operates, and in the rear portion of said groove there is preferably placed a blast nozzle 77 that directs a blast of air forwardly toward the displaced sheets at the top of the pile. The blast nozzle is carried by a vertical pipe 78 adjustably fixed in a bracket 79. This bracket includes a split clamp or collar 80 mounted on the square shaft 15 and contracted by a suitably handled bolt 81.

For the purpose of driving the various parts a main drive shaft 82 is provided, having a gear 83 in mesh with a gear 84 on a cam shaft 35. This gear 83 also is in mesh with a gear 86 on the shaft 75 of the roller 74. The gear 86 furthermore meshes with an idler gear 87 that operates a gear 88 fixed to the shaft 55. The drive shaft 82 is provided with a roller 89, around which pass the usual belts 90 for carrying the sheets away from the feeding mechanism. Cooperating with the roller 89 are pressure rollers 91 mounted on swinging arms 92 that are carried by a cross rod 93.

In the operation of this structure, a pile of sheets or cards is placed on the bracket 22 which are properly adjusted to support the same. When the drive shaft is thrown into operation, then the said lower side of the suction roll will operate rearwardly while the upper side of the return roll 74 will move forwardly or in the direction of the arrows shown in Figure 2. The pile support and pile are moved upwardly by the ratchet mechanism until the upper sheets have been forced rearwardly so as to swing the arm 53 rearwardly and stop the ratchet mechanism. The suction roller operating intermittently in a well-known manner, will pick up the topmost sheet that has been blown upwardly by the blast from the nozzle 77 and move it rearwardly through the throat 72 and guideway 73 until it is caught by the roller 89, rollers 91 and the tapes 90 and carried rearwardly. Should an underlying sheet adhere to the sheet thus being fed, it will be engaged by the forwardly acting surface of the roll 74 and this will act to remove the attached sheet and return it, leaving the upper sheet free to pass onward. The attached sheet is thus in position to be the next operated on.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim, is:

1. In a sheet feeding apparatus, the combination with a vertically movable pile support, of means for feeding the sheets in an edgewise direction and rearwardly from the top of a pile on the support, means for elevating the support toward the feeding means, means for causing the upper sheets of the pile to be moved rearwardly to project their rear ends beyond the pile when the support is elevated, means for positioning the pile including rearwardly inclined stops at the top for limiting the rearward movement of the top sheets, and means for directing a blast of air against the rearwardly projecting margins of the said sheets.

2. In a sheet feeding apparatus, the combination with a vertically moving pile support, of means for elevating it and a pile placed thereon, an arm overhanging the pile support, a depending forwardly inclined finger adjustably mounted on the arm and having means for fixing it thereto, forming an inclined way that is located in the path of the top of the pile to push the sheets thereof rearwardly, and mechanism for removing successively the top sheets which have been so pushed.

3. In a sheet feeding apparatus, the combination with a vertically movable pile support, of means for removing sheets successively from the top of a pile on the support, mechanism for elevating the support toward the removing means as the sheets are removed, means for laterally offsetting the uppermost sheets of the pile as the support is elevated, and means controlled by the offset sheets to govern the operation of the support moving mechanism.

4. In a sheet feeding apparatus, the combination with a vertically movable pile support, of means over the rear portion of the support for removing sheets from the top of a pile placed on the support, mechanism for elevating the pile support, means for pushing the uppermost sheets of the pile rearwardly as the support is elevated, and means for controlling the operation of the support elevating mechanism including a governing device in the path of and operated by the sheets that are pushed rearwardly.

5. In a sheet feeding apparatus, the combination with a vertically movable pile support, of means over the rear portion of the support for removing sheets from the top of a pile placed on the support, mechanism for elevating the pile support, means for pushing the uppermost sheets of the pile rearwardly as the support is elevated, and means for controlling the operation of the support elevating mechanism, including a governing finger located in rear of the upper portion of the pile and actuated by the edges of the sheets pushed rearwardly.

6. In a sheet feeding apparatus, the combination with a vertically movable pile support, of means over the rear portion of the support for removing sheets from the top of a pile placed on the support, pawl and ratchet mechanism for elevating the pile support, means above the front portion of the support for pushing rearwardly the uppermost sheets of the pile as the support is elevated, a detent for holding the pawl and ratchet mechanism inactive, and means for operating the detent including a finger at the rear of the pile that is pushed against and moved by the sheets when pushed rearwardly.

7. In a sheet feeding apparatus, the combination with a vertically movable pile support, of mechanism for elevating it, a rotary suction head

above the rear portion of the support, means for rotating the head in a direction to remove sheets from the support, a separating and return roll below the head having an annular groove, means for rotating the roll to cause its upper face to move in a direction opposite to the lower face of the suction head, means for pushing rearwardly the upper sheets of the pile, and means for controlling the operation of the support elevating mechanism including a governing device that operates in the groove of the roll and is engaged and operated by the sheets when pushed rearwardly.

8. In a sheet feeding apparatus, the combination with a vertically movable pile support, of pawl and ratchet mechanism for elevating it, a rotary suction head above the rear portion of the support, means for rotating the head in a direction to remove sheets from the support, a separating and return roll below the head having an annular groove, means for rotating the roll to cause its upper face to move in a direction opposite to the lower face of the suction head, means for pushing rearwardly the upper sheets of the pile, a detent for holding the pawl and ratchet mechanism against operation, and operating means for the detent including a swinging finger that operates in the groove of the roll and is engaged and operated by the sheets when pushed rearwardly.

9. In a sheet feeding apparatus, the combination with a vertically movable pile support, of pawl and ratchet mechanism for elevating it, a rotary suction head above the rear portion of the support, means for rotating the head in a direction to remove sheets from the support, a separating and return roll below the head having an annular groove, means for rotating the roll to cause its upper face to move in a direction opposite to the lower face of the suction head, means for pushing rearwardly the upper sheets of the pile, a detent for holding the pawl and ratchet mechanism against operation, operating means for the detent including a swinging finger that operates in the groove of the roll and is engaged and operated by the sheets when pushed rearwardly, and a blast nozzle for separating the sheets, said nozzle being also located in the groove of the roller.

10. In a sheet feeding apparatus, the combination with a vertically movable pile support, of ratchet mechanism for elevating it, a rotary suction roll above the rear portion of the support, a fugitive sheet return roll below the suction roll and at the rear of the support above the same, means for rotating the rolls to cause their opposing faces to move in opposite directions, means above the front side of the support for pushing the uppermost sheets of the pile toward the return roll, a detent for the ratchet mechanism, and operating means for the detent including a finger located in the path of the sheets pushed rearwardly and moved by said sheets.

11. In a sheet feeding apparatus, the combination with means for delivering sheets from the top of a pile, of a pile support movable toward the delivering means, said support comprising a carrier, and brackets mounted on the carrier and having mountings thereon that are relatively adjustable toward and from each other to permit the bodily adjustment of the brackets and permit them to support piles of different areas.

12. In a sheet feeding apparatus, the combination with means for delivering sheets from the

top of a pile, of vertical screws, means for rotating the screws, a carrier frame engaged with and moved by the screws, and pile supporting brackets having reciprocable mountings on the frame to secure the bodily adjustment of the brackets toward and from each other.

13. In a sheet feeding apparatus, the combination with a frame, of means mounted thereon for delivering sheets from the top of a pile, a pile support including a vertically movable carriage and substantially parallel pile-holding brackets reciprocably mounted on the carriage and bodily adjustable toward and from each other, upright pile guides along which the brackets operate, and means for mounting the guides on the frame and permitting their adjustment toward and from each other.

14. In a sheet feeding apparatus, the combination with a frame, of means mounted thereon for delivering sheets from the top of a pile, a pile support including a vertically movable carriage and pile-holding brackets mounted on the carriage and adjustable toward and from each other, upright guides angular in cross section and receiving the rear portions of the brackets, and mountings for said guides that permit their adjustment toward and from each other.

15. In a sheet feeding apparatus, the combination with a vertically movable pile support, of an overlying roller for delivering sheets from the top of a pile placed on the support, an overlying guide plate through which the lower portion of the roller extends, and an upstanding pile guide at the rear of the pile support, said guide having a rearwardly extending portion at its upper end that underlies the plate and forms therewith a guideway for the sheets moved by the roller.

16. In a sheet feeding apparatus, the combination with a vertically movable pile support, of an overlying roller for delivering sheets from the top of a pile placed on the support, an overlying guide plate through which the lower portion of the roller extends, an upstanding pile guide at the rear of the pile support, said guide having

a rearwardly extending portion at its upper end that underlies the plate and forms therewith a guideway for the sheets moved by the roller, and a separating and return roller operating in the lower portion of said guideway to detach adhering sheets from the sheets being moved by the overlying roller.

17. In a sheet feeding apparatus, the combination with a frame including upright standards having guideways, of vertical screws at the guideways, a vertical carriage engaged with the screws and guideways and having a cross bar, pile supporting brackets on the cross bar and adjustable thereon, angle guide strips at the rear ends of the brackets, mountings for said strips that permit the adjustment with the brackets, said strips having rearwardly extending portions at their upper ends, a plate overlying said portions, a rearwardly operating suction roll having its lower portion passing through the plate, a forwardly operating roll below the plate and between the rearwardly extending portions of the guide strips, a downwardly extending forwardly inclined device above the front portion of the brackets and operating to push the upper sheets of the pile over the rearwardly extending portions of the guide strips, ratchet mechanism for operating the screws, a detent for holding the ratchet mechanism inoperative, and a finger for operating the detent located between the rearwardly extending portions of the guides and moved by the sheets pushed thereover.

18. In a sheet feeding apparatus, the combination with a pile support and means for elevating it, of a fixed rearwardly inclined device that engages the front corner of a pile placed on the support and pushes the top portion of the pile rearwardly when the pile is elevated, and a sheet feeding device located over the upper rear portions of the sheets displaced rearwardly by said inclined device and operating on the top face only of the topmost sheet to feed the same rearwardly.

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