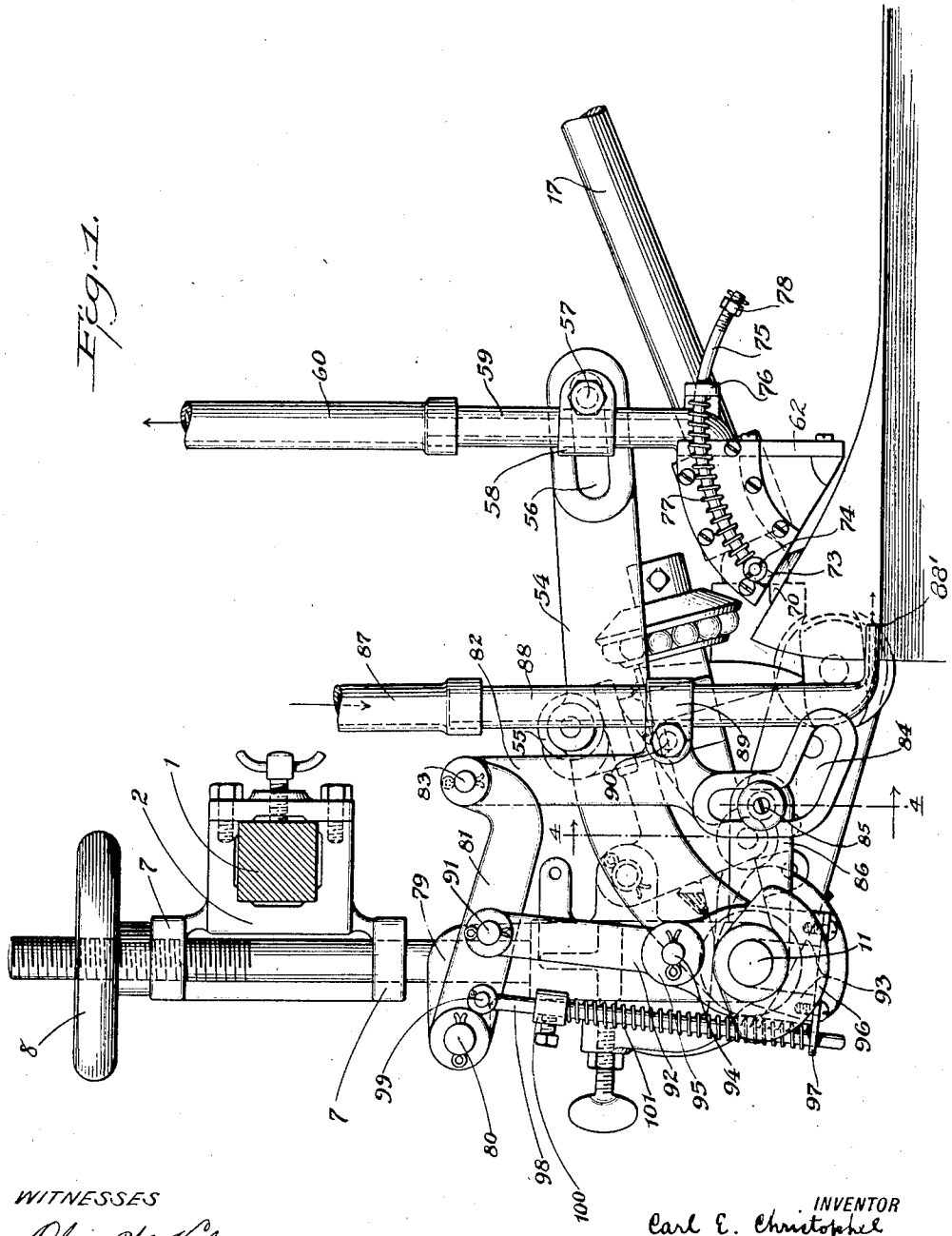
Nov. 27, 1923. 1,475,621

C. E. CHRISTOPHEL

SHEET SEPARATING MECHANISM

Filed Dec. 15, 1920 8 Sheets-Sheet 1

Fig. 1.



WITNESSES

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INVENTOR

Carl E. Christophel

BY Knight Bros

ATTORNEYS

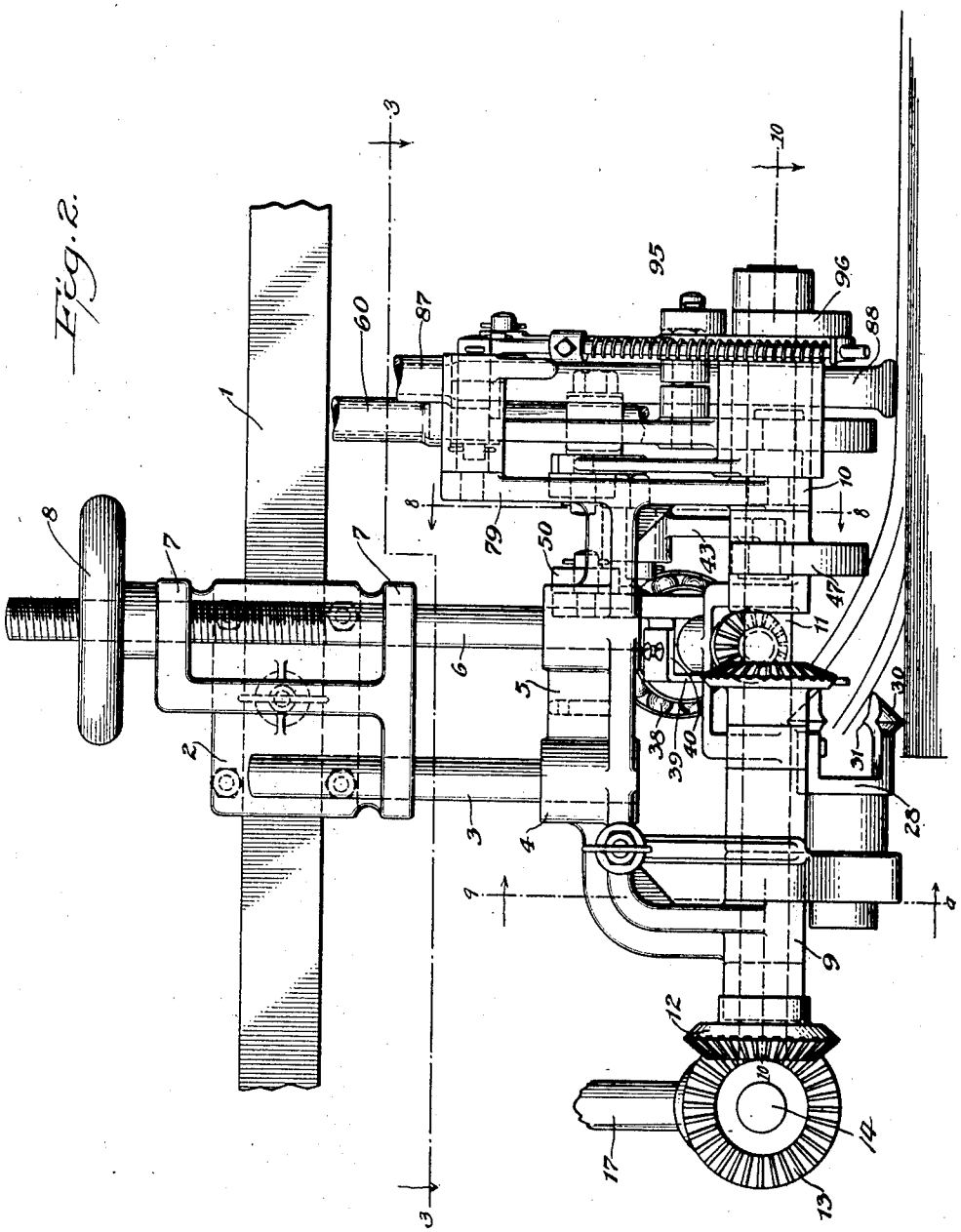
Nov. 27, 1923. 1,475,621

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SHEET SEPARATING MECHANISM

Filed Dec. 15, 1920 8 Sheets-Sheet 2

Fig. 2.



WITNESSES

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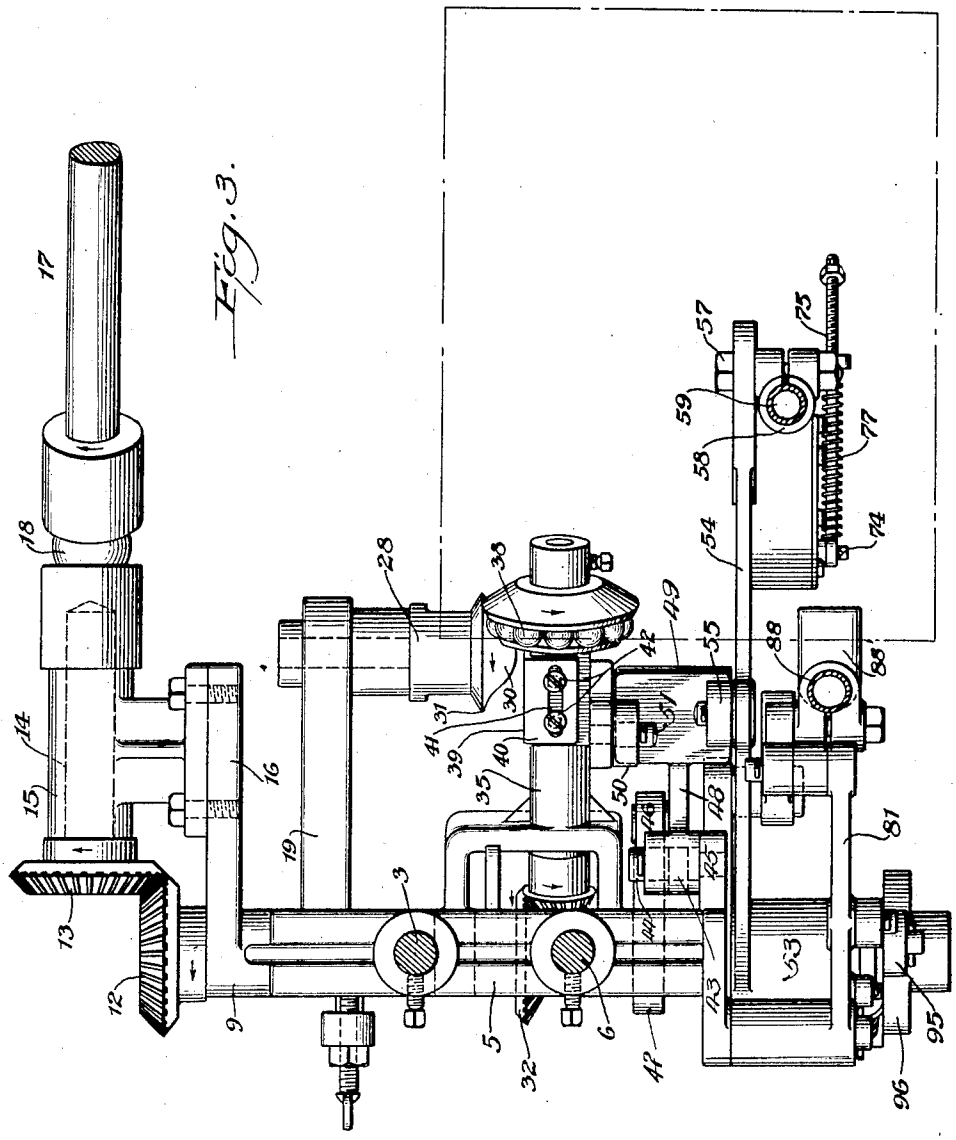
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SHEET SEPARATING MECHANISM

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Fig. 3.



WITNESSES

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Nov. 27, 1923. 1,475,621

C. E. CHRISTOPHEL

SHEET SEPARATING MECHANISM

Filed Dec. 15, 1920 8 Sheets-Sheet 4

Fig. 4.

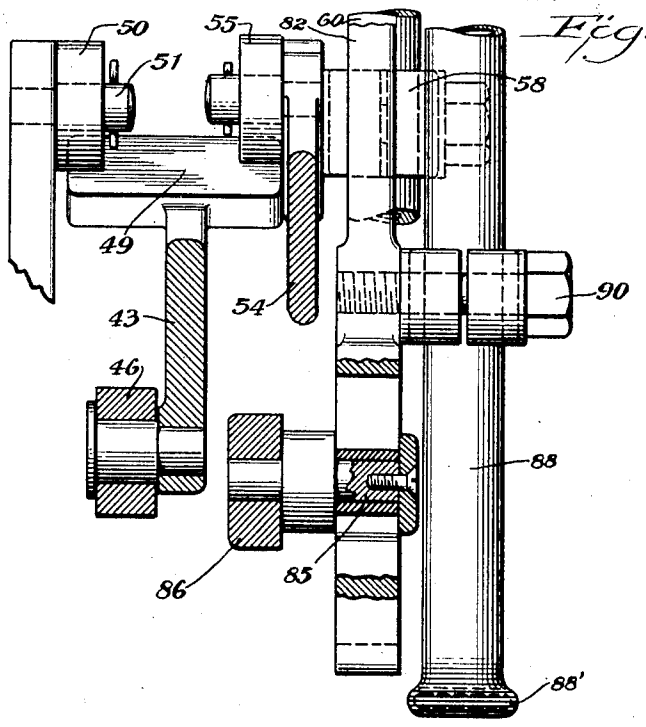


Fig. 7.

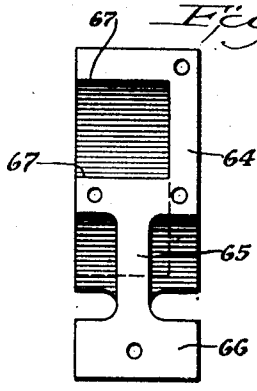


Fig. 5.

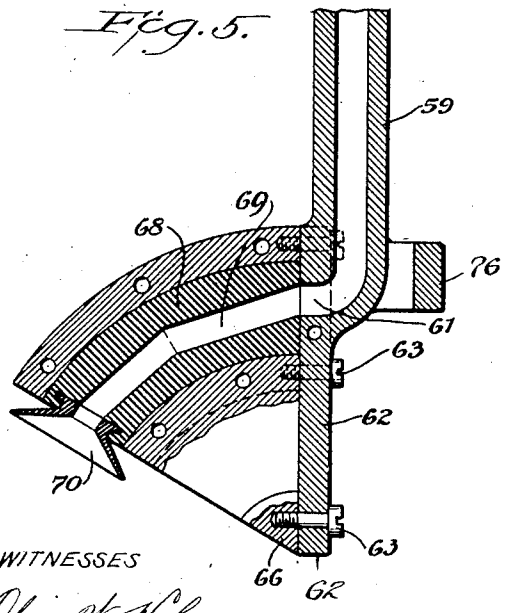
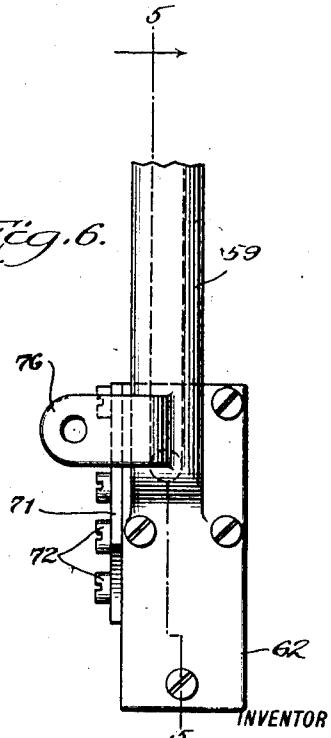


Fig. 6.



WITNESSES

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Nov. 27, 1923. 1,475,621

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SHEET SEPARATING MECHANISM

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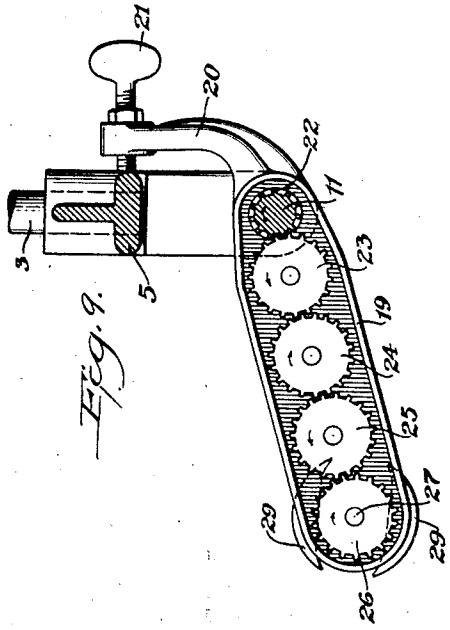


Fig. 9.

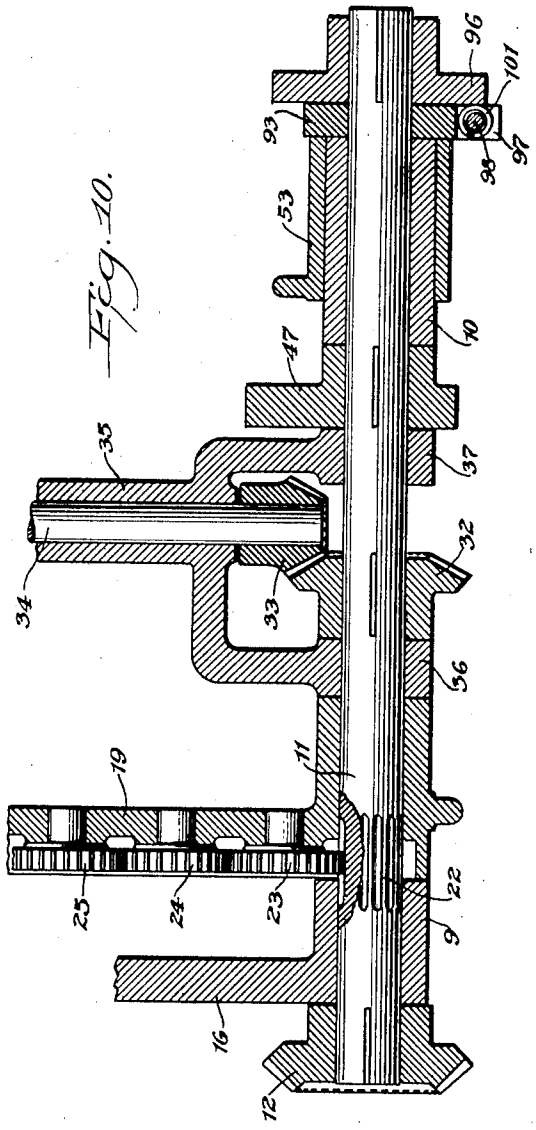


Fig. 10.

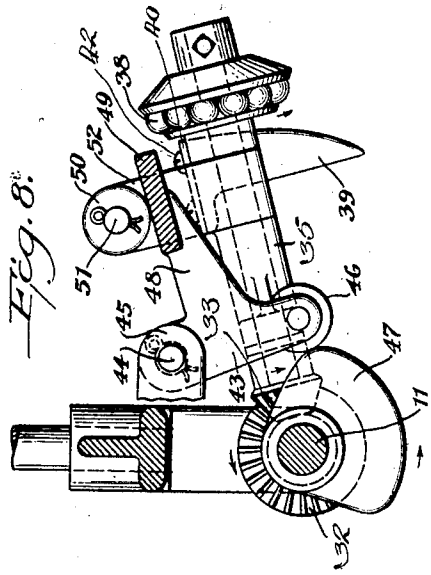


Fig. 8.

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SHEET SEPARATING MECHANISM

Filed Dec. 15, 1920 8 Sheets-Sheet 6

Fig. 12.

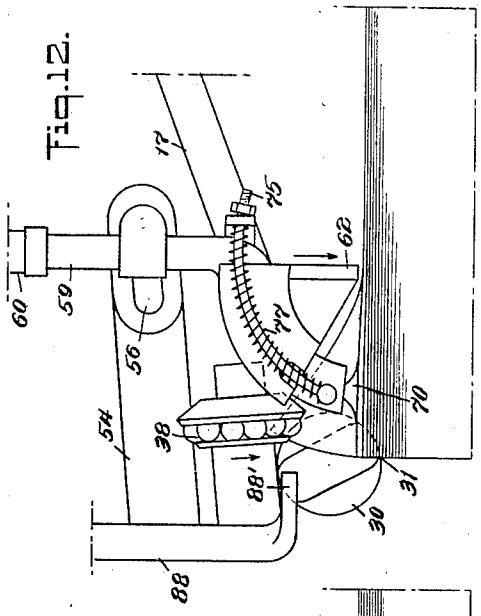


Fig. 14.

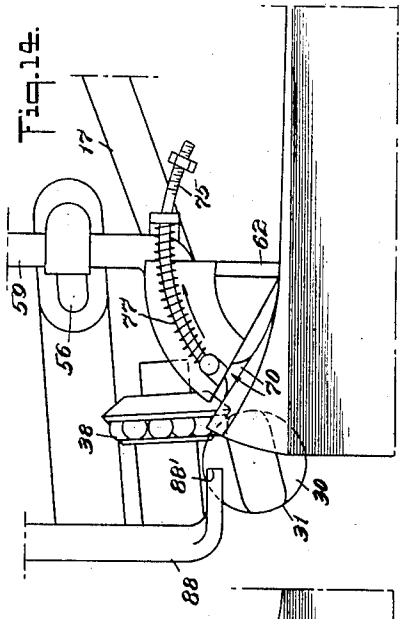


Fig. 11.

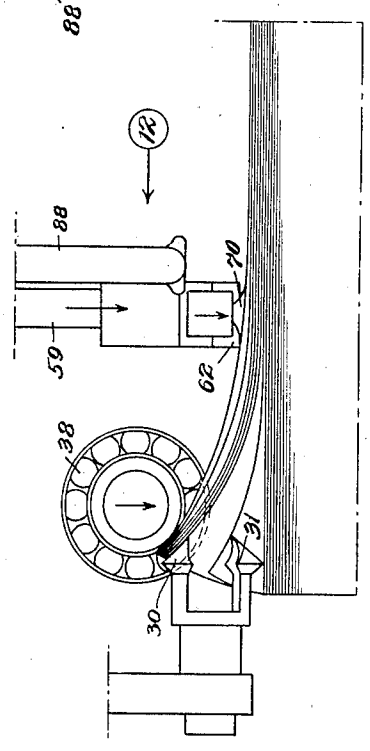
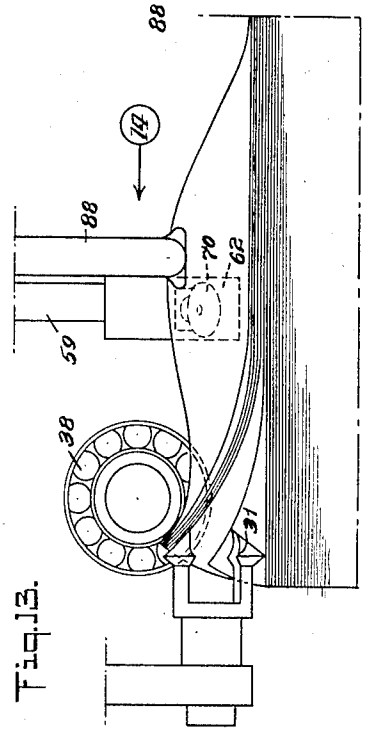


Fig. 13.



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Nov. 27, 1923. 1,475,621

C. E. CHRISTOPHEL

SHEET SEPARATING MECHANISM

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Fig.16.

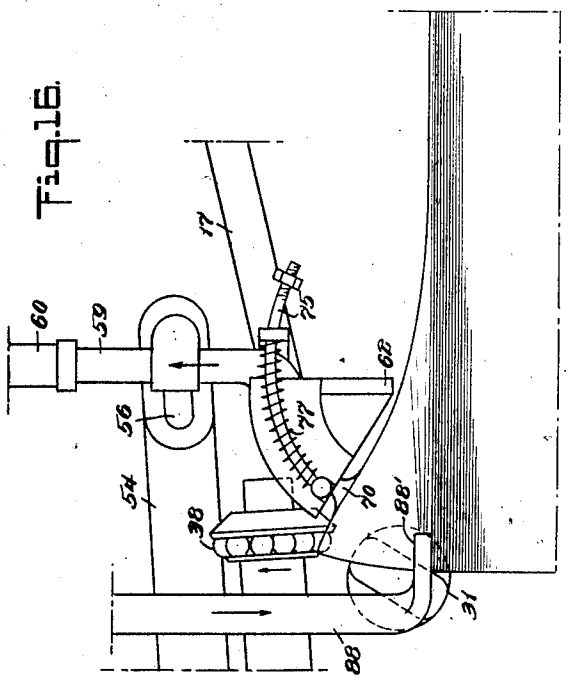


Fig.15.

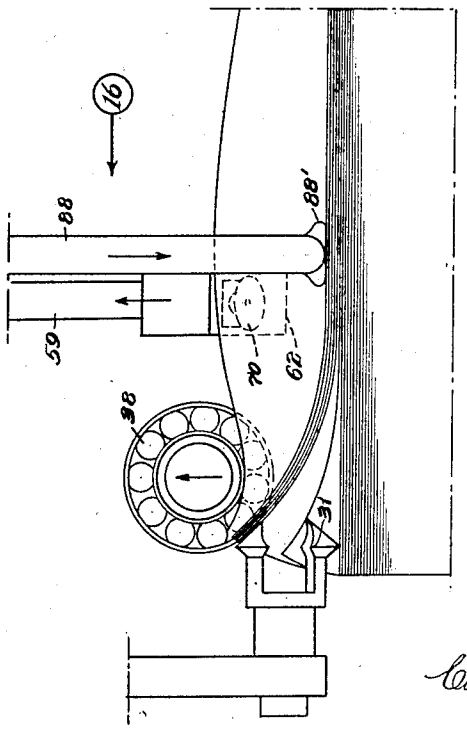
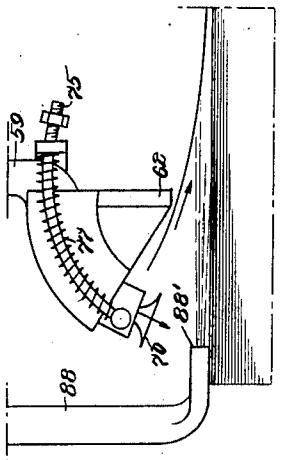


Fig.17.



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Nov. 27, 1923. 1,475,621

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SHEET SEPARATING MECHANISM

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FIG. 18.

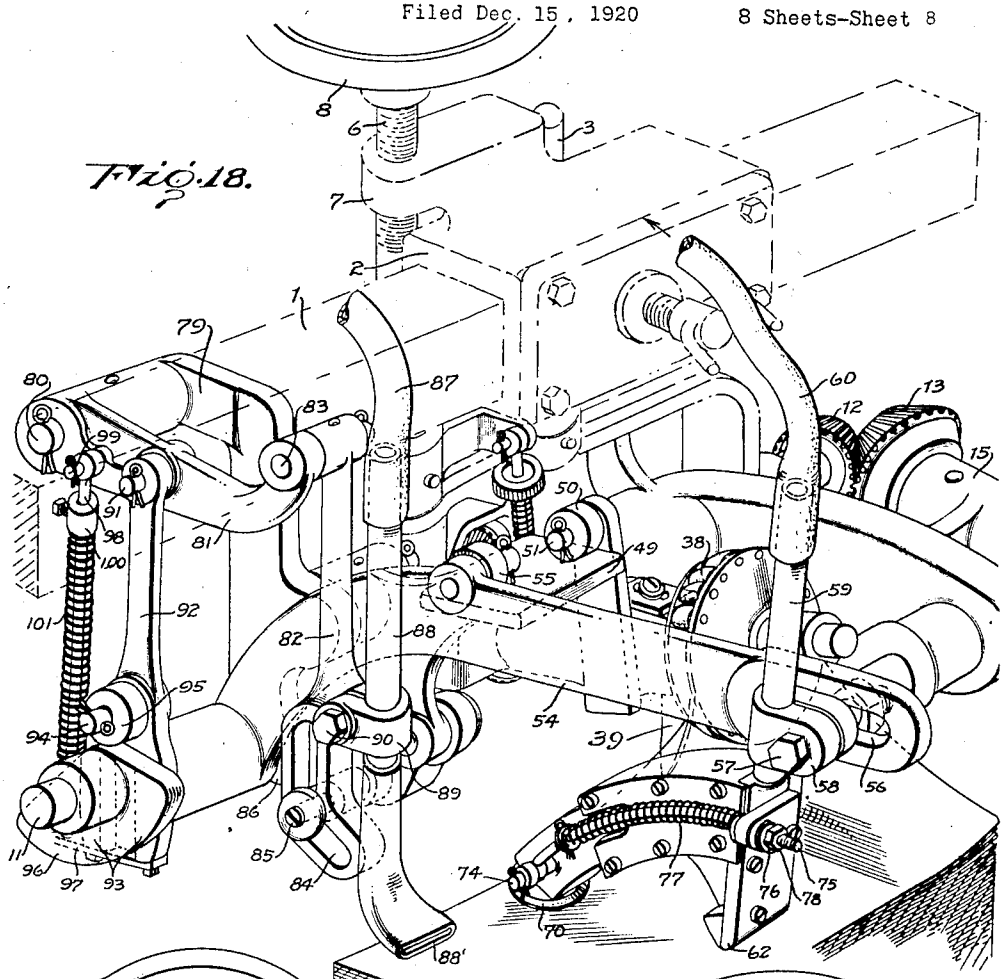
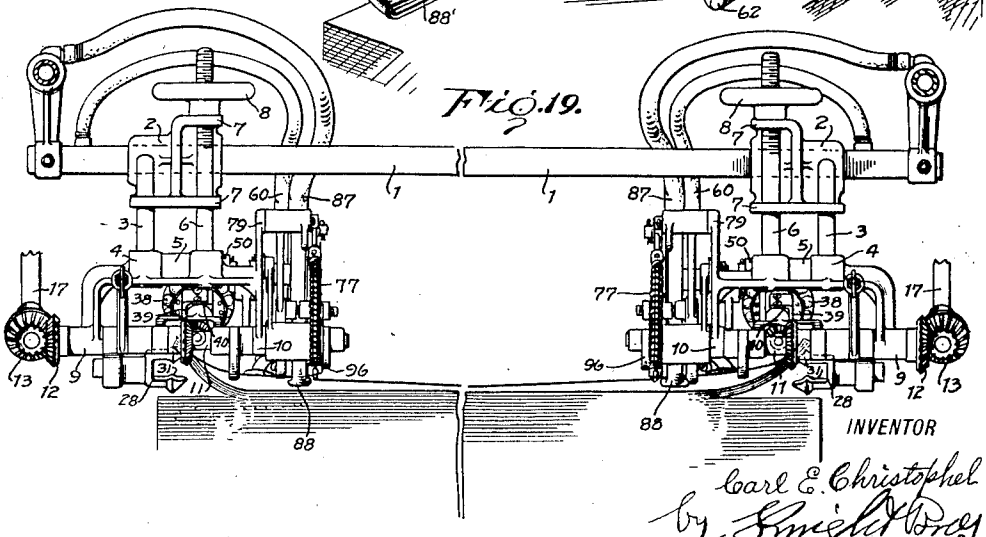


FIG. 19.



INVENTOR

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by Lyon & Lyon

ATTORNEYS.

Patented Nov. 27, 1923. 1,475,621

UNITED STATES PATENT OFFICE.

CARL E. CHRISTOPHEL, OF PEARL RIVER, NEW YORK, ASSIGNOR TO DEXTER FOLDER COMPANY, OF PEARL RIVER, NEW YORK, A CORPORATION OF NEW YORK.

SHEET-SEPARATING MECHANISM.

Application filed December 15, 1920. Serial No. 431,020.

To all whom it may concern:

Be it known that I, CARL E. CHRISTOPHEL, a citizen of Germany, residing at Pearl River, county of Rockland, State of New York, have invented certain new and useful Improvements in Sheet-Separating Mechanism, of which the following is a specification.

This invention relates to sheet separating mechanisms for automatic sheet feeding machines and more especially to that class of separators in which the top sheet of a pile is straightened across a valley or hollow formed in the top of a pile of sheets. Mechanism for performing the straightening operation upon the concave top of a pile for separating sheets from the pile is shown in the patent to Miehle et al. No. 606,975 dated July 5th, 1898, in connection with an automatically elevated concave table for supporting the pile in concave form. According to this patent, retarding rollers are arranged on one elevated part of the pile while cushion pusher fingers are moved forwardly in engagement with the other raised part of the pile to straighten the top sheet across the concave top of the pile in such a way as to bring the sheet into kissing relation with a sheet conveying sucker which moves the sheet forwardly from the pile into position to be engaged by delivery drop rollers. In the Brintnall Patent No. 802,679 dated October 24th, 1905, the main body of the pile remains flat while the opposite rear corners thereof are raised by wedges, thus in effect forming a wide trough or valley at the rear edge of the pile across which friction rollers, moving in opposite directions, straighten the top sheet and raise its edge slightly from the pile for the purpose of introducing blasts of air beneath the top sheet to separate it from the pile.

The present invention has for its object, to provide an improved construction, combination, and arrangement of parts in a separator of the sheet straightening type, whereby the sheet separating operation may be carried on with a high degree of accuracy, speed and general efficiency. For this purpose, my invention contemplates suitable means operating automatically and continuously for supporting a portion of a pile of sheets in raised position at one or more points to permit the top sheet to be separated by suitable sheet straightening mechanism and for adding other sheets to the raised portions for maintaining a substantially uniform thickness of sheets in the raised portion of the pile. The swinging lever shown in Patent No. 1,382,952 granted in my name on June 28th, 1921 is movable periodically into and out of position to lift a portion of the pile of sheets into position to be operated upon by a combing wheel which operates to impart sheet straightening movements to the top sheets. The present invention contemplates for this purpose a rotary segmental or mutilated platen for continuously supporting a portion of the pile in raised position, said platen being provided upon its segments with pick-up points for automatically adding from below portions of other sheets to replace those which are removed from the top. Cooperating with the mutilated platen alone or together with the combing wheel, is an auxiliary sheet separating sucker provided with a depending plate which is adapted in its lowermost position to rest upon the pile or to remain suspended above the pile, depending upon the adjusted position of the suction tube to adapt it to any particular stock upon which it is to operate. One of the objects of the present invention is to provide in combination with a sheet straightening device, an improved sheet separating suction device which is adapted to kiss a sheet which has been straightened by said device and to impart thereto a sharp angular movement of such a pronounced nature as to prevent the sheet next below it from being drawn up by the vacuum below the engaged top sheet. For this purpose, the sheet gripping sucker is carried by an arcuate plunger which is telescopically mounted in an arcuate housing into which it is adapted to be suddenly retracted when the sheet kissing sucker is closed by the top sheet. Other and further objects of the invention will appear in the specification and be pointed out in the claims, reference being had to the accompanying drawings, in which a preferred embodiment of my invention is illustrated.

Figure 1 is a side elevation of a sheet

separating mechanism embodying the principles of my invention, parts being broken away and parts shown in section;

Figure 2 is a rear elevation of the same, parts being broken away;

Figure 3 is a top plan view according to section line 3—3 of Figure 2, parts being broken away and parts shown in section;

Figure 4 is a section on an enlarged scale according to the line 4—4 of Figure 1, parts being broken away and parts shown in elevation;

Figure 5 is a vertical section on an enlarged scale of the suction device, corresponding to line 5—5, of Figure 6, parts being broken away and parts shown in elevation;

Figure 6 is a front elevation of the same;

Figure 7 is a front elevation on an enlarged scale of the arcuate housing of the suction sheet gripper removed;

Figure 8 is a section on the line 8—8, Figure 2, parts being shown in elevation;

Figure 9 is a section on the line 9—9, Figure 2, parts being broken away, and parts shown in side elevation;

Figure 10 is a section on the line 10—10, Figure 2, parts being broken away and parts shown in elevation;

Fig. 11 is a diagrammatic rear elevation of the sheet separating mechanism showing the relative positions of the parts immediately after the combing wheel and sheet separating sucker have reached their lowermost position, the holding foot being at this time in its raised position;

Fig. 12 is a diagrammatic side elevation of the same;

Figs. 13 and 14 are diagrammatic rear and side elevations respectively of the same showing the relative positions of the parts at the completion of the telescopic movement of the suction separator;

Figs. 15 and 16 are diagrammatic rear and side elevations respectively of the same in a later stage showing the relative positions of the parts at the end of the elevating movement of the combing wheel and sheet gripping sucker, the holding foot having been lowered to the pile beneath the raised top sheet and a blast of air delivered therefrom beneath the top sheet;

Fig. 17 is a diagrammatic side elevation of the same showing the relative positions of the parts immediately after the sheet has been released from the sheet separating sucker, said sucker being in the course of its return telescopic movement in readiness for operating upon another sheet;

Fig. 18 is a perspective view of the entire sheet separating mechanism;

Fig. 19 is a rear elevation of two sheet separating mechanisms showing their relative positions as normally arranged in a feeding machine.

Referring to the drawings, in the embodiment of my invention shown therein, a cross bar 1, which is usually supported by the side frames of a sheet feeding machine, may serve to mount a slidable bracket 2. Secured in the bracket 2 is a guide rod 3 upon which is rigidly mounted a boss 4 which is integrally formed with the separator frame 5. Secured in the separator frame 5 is a screw rod 6 which is slidable in bearing lugs 7, 7, on the bracket 2. A hand wheel 8 which is threaded to the upper end of screw rod 6, serves to impart vertical adjustments to the separator frame 5. Said separator frame 5 is provided with depending bearings 9 and 10 within which is journalled a power driven shaft 11. As shown in Figures 2 and 3, a bevel gear 12 is keyed to one end of power shaft 11 and meshes with a second bevel gear 13 which is keyed to a stub shaft 14 journalled in the bearing bracket 15 which is mounted on a forwardly presented bracket arm 16 on the depending bearing 9. A coupling shaft 17 is connected by a universal joint 18 to the stub shaft 14 for transmitting power to power shaft 11. As shown best in Figures 9 and 10, a frame or gear housing 19 is oscillatably mounted on the power shaft 11, said frame or housing being provided with an upwardly presented arm 20 which carries a thumb screw 21 in position to engage frame 5 for adjusting the angular position of housing 19 on the shaft 11. Said shaft 11 is provided with gear teeth 22 cut therein for driving a series of intermeshing gears 23, 24, 25, and 26, the gear 26 being keyed to a stub shaft 27 to which is keyed a preliminary separator 28. Said preliminary separator is provided with segmental portions 29 which are symmetrically disposed with respect to the axis of shaft 27. The laterally presented ends of the segmental portions 29 are provided with conical surfaces which constitute revolving platens which are suitably formed and arranged to cooperate with the combing wheel to be presently described. Each segmental portion 29 is provided with a pick-up point 31 which is adapted to move into engagement with the under surfaces of sheets near the top of a pile, the lifted portions of said sheets being retained in lifted position by the revolving platens 30 so that they may be operated upon by the combing wheel and straightened into position to be gripped by the sucker to be hereinafter referred to. Keyed to the shaft 11, to the right of frame or gear housing 19, according to Figure 10, is a bevel gear 32 which meshes with a bevel pinion 33 on a radial shaft 34 which is journalled in a tubular arm 35 provided with branches 36 and 37 by means of which said arm is freely journalled on the shaft 11 to be swung towards and away from the top of a pile of sheets. Keyed to the outer

end of shaft 34 is a combing wheel 38, the combing elements of which are arranged on axes which intersect the axis of shaft 34 similarly to the elements of a conical surface. Said combing elements are thereby adapted to cooperate with the conical surfaces of platens 30, 30, whenever the combing wheel 38 is lowered. A sheet edge gage 39 with a curved forward edge, for engaging the edges of the raised portions of some of the top sheets of a pile, has a laterally presented top plate or flange 40 provided with a slot 41 whereby said sheet edge gage 39 may be adjustably secured to the tubular arm 35 by means of screws 42. The gage 39 resists any tendency of the sheets to shift rearwardly under the combing action. Suitable means for raising and lowering the combing wheel arm are provided according to the present embodiment of my invention, by a cam arm 43 (see Figures 4 and 8) which is pivotally mounted by a pin 44 carried in a lug 45. The cam arm 43 is provided with a cam roller 46 which runs on a cam 47 keyed to the power shaft 11. Rigid with the cam arm 43 is a forwardly presented arm 48 with a cam plate 49 at its forward end. Riding upon the cam plate 49 is a roller 50 journalled on a pin 51 carried by a post 52 which is mounted on the combing arm 35. As shown in Figure 10, the right hand bearing 10 for the power shaft 11, is elongated axially and is itself adapted as a journal bearing for the hub portion 53 of a curved lever arm 54 which is raised and lowered by means of a cam roller 55 journaled on a pin carried by arm 54 and riding on the cam plate 49. In its forward end, lever arm 54 is provided with a slot 56 in which is adjustably mounted a bolt 57 which clamps a split collar 58 to a suction tube 59 and connects said suction tube to the lever arm 54. A flexible tube 60 connects the upper end of tube 59 with an air exhausting pump (not shown) which tends to produce a vacuum in tube 59 which latter constitutes part of a suction device which is shown in detail in Figures 5, 6, and 7. Thus the bore of tube 59 is provided with a rearwardly presented port 61 which opens thru the upper end of a plate 62, said plate constituting a depending foot which, when operating upon certain kinds of stock, may rest upon the top of a pile of sheets. Secured to the plate 62 by means of screws 63, is a box-like structure comprising an arcuate housing 64, sector plate 65, and an angular boss 66. As shown in Figures 5 and 7, the arcuate groove is adapted to slidably receive a tubular arcuate section 68 which telescopes thereinto said section 68 being provided with a bore 69 which registers with port 61 in the innermost position of section 68. The section 68 is provided at its outer end with a rubber sucker 70 which is adapted to be closed by and to grip a sheet. A cover plate 71 is secured to the arcuate housing 64 by means of screws 72 and in its lower end is provided with an arcuate slot 73 (see Figure 1) to accommodate a pin 74 projecting laterally from section 68 and to which is connected one end of a curved spring rod 75 which slides in a perforated lug 76 which projects laterally from the lower end of tube 59. Interposed between the head of spring rod 75 and the lug 76, is a compression spring 77 which tends to hold the sucker 70 in its outermost position. A stop nut 78 on the forward end of spring rod 75 serves to limit the outward displacement of sucker 70. An upwardly extending arm 79 of the separator frame 5 carries a laterally presented pin 80 upon which is journalled a lever arm 81. A rod 82 which is pivotally connected at 83 to the forward end of lever arm 81 is provided near its lower end with an angularly bent slot 84 which causes forward and backward movement to be imparted to the rod 82 by means of a stud 85 which slides in said slot. The stud 85 is carried by a forwardly presented arm 86 carried by the bearing 10. A flexible pipe 87 delivers air under pressure to the upper end of a tube 88 which is held by a split collar clamp 89 and secured by a bolt 90 to the rod 82. Connected to the lever arm 81 by a pin 91 is a cam rod 92 having its lower end bifurcated to form branches 93 which center said rod with respect to the power shaft 11. The rod 92 carries a pin 94 upon which is journalled a roller 95 which runs on the cam 96 keyed to shaft 11. Secured to the downwardly presented ends of the branches 93, 93, of rod 92, is an abutment plate 97 thru which extends a spring rod 98. Said spring rod has its upper end pivoted on a pin 99 and is provided with an abutment collar 100 between which and the plate 97 is disposed a spring 101 which tends to retain the cam rod 92 in its lowermost position. The sheet separating action will now be readily understood and briefly related is as follows:

The preliminary separation of portions of some of the top sheets of a pile in a periodically recurring operation, the axis of revolution of the segmental platens 30, 30, being maintained in fixed relation to a series of rods which gage the rear edge of a pile of sheets. Said rods or rear edge gages (not shown on the drawings) are preferably mounted on the transverse bar 1 and according to the present embodiment of my invention, maintain the axis of revolution of the platens 30, 30, in approximately the vertical plane of the rear edge of the pile. By means of this arrangement, the preliminary separator may be readily adjusted in position with respect to piles of sheets of any size by merely adjusting the position of transverse bar 1. As said preliminary

separator rotates, its pick up points 31, 31, elevate portions of a predetermined number of sheets, said sheet portions being added from below to correspond with the upward pile feed movement under the control of the pile governor (not shown). During this operation, the combing wheel 38 is caused to drop under spring pressure so as to cooperate with each of the revolving platen surfaces 30, 30 in succession so that there are two sheets fed off for each rotation of the preliminary separator. As pointed out above, the suction tube is made vertically adjustable by means of clamp collar 58 and bolt 57 so that the foot or lower end of plate 62 may be set to rest on the top of the pile in lowered position, as is usually preferred, or to remain suspended a short distance above the pile in some instances. At the completion of a sheet separating action, the plate 62 is in raised position with the sheet engaging sucker 70 in retracted position while the holding foot 88′ is down on the pile as shown in Figure 1. Immediately after the separated top sheet has been removed, the holding foot 88′ is raised from the pile while the sucker 70 having been retured to its extended position by spring 77 as soon as the separated top sheet was released thereby is dropped with its housing 62—64 toward the pile. As shown in Figures 11 and 12, the combing wheel 38 has begun to operate upon the corner of the pile which is supported in upwardly displaced position by one of the platens 30 and is tending to straighten the upper sheet or sheets across the hollow top surface of the pile. As soon as the top sheet of the pile is sufficiently straightened to closely approach the mouth of the sucker, the sheet will be gripped by the sucker, and the vacuum therein will cause the sucker to telescope and thereby impart a sharp angular separating movement to the top sheet as shown in Figs. 13 and 14, this action usually occurring about midway between the drop and lift of the combing wheel. Immediately following this telescopic movement of the sucker 70, the suction separator is raised in its entirety to the positions shown in Figs. 15 and 16 to impart a further lifting effect to the top sheet, the combing wheel 38 being elevated at the same time. During the period of time elapsing between the snap up or telescopic movement of the sucker and the elevation of the sheet separating suction device in its entirety, the holding foot 88′ has dropped to the pile below the elevated top sheet and a blast of air is delivered therefrom to form an air blanket upon which the top sheet may be floated off. Immediately after the sucker 70 has reached the position shown in Figures 15 and 16, the suction is broken in tube 59 and the separated top sheet is released to the sheet forwarding devices as indicated in Figure 17. A new series of movements now begins and proceeds as already explained.

It will appear from the foregoing description that when the suction device moves downwardly, the lower end of plate 62 may or may not rest upon the top of the pile depending upon the position to which the suction tube 59 has been adjusted to meet the requirements of the different kinds of stock which may be handled by the machine. When that material is light stock, it is usually desirable to have the plate 62 drop into engagement with the top of the pile and the sucker 70 to come close to the top sheet so that the combing wheel 38 and the sheet separating sucker 70 become active upon the top sheet in quick succession and continue in cooperation until the combing wheel is lifted. When a heavy stock of paper is to be separated, the suction devices may be supported entirely out of contact with the pile. The combing effects of combing wheels 38 may be extended beyond the suction devices, and, when thought to be desirable, this combing separating action may be extended across the entire pile between oppositely disposed separators as indicated in Figure 19. It will be understood by reference to Figure 19, that the usual arrangement of the improved separating mechanism in an automatic feeding machine is in right and left sets arranged to operate above the opposite rear corners of an automatically elevated pile of sheets.

I claim:—

1. In sheet separating mechanism, a sheet gripper movable into and out of sheet gripping position, means for raising a portion of a pile of sheets and continuously maintaining said portion in raised position, and a sheet combing instrumentality periodically cooperating with said raising and maintaining means for displacing the top sheet of the displaced portion of said pile into position to be engaged by said sheet gripper.

2. In sheet separating mechanism, a sheet gripper movable into and out of sheet gripping position, means for raising a portion of a pile of sheets and continuously maintaining said portion in raised position, and a sheet combing instrumentality periodically cooperating with said raising and maintaining means for displacing the top sheet of the displaced portion of said pile into position to be engaged by said sheet gripper said raising and maintaining means comprising portions moving one after the other into supporting engagement with the raised portion of the pile.

3. In sheet separating mechanism, a sheet gripper movable into and out of sheet gripping position, means for raising a portion of a pile of sheets and continuously maintaining said portion in raised position, and a

sheet combing instrumentality periodically cooperating with said raising and maintaining means for displacing the top sheet of the displaced portion of said pile into position to be engaged by said sheet gripper, said raising and maintaining means comprising portions moving one after the other into supporting engagement with the raised portion of the pile and suitably formed and disposed to raise portions of additional sheets as the pile is raised.

4. In sheet separating mechanism, a sheet gripping sucker movable into and out of sheet gripping position above a pile of sheets, a rotary platen suitably disposed to flex some of the top sheets of a pile, and a combing wheel movable into and out of cooperative relation to said rotary platen for drawing the top sheet across the flexure in said top sheets and into position to be engaged by said sucker.

5. In sheet separating mechanism, a sheet gripping sucker movable into and out of sheet gripping position above a pile of sheets, a rotary platen suitably disposed to flex some of the top sheets of a pile, and a combing wheel movable into and out of cooperative relation to said rotary platen for drawing the top sheet across the flexure in said top sheets and into position to be engaged by said sucker said rotary platen comprising segments with which said combing wheel cooperates one after the other.

6. In sheet separating mechanism, a sheet gripping sucker movable into and out of sheet gripping position above a pile of sheets, a rotary platen suitably disposed to flex some of the top sheets of a pile, and a combing wheel movable into and out of cooperative relation to said rotary platen for drawing the top sheet across the flexure in said top sheets and into position to be engaged by said sucker said rotary platen comprising segments with which said combing wheel cooperates one after the other, said segments being provided with pick-up corners for lifting the edges of some of the top sheets and thus flexing the same.

7. In sheet separating mechanism, a rotary platen adapted to be disposed adjacent one edge of a pile of sheets and comprising segments provided with pick-up corners for lifting portions of some of the top sheets of said pile to form a bend therein, a combing wheel cooperating with said platen sections for straightening top sheets across the bend therein, and a sheet gripping sucker movable into and out of position to grip a sheet thus straightened.

8. In sheet separating mechanism, a rotary platen adapted to be disposed adjacent one edge of a pile of sheets and comprising segments provided with pick-up corners for lifting portions of some of the top sheets of said pile to form a bend therein, a combing wheel cooperating with said platen sections for straightening top sheets across the bend therein, and a sheet gripping sucker movable into and out of position to grip a sheet thus straightened said platen sections being provided with conical surfaces and the elements of said combing wheel being arranged on axes suitably disposed to correspond thereto.

9. In sheet separating mechanism, a rotary platen adapted to be disposed adjacent one edge of a pile of sheets and comprising segments provided with pick-up corners for lifting portions of some of the top sheets of said pile to form a bend therein, a combing wheel cooperating with said platen sections for straightening top sheets across the bend therein, and a sheet gripping sucker movable into and out of position to grip a sheet thus straightened said platen sections being provided with conical surfaces and the elements of said combing wheel being arranged on axes suitably disposed to correspond thereto, means for raising and lowering said rotary platen with respect to the top of a pile of sheets, and means for moving said combing wheel into and out of cooperating position with respect to said rotary platen.

10. In sheet separating mechanism, a rotary separator platen journalled on an axis substantially parallel to the top of a pile of sheets, said platen being provided with a surface of revolution the elements of which are angularly disposed with respect to the rotary axis of said platen for holding a portion of the top sheets of said pile in flexed up position, and a combing wheel comprising elements conforming to said surface of revolution for imparting a preliminary separation to the top sheet of the pile.

11. In sheet separating mechanism, a rotary separator platen journalled on an axis substantially parallel to the top of a pile of sheets, said platen being provided with a surface of revolution the elements of which are angularly disposed with respect to the rotary axis of said platen for holding a portion of the top sheets of said pile in flexed up position, and a combing wheel comprising elements conforming to said surface of revolution for imparting a preliminary separation to the top sheet of the pile said rotary platen comprising spaced conical segments provided with pick-up points for elevating portions of the top sheets.

12. In sheet separating mechanism, a rotary pick-up platen, a combing wheel movable into and out of position to cooperate with said platen, and a gage movable with said combing wheel for engaging the lateral edges of sheets in a pile.

13. In sheet separating mechanism, the combination with a rotary platen adapted to pick up portions of the upper sheets of a pile and to hold said portions flexed, of a

combing wheel movable into and out of position to cooperate with said rotary platen.

14. In sheet separating mechanism, the combination with a rotary platen adapted to pick up portions of the upper sheets of a pile and to hold said portions flexed, of a combing wheel movable into and out of position to cooperate with said rotary platen and means partaking of the movements of said combing wheel for gaging the edges of said upper sheets.

15. In sheet separating mechanism, a rotary power shaft, a combing wheel arm oscillatably mounted on said shaft, a combing wheel shaft journalled in said arm and geared to said power shaft, a combing wheel keyed to said combing wheel shaft, means for raising and lowering said combing wheel arm, and a rotary platen for bending portions of some of the top sheets of a pile and upon which said combing wheel operates in its lowered position.

16. In sheet separating mechanism, a rotary power shaft, a combing wheel arm oscillatably mounted on said shaft, a combing wheel shaft journalled in said arm and geared to said power shaft, a combing wheel keyed to said combing wheel shaft, means for raising and lowering said combing wheel arm, a platen carrying arm oscillatably mounted on said power shaft, said platen carrying arm being provided with means for adjusting its position relatively to a pile of sheets, a rotary platen journalled in said platen carrying arm, and driving connections extending between said power shaft and rotary platen.

17. In sheet separating mechanism, a rotary platen adapted to raise and sustain a portion of a pile of sheets, a sheet gripping sucker arranged above said pile of sheets, and a combing wheel operating on the displaced portion of the top sheet of said pile in a direction away from said sucker for drawing the top sheet nearer to said sucker.

18. In sheet separating mechanism, a rotary platen adapted to raise and sustain a portion of a pile of sheets, a sheet gripping sucker arranged above said pile of sheets, and a combing wheel operating on the displaced portion of the top sheet of said pile in a direction away from said sucker for drawing the top sheet nearer to said sucker the cooperating portions of said rotary platen and combing wheel respectively moving substantially in planes angularly disposed with respect to each other.

19. In sheet separating mechanism, the combination with means for sustaining a valley or hollow in a plurality of sheets, and sheet straightening means, of a telescopic sheet separating suction device.

20. In sheet separating mechanism, the combination with a support for a pile of sheets, sheet straightening means, of a telescopic sheet separating suction device, said suction device being provided with a sheet gripping sucker movable arcuately with respect to the top surface of the pile.

21. In sheet separating mechanism, the combination with means for sustaining a valley or hollow in a plurality of sheets, and sheet straightening means, of a telescopic sheet separating suction device, said suction device comprising relatively movable sections telescoping on an arcuate axis.

22. In sheet separating mechanism, a suction device movable into and out of operative position above a pile of sheets, said suction device comprising telescopic sections of which one of said sections has an endwise arcuate movement with respect to the other.

23. In sheet separating mechanism, a suction device comprising a vacuum tube, an arcuate housing connected to one end of said tube, an arcuate tubular section having an arcuate telescopic connection with said arcuate housing, and a sucker connected to the outer end of said tubular section.

24. In sheet separating mechanism, a suction device comprising a vacuum tube, an arcuate housing connected to one end of said tube, an arcuate tubular section having an arcuate telescopic connection with said arcuate housing, and a sucker connected to the outer end of said tubular section, said vacuum tube being provided with a depending foot adapted to rest upon a pile of sheets.

25. In sheet separating mechanism, a suction device comprising a vacuum tube, an arcuate housing connected to one end of said tube, an arcuate tubular section telescopically mounted on an arcuate axis in said arcuate housing, and a sucker connected to the outer end of said tubular section, said vacuum tube being provided with a depending foot adapted to rest upon a pile of sheets and means for raising and lowering said suction device.

26. In sheet separating mechanism, a suction device comprising a vacuum tube, an arcuate housing connected to one end of said tube, an arcuate tubular section telescopically mounted in said arcuate housing, a sucker connected to the outer end of said tubular section, and resilient means tending to retain said tubular section in its outermost position with respect to said arcuate housing.

27. In sheet separating mechanism, the combination with a sheet gripper movable into and out of position to grip a sheet, of sheet combing means movable into and out of sheet combing position, said sheet gripper and combing means being provided with cam rollers presented towards each other, a cam plate movable about an axis and engaging said cam rollers in common, and a cam operated arm mounted on said cam plate.

28. In sheet separating mechanism, the combination with a sheet gripper movable into and out of position to grip a sheet, of sheet combing means movable into and out of sheet combing position, said sheet gripper and combing means being provided with cam rollers presented towards each other, a cam plate movable about an axis and engaging said cam rollers in common, a cam operated arm mounted on said cam plate and a sheet straightening gage carried by said sheet combing means.

29. In sheet separating mechanism, a sheet separating sucker, sheet combing means for raising one edge of a sheet to be engaged by said sucker, a cam operated arm, a blower tube pivotally suspended from said cam operated arm, a slotted arm carried by said blower tube, and a fixed cam pin engaging said slotted arm for moving said blower tube inwardly and outwardly with respect to a pile of sheets.

30. In sheet separating mechanism, a power shaft, a rotary platen driven by said power shaft, a combing wheel driven by said power shaft and oscillatable about the axis thereof, an oscillatable arm, a cam rod connected to said arm, a cam keyed to said power shaft for operating said cam rod, a blower tube suspended from said oscillatable arm and movable into and out of operative position with respect to a pile of sheets, a sheet gripping sucker movable about the axis of said power shaft, an oscillatable cam plate common to said combing wheel and sheet gripping sucker, and a cam keyed to said power shaft and having operating connections with said cam plate.

31. In sheet separating mechanism, sheet gripping means movable into and out of position to grip a sheet, means for continuously supporting a portion of a pile of sheets in raised position, and means cooperating with said supporting means for periodically moving the top sheet of said pile into position to be gripped by said sheet gripping means.

32. In sheet separating mechanism, sheet gripping means movable into and out of position to grip a sheet, means for continuously supporting a portion of a pile of sheets in raised position, and means cooperating with said supporting means for periodically moving the top sheet of said pile into position to be gripped by said sheet gripping means, said supporting means being adapted to add to the raised portion of the pile to replace the sheets that are removed.

33. In a sheet separating mechanism, sheet gripping means movable into and out of position to grip a sheet, means for continuously supporting a portion of a pile of sheets in raised position, and means cooperating with said supporting means for periodically moving the top sheet of said pile into position to be gripped by said sheet gripping means, said sheet supporting means comprising a rotary platen provided with pick-up points for adding to the raised portion of the pile from time to time to replace the sheets removed therefrom.

34. In sheet separating mechanism, a holding foot movable into and out of position to hold the top sheet of a pile, a sheet engaging sucker movable angularly about the point on said pile which is engaged by said holding foot, means for continuously supporting a portion of a pile of sheets in raised position, and sheet combing means cooperating with said supporting means for moving successive top sheets into position to be engaged by said sucker in sheet gripping position.

35. In a sheet feeding machine, a sheet holding foot movable into and out of engagement with the top sheet of a pile, a sheet engaging sucker movable angularly about the point on said pile which is engaged by said sheet holding foot, a rotary pick-up platen, and a combing wheel movable into and out of position to cooperate with said platen for facilitating the removal of a top sheet by said sheet engaging sucker.

36. In a sheet feeding machine, a sheet holding foot movable into and out of engagement with the top sheet of a pile, a sheet engaging sucker movable angularly about the point on said pile which is engaged by said sheet holding foot, a rotary pick-up platen, and a combing wheel movable into and out of position to cooperate with said platen for facilitating the removal of a top sheet by said sheet engaging sucker, said combing wheel being provided with a side edge gage for the sheets raised by said rotary pick-up platen.

37. In a sheet separator, the combination with means for intermittently raising corner portions of sheets and continuously supporting an approximately uniform number of said corner portions elevated above the top surface of the pile, of means for intermittently straightening the top sheet across the valley or hollow formed by said raised corner portions.

38. In a sheet separator, the combination with means for continuously raising and supporting a portion of a pile of sheets above the top surface of the pile, said means comprising portions moving one after the other into supporting engagement with the raised portion of the pile, and means for intermittently straightening the top sheet across the valley or hollow formed by said raised portion.

39. In a sheet separator, the combination with a rotary device suitably disposed to raise and support a portion of a pile of sheets above the top surface of a pile, said

device comprising portions moving one after the other into supporting engagement with the raised portion of the pile, and means for intermittently straightening the top sheet across the valley or hollow formed by said raised portion.

40. In a sheet separator, the combination with a rotary platen comprising spaced segments formed with pick-up corners, said platen being suitably disposed to engage and lift the edges of some of the top sheets and support the lifted portions of the sheets above the top surface of the pile, said means comprising portions moving one after the other into supporting engagement with the raised portion of the pile, and means for intermittently straightening the top sheet across the valley or hollow formed by said raised portion.

41. In a sheet separator, the combination with means for supporting a portion of a pile of sheets raised above the top surface of the pile, of a combing member operating upon the raised portion of sheets, and a sheet gage associated with said combing member adjacent to the lateral edge of the pile to prevent lateral displacement thereof.

42. In a sheet separator, the combination with means suitably disposed to raise and support a portion of a pile of sheets above the top surface of the pile, of a sheet combing device operating upon the raised portions of sheets to straighten the top sheet across the valley or hollow formed by said raised portions, and a sheet gage supported adjacent to said combing device in position to limit the displacement of sheets acted upon by said combing device.

43. In a sheet separator, the combination with means disposed to support portions of a pile of sheets raised above the top surface of the pile, of a combing wheel operating upon the raised portions of sheets, an arm carrying said combing wheel, and a sheet gaging member mounted upon said arm and supported thereby in position to limit the movement of sheets acted upon by said combing wheel.

44. In a device of the character described, the combination of automatically operating means for continuously maintaining an approximately uniform portion of the top of a pile of sheets elevated at a point, and a device cooperating with said means and exerting a straightening action along one edge of the sheet.

45. In a device of the character described, the combination of means for continuously and automatically maintaining the top of a pile of sheets elevated at a point, and a rotary device cooperating with said means and exerting a straightening action along one edge of the sheet.

46. In a device of the character described, the combination of rotary means for continuously and automatically maintaining the top of a pile of sheets elevated at a point, and a device cooperating with said means and exerting a straightening action along one edge of the sheet.

47. In a device of the character described, the combination of rotary means for continuously and automatically maintaining the top of a pile of sheets elevated at a point, and a rotary device cooperating with said means and exerting a straightening action along one edge of the sheet.

48. In a device of the character described, the combination of means for continuously and automatically maintaining the top of a pile of sheets elevated at two points, and devices cooperating with said means and exerting a straightening action along one edge of the topmost sheet between said points.

49. In a device of the character described, the combination of means for continuously and automatically maintaining the top of a pile of sheets elevated at two points, and devices cooperating with said means and exerting a straightening action in opposite directions along one edge of the topmost sheet between said points.

50. In a device of the character described, the combination of rotary means for continuously and automatically maintaining the top of a pile of sheets elevated at two points, and devices cooperating with said means and exerting a straightening action along one edge of the topmost sheet between said points.

51. In a device of the character described, the combination of rotary means for continuously and automatically maintaining the top of a pile of sheets elevated at two points, and rotary devices cooperating with said means and exerting a straightening action along one edge of the topmost sheet between said points.

52. In sheet separating mechanism, the combination of a rotary member for elevating and supporting one edge of a pile of sheets, and a rotary sheet-straightening device cooperating therewith and engaging the topmost sheet of the pile to straighten the same.

53. In a sheet separating mechanism, the combination of a rotating member for elevating and supporting one edge of a pile of sheets, and a continuously rotating sheet-straightening device cooperating therewith and engaging the topmost sheet of the pile to straighten the same.

54. In a sheet separating mechanism, the combination of a continuously rotating member for elevating and supporting one edge of a pile of sheets, and a rotating sheet-

straightening device cooperating therewith and engaging the topmost sheet of the pile to straighten the same.

55. In a sheet separating mechanism, the combination of a continuously rotating member for elevating and supporting one edge of a pile of sheets, and a continuously rotating sheet-straightening device cooperating therewith and engaging the topmost sheet of the pile to straighten the same.

56. In a device of the character described, the combination with means for supporting a portion of a pile of sheets raised above the top surface of the pile, of a suction gripper, a sheet straightening device operating upon the raised portion of sheets, and common means elevating said gripper and straightening device with relation to the pile.

57. In a device of the character described, the combination of a sheet gripper, means for elevating and lowering the same, means for holding one edge of the sheet elevated, a rotary combing wheel, and means rotating the same outwardly toward the edge of the pile whereby the topmost sheet is straightened and engaged with said gripper.

58. In a device of the character described, the combination of a sheet gripper, a rotary means for holding one edge of the topmost sheet of the pile elevated, a rotary combing wheel, and means rotating the same outwardly toward the edge of the pile whereby the topmost sheet is straightened and engaged with said gripper.

59. In a device of the character described, the combination of two rotary devices supporting the topmost sheet of the pile and holding it elevated at two points, two rotary combing wheels, and means for rotating the same toward said devices whereby the topmost sheet is straightened.

60. In a device of the character described, the combination of devices rotating toward the center of the sheet pile supporting the topmost sheet and holding it elevated at two points, two rotary combing wheels, and means for rotating the same toward said devices whereby the topmost sheet is straightened.

61. In a device of the character described, a sheet gripper adapted to act on the topmost sheet of a pile, a rotary sheet-straightening device that acts to move said sheet into engagement with said gripper, and common means for elevating and lowering the gripper and sheet-straightening device.

62. In a sheet feeding machine, a pile supporting table, a rotary platen for imparting a bend to a portion of said pile, a sheet engaging sucker, and means cooperating with said rotary platen for straightening the top sheet of said pile across said bend.

63. In a sheet feeding machine, the combination with a pile holding table, of a sucker, a rotary platen for supporting a portion of a pile of sheets above said table, and a sheet combing wheel cooperating with said rotary platen and operating upon the top sheet of the pile for effecting a preliminary separation of said top sheet in connection with said sucker.

64. In a sheet feeding machine, the combination with a table for supporting a pile of sheets, a rotary mutilated platen for supporting a portion of said pile above said table, the mutilated platen being provided with sheet engaging points for lifting portions of additional sheets above said table from time to time, a sucker movable into and out of position to receive a sheet, and a combing wheel periodically cooperating with said portions of the mutilated platen for preliminarily separating successive top sheets of the pile.

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