

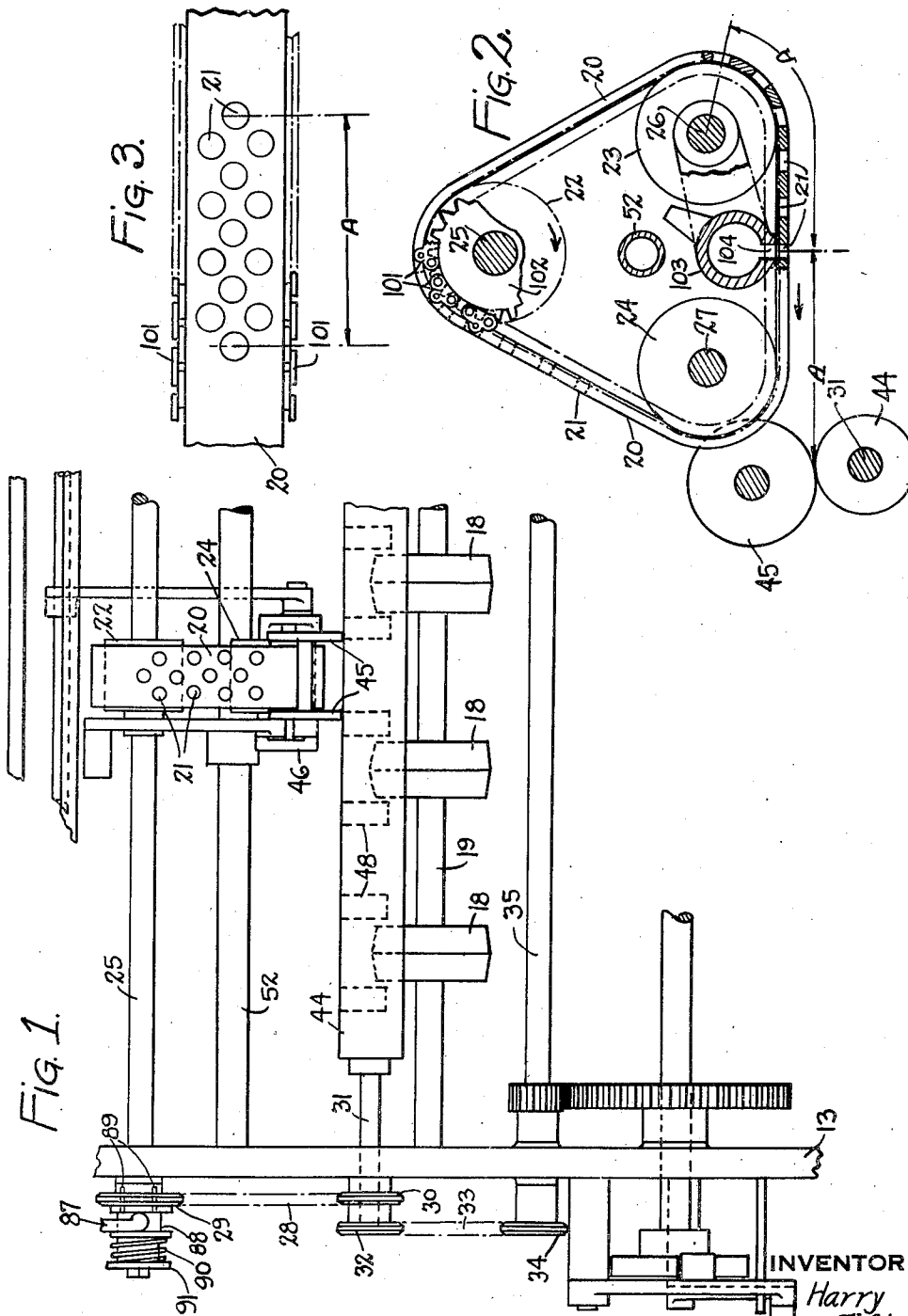
June 18, 1935.

H. EHLIG

2,005,079

SHEET FEEDER

Original Filed Sept. 13, 1928



INVENTOR
Harry Ehlig
BY HIS ATTORNEY
Philip K. Kerk

UNITED STATES PATENT OFFICE

2,005,079

SHEET FEEDER

Harry Ehlig, Pearl River, N. Y., assignor to Dexter Folder Company, New York, N. Y., a corporation of New York (1934)

Original application September 13, 1928, Serial No. 305,643. Patent No. 1,829,984, November 3, 1931. Divided and this application July 14, 1931, Serial No. 550,673

19 Claims. (Cl. 271-26)

This application is a division of my pending application filed September 13, 1928, Serial No. 305,643 which issued as U. S. Letters Patent No. 1,829,984, November 3, 1931.

My invention relates to improvements in sheet feeders for automatically separating and advancing successive sheets of paper or other impression-receiving material to printing, folding or ruling machines, or to such other types of machines as are devised to operate thereafter on such sheets.

The objects of my invention are, among other things, mainly to provide a sheet-feeder of this character having a simplified design and which will have embodied therein separate mechanisms capable of performing efficient work, not likely to get out of order, very sensitive in action, and all incorporated in a feeder which will automatically and with great rapidity invariably separate and then feed or advance the successive sheets from a pile or bank of paper, but preferably from a fanned-out bank of paper on the feed-board.

With these objects in view, I have devised an improved front-edge sheet feeder which will separate and advance the sheets in a continuous spaced-apart flow by novel sheet separating and forwarding devices operating on the front portion or margins of the stacked-up sheets, comprising an improved suction feeding-off device operating in conjunction with an endless loop belt having perforations therein formed in groups extending longitudinally of said belt and spaced-apart lengthwise thereof, whereby the superposed sheets are separated and advanced one by one in regular succession to the usual feed-rollers.

A further feature of my invention is to embody with such perforated suction-belt which is continuously operated in a forward direction, mechanisms whereby the suction is continuously applied to the suction shoe chamber and thence through the groups of groups of spaced-apart groups of perforations in the belt, yet such suction feeding-off devices are, through spacing of said groups, operable only intermittently to enable the successive sheets to be separated and advanced in proper spaced relation with one another. By my improvements it is not necessary to control the timing or duration of the suction which is customarily applied intermittently to the feeding-off devices.

My improved sheet-feeder also embodies other advantageous features of novelty and improvement in which the different operating parts are greatly simplified in form and action, and are made more effective and otherwise better adapted for use, all of which will be hereinafter described

and then particularly set forth in the appended claims.

The drawing shows my improvements in their preferred embodiment in a continuous sheet-feeder; such improvements, however, are not to be restricted to any particular type of sheet-feeder, as the invention may be embodied in various forms of feeders with similar advantages and results.

Of the drawing, Fig. 1 is an end elevation of my feeder partly broken away, looking rearwardly from the delivery end of the machine and showing the general arrangement of the various parts and mechanisms embodied therein;

Fig. 2 is a side view partly in section of the suction shoe and perforated belt; and

Fig. 3 is a plan view of the belt and drive shown in Fig. 2.

Similar numerals refer to similar parts through the several figures.

Referring more particularly to Fig. 1, the side-frame 13 of the feeder proper (the opposite side-frame not being shown) is at one side of the usual feed-board in a continuous sheet-feeder over which travel the bank-advancing belts that pass around the drums 18 fast to the cross-shaft 19 that intermittently rotates to advance the bank of sheets along the feed-board.

In the present embodiment the sheet separating and suction device comprises the endless loop belt 20 having spaced-apart perforations 21 cut therein, preferably in staggered relationship, which belt 20 passes around three wheels 22, 23 and 24 journaled on the stub shafts 25, 26 and 27 respectively (Fig. 2). The belt 20 has its perforations 21 cut or therein formed in predetermined spaced-apart groups arranged longitudinally in the belt, and this belt 20 is affixed to a pair of chains 101 (Fig. 3) that engage a pair of sprockets 102 (only one being shown in Fig. 2) mounted on the drive shaft 25 of the wheel 22. The suction shoe 103 is held stationary with its open port or nozzle 104 bearing against the upper surface of the lower run of the belt 20 (Fig. 2). The nozzle 104 registers at intervals with the longitudinally extending and spaced apart groups of belt perforations 21, while the required suction to enable the belt to separate and advance the sheets is applied continuously to the suction shoe 103 by a suitable hose connected with the pipe 52 coupled to any suitable air-exhausting means not shown.

The drive wheel 22 on the shaft 25 and the belt 20 are driven in the direction of the small arrows (Fig. 2) by the chain 28 which passes

around the sprocket 29 connected to the shaft 25 by a clutch. The chain 28 also passes around the sprocket 30 mounted on the cross-shaft 31 which carries the sprocket 32 driven by the chain 33 which passes around the sprocket 34 fast to the power-shaft 35 journaled in the side-frame 13.

Mounted on the shaft 31 is the lower feed-roll drum 44 above which are the usual drop-rollers 45. The front margins of the sheets rest on the guide-plate 48 so that the leading edge of the advancing sheet fed forwardly by the belt 20 may be directed into the bite of the drum 44 and drop-rollers 45. Each group of perforations 21, as clearly shown in Fig. 2 of the drawing and indicated by the long arrows A-A therein, extends longitudinally of the belt a distance equal to that between the center of the nozzle 104 and the bite of the feed and drop rollers 44, 45.

The clutch lever 87 operates the clutch collar 88 slidably mounted on the end of the shaft 25. The collar 88 carries projecting pins 89 which engage holes drilled in the face of the sprocket 29. The spring 90 coiled about the shaft 25 between the collar 88 and washer 91 normally holds the clutch members in engagement to operate the feeder (Fig. 1). When the lever 87 is shifted to the left the collar 88 is disconnected from the sprocket 29 on the shaft 25 and the belt 20 stops.

In operation with suction applied to the shoe 103 from the pipe 52, and the belt moving forwardly (Fig. 2) by the drive mechanism described, the front edge of the top sheet is picked up when the forward perforations of a group thereof in the belt 20 reach their Fig. 2 position. The perforations of said group are successively brought in operative relation with the nozzle 104 until the separated sheet is then advanced by the belt 20 to, and its leading edge is caught by, the feed-rollers 44 and drop rollers 45 at which time the last of the perforations in the active group on the under run of the belt 20 travel forwardly beyond the zone of the port or nozzle 104 of the suction shoe 103 so that suction is no longer applied to the sheet and it is released from the belt. During the continued advance of the belt 20 the next sheet will, through the medium of the next group of perforations 21, be picked up and advanced by the belt in the same manner until the sheet is released therefrom and caught by the rollers 44, 45. The travel of the belt 20 is controlled by the clutch heretofore described, and it is obvious that belts of variably-spaced groups of perforations in the run of the belt may be employed to accommodate sheets of different sizes.

The foregoing construction embodies the underlying principles of my invention, but various changes or modifications may be made in the structural details without departing from the scope of my improvements. However the foregoing is sufficient to disclose the basic principles and advantages of my invention as installed in a sheet-feeder of the continuous type.

I claim as my invention:

1. In a sheet feeder, a moving suction feed belt for separating and feeding sheets from a supply thereof, said belt having perforations therein formed in groups extending longitudinally of the belt and spaced apart lengthwise thereof to provide imperforate longitudinally extending belt portions that close the source of suction to atmosphere at predetermined inter-

vals and thereby intermit the separation and feeding of said sheets, each group of perforations serving with the belt to separate and feed a single sheet from said supply during one cycle of operation of the belt and each group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

2. In a sheet feeder, suction applying means having suction continuously created therein and a moving suction feed belt associated therewith for separating and feeding sheets from a supply thereof, the belt having perforations for application of suction to the sheets by the suction applying means, said perforations being formed in groups extending longitudinally of said belt and spaced-apart lengthwise thereof and the belt having imperforate portions extending lengthwise thereof between said groups to periodically close the suction applying means to atmosphere and intermit the separation and feeding of said sheets, each group of perforations serving with the belt to separate and feed a single sheet from said supply during one cycle of operation of the belt and each group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

3. In a sheet feeder, a suction applying device and a movable suction feed belt associated therewith to separate and advance sheets one after another from a supply thereof, said belt having perforations for application of suction to the sheets by the suction applying device, said perforations being formed in groups extending longitudinally of the belt and spaced apart lengthwise thereof and the belt having imperforate portions extending lengthwise thereof between said groups to periodically close the suction applying device to atmosphere and intermit the separation and feeding of said sheets, each group of perforations serving with the belt to separate and feed a single sheet from said supply during one cycle of operation of the belt and each group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet, and means for driving the belt to move the groups one after another at intervals past said device and separate and advance the sheets as aforesaid.

4. In a sheet feeder, a suction applying device having suction continuously created therein and a movable suction feed belt associated therewith to separate and advance sheets one after another from a supply thereof, said belt having perforations for application of suction to the sheets by the suction applying device, said perforations being formed in groups extending longitudinally of the belt and spaced apart lengthwise thereof and the belt having imperforate portions extending lengthwise thereof between said groups to periodically close the suction applying device to atmosphere and intermit the separation and feeding of said sheets, each group of perforations serving with the belt to separate and feed a single sheet from said supply during one cycle of operation of the belt and each group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet, and means for continuously driving the belt to move the groups one after another at intervals past said device and separate and advance the sheets as aforesaid.

5. In means for feeding sheets to other means,

a suction applying device and a movable sheet feeding belt provided with a group of perforations extending lengthwise of the belt a distance substantially equal to that between the suction applying device and the means to which the sheets are fed, said belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere and said group, the imperforate portion or portions of the belt, and said device providing for gripping and feeding of different sheets by the belt at predetermined intervals through successive cycles of movement of the latter, the group of perforations serving with the belt to separate and feed a single sheet from said supply in each of said cycles and the group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

6. In means for feeding sheets to other means, a suction applying device and a movable sheet feeding belt provided with groups of perforations, each group extending lengthwise of the belt a distance substantially equal to that between the suction applying device and the means to which the sheets are fed and the groups being spaced apart longitudinally of said belt, the belt having imperforate portions extending lengthwise thereof between the groups to periodically close the suction applying device to atmosphere and said imperforate portions, said groups, and said device providing for gripping and feeding of sheet successively at predetermined intervals by the belt during each cycle of movement of the latter, the group of perforations serving with the belt to separate and feed a single sheet from said supply in each of said cycles and the group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

7. In means for feeding sheets to other means, a suction applying device having suction continuously created therein and a movable sheet feeding belt associated with the suction applying device, said belt being provided with a group of perforations extending lengthwise of the belt a distance substantially equal to that between the suction applying device and the means to which the sheets are fed, the belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, and the imperforate portion or portions of said belt, said group, and said device providing for gripping and feeding of different sheets by the belt at predetermined intervals through successive cycles of movement of the latter, the group of perforations serving with the belt to separate and feed a single sheet from said supply in each of said cycles and the group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

8. In means for feeding sheets to other means, a suction applying device and a continuously driven sheet feeding belt associated with the suction applying device, said belt being provided with a group of perforations extending lengthwise of the belt a distance substantially equal to that between the suction applying device and the means to which the sheet is fed, the belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying

device to atmosphere, and the imperforate portion or portions of said belt, said group, and said device providing for gripping and feeding of different sheets by the belt at predetermined intervals through successive cycles of movement of the latter, the group of perforations serving with the belt to separate and feed a single sheet from said supply in each of said cycles and the group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

9. In means for feeding sheets to other means, a suction applying device having suction continuously created therein and a continuously moving sheet feeding belt associated with the suction applying device, said belt being provided in a portion thereof with a group of perforations extending lengthwise of the belt a distance substantially equal to that between the suction applying device and the means to which the sheet is fed, the belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, and the imperforate portion or portions of said belt, said group, and said device providing for gripping and feeding of different sheets by the belt at predetermined intervals through successive cycles of movement of the latter, the group of perforations serving with the belt to separate and feed a single sheet from said supply in each of said cycles and the group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

10. In means for feeding sheets one after another to other means, a suction applying device having suction continuously created therein and a continuously driven sheet feeding belt associated with the suction applying device, said belt being provided longitudinally thereof with a plurality of groups of perforations, each group extending lengthwise of the belt a distance substantially equal to that between the suction applying device and the means to which the sheets are fed and the groups being spaced apart longitudinally of the belt, the belt having imperforate portions extending lengthwise thereof between the groups to periodically close the suction applying devices to atmosphere and said portions, said groups, and said device providing for gripping and feeding of sheets successively at predetermined intervals by the belt during each cycle of movement of the latter, each group of perforations serving with the belt to separate and feed a single sheet from said supply during one cycle of operation of the belt and each group including a plurality of perforations extending lengthwise of said belt and acting one after another therewith on the single sheet.

11. In means for feeding sheets to other means, a suction applying device, a movable sheet feeding belt associated therewith, said belt being provided with a group of perforations extending lengthwise of the belt in a portion only thereof, the belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, said group and the imperforate belt portion or portions passing the suction applying device once during each cycle of movement of the belt and enabling different sheets to be successively gripped on and fed by the belt through successive cycles of movement thereof, and mechanism driving the belt and

maintaining different pluralities of perforations of the group successively in operative relation with said suction applying device whereby the latter may apply suction continuously to a sheet after it is gripped on the belt and until said sheet is fed thereby to the means to be fed.

12. In means for feeding sheets to other means, a suction applying device having suction continuously created therein, a movable sheet feeding belt associated with the suction applying device, said belt being provided with a group of perforations extending lengthwise of the belt in a portion only thereof, the belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, said group and the imperforate belt portion or portions passing the suction applying device once during each cycle of movement of the belt and enabling different sheets to be successively gripped on and fed by the belt through successive cycles of movement thereof, and mechanism driving the belt and maintaining different pluralities of perforations of the group successively in operative relation with said device whereby the latter may apply suction continuously to a sheet after it is gripped on the belt and until said sheet is fed thereby to the means to be fed.

13. In means for feeding sheets to other means, a suction applying device, a movable sheet feeding belt associated therewith, said belt being provided with a group of perforations extending lengthwise of the belt in a portion only thereof, the belt being imperforate, lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, said group and the imperforate belt portion or portions passing the suction applying device once during each cycle of movement of the belt and enabling different sheets to be successively gripped on and fed by the belt through successive cycles of movement thereof, and mechanism continuously driving the belt and maintaining different pluralities of perforations of the group successively in operative relation with said device whereby the latter may apply suction continuously to a sheet after it is gripped on the belt and until said sheet is fed thereby to the means to be fed.

14. In means for feeding sheets to other means, a suction applying device having suction continuously created therein, a movable sheet feeding belt associated with the suction applying device, said belt being provided with a group of perforations extending lengthwise of the belt in a portion thereof, the belt being imperforate lengthwise thereof a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, said group and the imperforate belt portion or portions passing the suction applying device once during each cycle of movement of the belt and enabling different sheets to be successively gripped on and fed by the belt through successive cycles of movement thereof, and mechanism continuously driving the belt and maintaining different pluralities of perforations of the group successively in operative relation with said device whereby the latter may apply suction continuously to a sheet after it is gripped on the belt and until said sheet is fed thereby to the means to be fed.

15. In means for feeding sheets to other means, a suction applying device, a movable sheet feed-

ing belt associated therewith, said belt being provided with a plurality of groups of perforations and a plurality of imperforate portions extending longitudinally of the belt and periodically closing the suction applying device to atmosphere, each group extending lengthwise of the belt in a portion only thereof and said groups being spaced apart longitudinally of the belt by said imperforate portions so that sheets may be successively gripped on and fed one after another by the belt at predetermined intervals to the means to be fed and during each cycle of movement of said belt, and mechanism for driving the belt and moving the groups and imperforate belt portions one after another past the suction applying device, said mechanism successively maintaining different pluralities of perforations of the groups in operative relation with said device at intervals so that the latter may apply suction continuously to each sheet after it is gripped on and until the same is fed by the belt as aforesaid.

16. In means for feeding sheets to other means, a suction applying device having suction continuously created therein, a movable sheet feeding belt associated with the suction applying device, said belt having a plurality of groups of perforations and a plurality of imperforate portions extending longitudinally of the belt and periodically closing the suction applying device to atmosphere, each group extending longitudinally of the belt in a portion only thereof and said groups being spaced apart lengthwise of the belt by said imperforate portions so that sheets may be successively gripped on and fed one after another by the belt at predetermined intervals to the means to be fed and during each cycle of movement of said belt, and mechanism for continuously driving the belt and moving the groups and imperforate belt portions one after another past the suction applying device, said mechanism successively maintaining different pluralities of perforations of the groups in operative relation with said suction applying device at intervals so that the latter may apply suction continuously to a sheet after it is gripped on and until the same is fed by the belt as aforesaid.

17. In means for feeding sheets to other means, a suction applying device, a movable sheet feeding belt associated therewith above and in spaced relation with the sheets, said belt being provided with a group of perforations extending lengthwise of the belt in a portion only thereof and the belt being imperforate longitudinally of the same a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, said group and the imperforate belt portion or portions passing the suction applying device once during each cycle of movement of the belt and enabling different sheets to be successively picked up, gripped on the belt, and fed thereby to the means to be fed through successive cycles of movement of said belt, and mechanism driving the belt and maintaining different pluralities of perforations of the group successively in operative relation with the suction applying device after a sheet is picked up and gripped on the belt and until said sheet is fed thereby to the means to be fed.

18. In means for feeding sheets to other means, a suction applying device having suction continuously created therein, a movable sheet feeding belt associated with the suction applying device and arranged therewith above and in spaced relation with the sheets, said belt being provided

with a group of perforations extending lengthwise of the belt in a portion only thereof and the belt being imperforate longitudinally of the same a predetermined distance or distances from opposite ends of the group to periodically close the suction applying device to atmosphere, said group and the imperforate belt portion or portions passing the suction applying device once during each cycle of movement of the belt and enabling different sheets to be successively picked up, gripped on the belt, and fed thereby to the means to be fed through successive cycles of movement of said belt, and mechanism continuously driving the belt and maintaining different pluralities of perforations of the group successively in operative relation with the suction applying device after a sheet is picked up and gripped on the belt and until said sheet is fed thereby to the means to be fed.

19. In means for feeding sheets to other means, a suction applying device having suction continuously created therein, a movable sheet feeding belt associated with the suction applying device and arranged therewith above and in spaced relation with the sheets, said belt being provided

with a plurality of groups of perforations and a plurality of imperforate portions for periodically closing the suction applying device to atmosphere, each group and each imperforate belt portion extending lengthwise of the belt a predetermined distance and being moved past the suction applying device once during each cycle of movement of the belt, said groups being spaced apart longitudinally of the belt by said imperforate belt portions and enabling sheets to be successively picked up and gripped on the belt and fed thereby one after another at predetermined intervals to the means to be fed during each cycle of movement of said belt, and mechanism continuously driving the belt and moving the groups and the imperforate belt portions one after another past the suction applying device, said mechanism successively maintaining different pluralities of perforations of the groups respectively in operative relation with said device at intervals so that the latter may apply suction continuously to a sheet after it is picked up and until the same is fed as aforesaid.

HARRY EHLIG. 25