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PAPER SHEET FORWARDING APPARATUS

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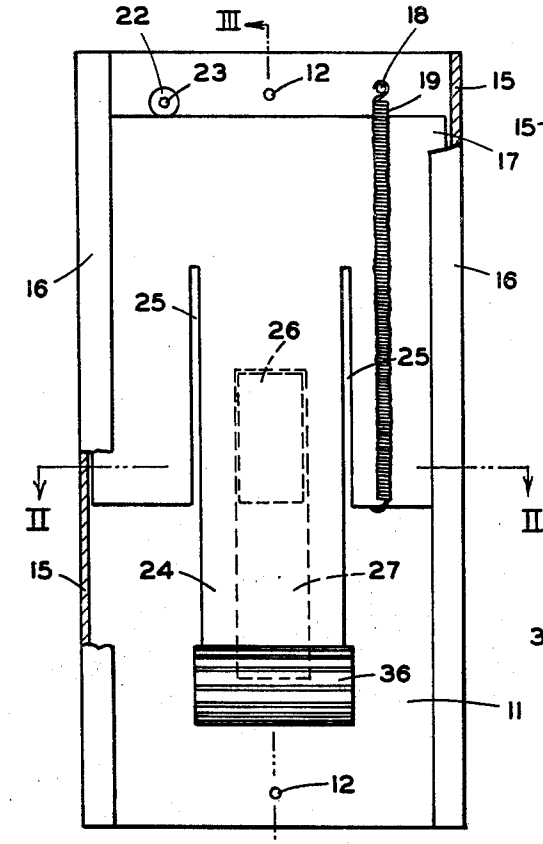


fig. 1

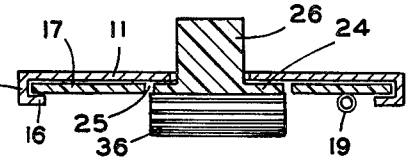


fig. 2

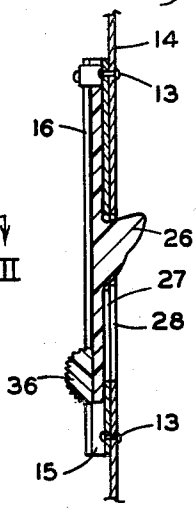


fig. 3

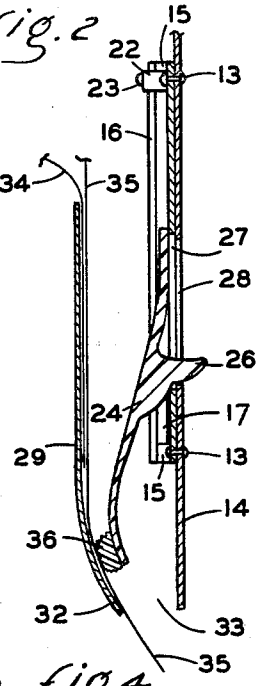


fig. 4

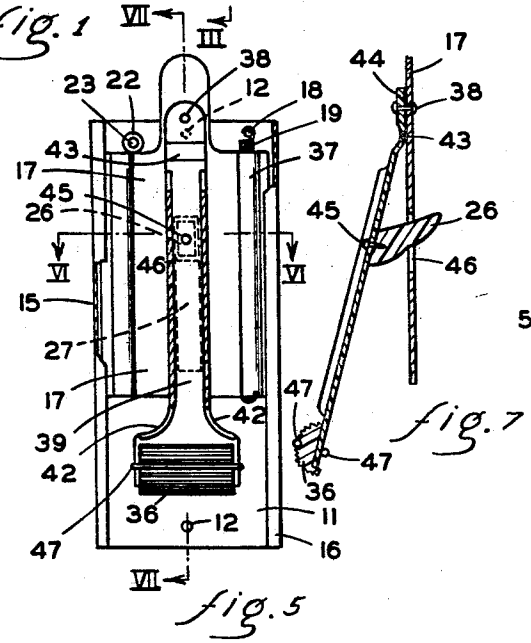


fig. 5

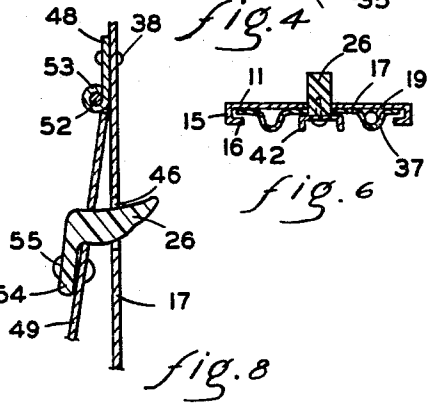


fig. 6

fig. 7

fig. 8

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PAPER SHEET FORWARDING APPARATUS

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This invention relates to apparatus for forwarding a paper sheet, particularly to apparatus adapted to be incorporated in a dispensing apparatus for dispensing single sheets of paper from a pack thereof. This application is a continuation-in-part of application Serial No. 783,401, filed December 29, 1958, now U.S. Patent No. 3,037,717, and of application Serial No. 152,563, filed November 15, 1961, which latter application was filed as a continuation-in-part of applications Serial No. 783,401 and Serial No. 678,506, filed August 16, 1957 and now abandoned.

Numerous paper products are used in sheet form. In many such instances it is desirable to furnish the sheets in the form of a pack comprising a plurality of sheets which can be installed in a suitable dispenser and from which individual sheets can be dispensed as desired. Such paper articles include paper towels, paper toilet seat covers, certain kinds of wrapping paper and the like. In some instances the pack may comprise folded sheets stapled to a backing board which is suspended in the dispenser by suitable means and in other instances the pack may comprise a plurality of flat sheets in face-to-face contact unsecured to one another but suspended in the dispenser by suitable members engaging slots formed in the edges of the pack. In still another variation a plurality of rolls of paper, such as rolls of paper toweling, are suspended in the dispenser with the ends of the several roll-forming sheets depending in face-to-face contact with one another in a zone wherein the outermost sheet can be engaged by suitable means and forwarded into a dispensing zone. When the first roll is completely used, the forwarding means automatically engages the unrolled section of the next adjacent sheet and forwards it in the same manner, thus avoiding the possibility of the dispenser becoming completely empty before it is serviced. The plurality of unrolled sections of the sheets which depend in the apparatus in face-to-face contact form a "pack" of sheets even though individual sections of each sheet are not severed from one another except upon completion of the dispensing operation.

It is convenient in using the forwarding means which will be described to provide a dispenser comprising a cabinet in which a pack of paper sheets can be mounted in such a way that successive sheets can be forwarded by the forwarding means downwardly into a dispensing opening or zone. It is also convenient to secure the forwarding apparatus to the inner surface of one of the panels of the cabinet. In the following description this panel will be referred to as the "front" panel of the cabinet, the pack of sheets being in such case considered to be disposed essentially vertically within the cabinet essentially parallel with the front panel and removed a suitable distance therefrom. The sheet of the pack nearest the front panel is thus conveniently referred to as the "front" sheet of the pack. Although the invention will be described with these matters in mind, it is pointed out that other arrangements are also possible and can be employed if desired.

The present invention is, therefore, particularly concerned with apparatus for effecting the initial forwarding of a sheet from a pack thereof retained in a dispensing cabinet for a distance sufficient to enable the forwarded sheet to be grasped by the hand and pulled completely from the cabinet. In the case of the continuous rolled up sheet referred to, severance of an individual sheet from

the continuous strip is usually effected by tearing it along an edge of the dispensing container after it has been withdrawn for a suitable distance from the dispenser.

The initial forwarding effect is accomplished by providing a suitable frictional sheet-engaging element mounted on a flexible tongue which is normally retained by suitable spring means in a retracted position such that the tongue and frictional element are out of contact with the pack of paper sheets. Upon operation of the device the tongue flexes and the frictional element travels both inwardly of the cabinet into pressure contact with the front sheet of the pack and also in a direction, e.g. downwardly, which will forward the engaged sheet toward a suitable opening, or dispensing zone, in a wall of the dispenser through which the sheet projects upon completion of the downward stroke of the frictional element. Following the completion of the stroke, the tongue becomes unflexed, the frictional element diengages the forwarded sheet and the tongue and frictional element are retracted into their original positions, e.g. by suitable spring means. The edge of the forwarded sheet is thus left projecting through the dispensing zone out of the cabinet in a position such that it can be grasped by the hand.

The invention can be understood readily by reference to the accompanying drawing wherein certain features are, for the sake of clarity, shown on a somewhat exaggerated scale and wherein:

FIGURE 1 is a plan view of a paper sheet forwarding apparatus embodying features of the invention;

FIGURE 2 is a sectional elevation taken along the line II—II of FIGURE 1;

FIGURE 3 is a side elevation, principally in section and considerably reduced, taken along the line III—III of FIGURE 1 and showing the apparatus secured to a wall of a dispensing cabinet;

FIGURE 4 is a sectional elevation corresponding to FIGURE 3 but including a pressure plate and a thin pack of paper sheets and illustrating the positions of the parts at one stage during the dispensing of a single sheet from the pack;

FIGURE 5 is a plan view of a modification of apparatus of the invention showing features alternative to those of FIGURE 1;

FIGURE 6 is a sectional elevation taken along the line VI—VI of FIGURE 5;

FIGURE 7 is a partial side elevation, principally in section, taken along the line VII—VII of FIGURE 5 and showing the locations of certain of the parts at one stage in a dispensing operation; and

FIGURE 8 is a partial side elevation corresponding to FIGURE 7 but showing still another alternative arrangement of the parts.

Referring to FIGURES 1, 2, 3 and 4, there is illustrated a base panel **11** adapted to be secured to the inner surface of a wall panel **14** of FIGURES 3 and 4, of a dispensing cabinet. In the modification shown, the panel **11** is provided with holes **12** through which rivets **13** of FIGURES 3 and 4, can be inserted so as to also engage suitable holes in the wall **14** of the dispensing cabinet. The base panel **11** is provided with upstanding edges **15** along its opposite sides and with overhanging flanges **16** secured to the edges **15** which extend toward one another at a suitable distance from the base panel itself, thus providing facing channels of suitable width along opposite edges of the base panel. The base panel is generally secured to a wall of a dispensing cabinet with the channels extending vertically.

A sliding element **17** adapted to be retained slidably in the facing channels is also provided and is located in the channels in essentially face-to-face contact with the base panel **11**. The base panel, including the facing channels, and the sliding element **17**, are made of suffi-

ciently rigid material, and are dimensioned appropriately, to allow for easy sliding movement of the sliding element in the channels but without any danger of its becoming disengaged from the channels. Generally, the apparatus is arranged to provide for downward sliding movement of the sliding element **17** during the initial stages of a dispensing operation, which operation will be described later. Suitable means is provided in such case for retaining the sliding element **17** in its retracted or upper position between consecutive dispensing operations. One convenient means for maintaining the sliding element in its retracted position comprises a pin **18** secured near the top of the base panel **11** to which is secured one end of a coil spring **19**, the lower end of the spring being provided with a hook which engages the lower end of the sliding element **17**. Any suitable retracting means can, however, be employed. A suitable stop, such as a rubber washer **22** secured to the base panel with a rivet **23**, is also provided near the upper end of the panel so that it engages the upper end of the sliding element **17** in its fully retracted position and prevents its further upward travel.

The sliding element **17** is provided with a flexible tongue **24** secured to it in suitable fashion, preferably adjacent to the upper end of the panel. In the modification illustrated in FIGURES 1, 2, 3 and 4, the sliding element **17** and the flexible tongue **24** are formed integral with one another from a single plastic sheet having properties to provide a suitably rigid sliding element and a suitably flexible tongue. Such plastic materials include certain grades of nylon, of polyvinyl chloride and of other plastic materials. As illustrated, the tongue **24** can be separated from the body of the sliding element **17** except at its top end by suitable slots **25**. It is also desirable to provide the lower end of the flexible tongue **24** with a frictional element **36** which is located on the side of the tongue adjacent to the pack of sheets and secured to the tongue in any convenient way, e.g. by an adhesive or by a suitable clip. Such a frictional element can comprise a pad or a half round section of soft rubber or of other suitable material which, when pressed against the front sheet of the pack will engage it with sufficient friction to forward it downwardly as the pad itself travels downwardly.

The flexible tongue **24** is provided with an actuating button or lever **26** which is adapted to project through a suitably wide and long slot **27** in the base panel **11** and also to project through a corresponding slot **28** in the cabinet wall **14** into a position such that it can be engaged and pressed downwardly by the operator's finger. The button **26** can conveniently be molded integral with the flexible tongue **24**.

It will be apparent from the description thus far that, when the operator presses downward on the part of the lever **26** projecting through the cabinet wall **14**, the lever, the flexible tongue **24** and the sliding element **17** will travel downwardly as a unit with the limit of their travel being determined by the length of whichever of the slots **27** and **28** is the shorter. It will also be apparent that, since the lever **26** projects off-center with respect to the longitudinal axis of the tongue **24** and since the tongue itself is flexible, any pressure on the upper surface of the lever **26** will also cause the tongue **24** to flex and swing inwardly of the cabinet in the fashion illustrated in FIGURE 4.

FIGURE 4 also illustrates the manner in which this inward and downward movement of the lower end of the tongue **24** is utilized to forward a paper sheet sufficiently far out of the lower end of the cabinet to enable it to be grasped by the hand. To this end there is conveniently provided inside the cabinet at a suitable distance from the cabinet wall **14** and base panel **11** a rigid pressure plate **29** which extends essentially parallel with the cabinet wall **14** except that its lower end **32** can be curved smoothly toward the wall **14**, if desired. The lower end **32** of the

plate **29** and the lower end of the cabinet wall **14** are generally formed so that they are relatively close to one another but so that there remains an adequate slot or dispensing zone **33** between them. The pack of paper sheets from which individual sheets are to be dispensed is located in the dispensing cabinet so that it is suspended by suitable means closely adjacent to the pressure plate **29** on the side thereof facing the cabinet wall **14**. In many instances the pressure plate **29** can be the wall of the cabinet opposite the wall **14**.

The pack of paper sheets which are to be dispensed using the apparatus of the invention can comprise any suitable number of sheets which can be suspended in any suitable way adjacent to the pressure plate **29** in the way described. Tissue sheets which tear easily can be stapled through suitable tear tabs to a backing board of cardboard or other suitably stiff material and the board can then be suspended from suitably located hooks or pegs within the cabinet. Unfolded paper towels can be slotted along their edges and suspended in pack form from suitable hangers adapted to engage the slots. In the modification of FIGURE 4 the pack comprises a rearward sheet **34** and a forward sheet **35** which are unrolled, but still attached, sections of paper toweling, the rolls of toweling being supported suitably elsewhere within the cabinet. In this instance when a suitable section of the forward towel **35** has been withdrawn from the cabinet it is severed by tearing it along the lower edge of the cabinet panel **14**. It will be apparent that the pack of paper sheets should not be thick enough to interfere with the retraction of the tongue **24** once the pressure of the finger on the actuating lever **26** has been released.

It will thus be seen that the complete dispensing operation comprises first pressing downwardly on the actuating lever **26** which causes the tongue **24** to flex and the frictional element **36** to engage the surface of the front sheet of the pack. Further pressure on the lever **26** causes the tongue and associated parts to move downwardly and the engaged sheet to be forwarded downwardly until it protrudes from the dispensing zone **33**. When this operation is completed the finger is removed from the lever **26** allowing the tongue **24** to resume its normal unflexed position in essentially the plane of the sliding element **17** and allowing the spring **19** to retract the sliding element and the tongue to their uppermost or retracted positions. The retraction is thus accomplished with the frictional element **36** out of contact with the forwarded sheet. After the forwarded sheet has been withdrawn from the dispensing cabinet the dispensing operation can be repeated and the next adjacent sheet forwarded into position for withdrawal. In the modification illustrated in FIGURE 4 it will be seen that forwarding of paper toweling from the roll from which the section **35** is unrolled will be continued by repeated operation of the apparatus until the roll is exhausted and that subsequent operation of the apparatus will cause toweling to be unrolled and dispensed from the roll of which the section **34** is an unrolled portion.

Although one modification of the apparatus of the invention has been described and illustrated in FIGURES 1, 2, 3 and 4, it should be pointed out that certain other modifications of the apparatus are contemplated. Some of these several modifications may at times be preferable to others, depending upon the properties of the particular sheets of paper or of other material which are to be forwarded. One such other modification is illustrated in FIGURES 5, 6 and 7 wherein it will be observed that the base panel **11** and the members **15** and **16** are formed and arranged essentially as in the modification of FIGURE 1. In this instance the sliding element **17** is conveniently, but not necessarily, formed with one or more longitudinal troughs **37**, in one of which the spring **19** can be enclosed to avoid any tendency for the spring to become detached at its ends so as to render the apparatus temporarily inoperable.

In particular, it will be noted that the flexible tongue **39** on which the frictional element **36** is mounted is formed somewhat differently than is the case with the modification of FIGURE 1. In the modification of FIGURES 5, 6 and 7 the tongue is formed separately from the sliding element **17** and is secured by its upper end section **44** to the sliding element **17**, as by a rivet **38**. The main portion of the tongue **39** is formed as a rigid member and can be provided with stiffening ribs **42** along its edges to render it essentially inflexible. A short intermediate section **43** of the tongue extending between the rigid section and the upper section **44** is formed of flexible material so that in carrying out the dispensing operation the entire flexing action of the tongue occurs at the section **43**. The entire tongue can be molded of a suitable plastic material, preferably with the section **43** being a thinner section of the molding, although the tongue can be formed in any other desired way. The actuating lever **26** can be molded integral with the tongue or formed separately and secured to the tongue, e.g. with an adhesive or by means of a screw **45**. In the instance under consideration a slot **46** is formed in the sliding element **17** to permit movement of the actuating lever **26** through it. The frictional element **36** is secured by the lower end of the tongue **39** as in the modification of FIGURE 1, e.g. by an adhesive or any other suitable means. One especially desirable means comprises a suitable wire clip **47** which permits the frictional element **36** to be removed and renewed should this become desirable or necessary. A suitable slot **27** is, of course, formed in the base panel **11** and in the cabinet wall to which the panel is attached to permit the desired travel of the actuating lever **26** upwardly and downwardly.

From the foregoing it will be seen that with the modification of FIGURES 5, 6 and 7 the dispensing operation is carried out in essentially the same manner as that described in connection with the modification of FIGURES 1, 2, 3 and 4. It will be observed further that, because of the rigid and essentially inflexible nature of the main section of the tongue **39** extending below the flexible section **43**, it is possible, by regulating the tension exerted by the spring **19**, to regulate with a considerable degree of accuracy the pressure exerted by the frictional element **36** on the sheet of material being dispensed. Thus, the more tension exerted by the spring **19** the greater will be the pressure exerted by the frictional element **36** during the downward travel of the actuating lever **26**. This is not so strictly true of the modification of FIGURES 1, 2, 3 and 4 because of the flexible nature of the section of the tongue **24** extending between the lever **26** and the frictional element **36**. The modification of FIGURES 5, 6 and 7 is thus more adapted to adjustment to accommodate sheets of paper or other materials having particular properties than is the modification of FIGURES 1, 2, 3 and 4. One such property which may sometimes need to be considered relates to the ease with which the engaged sheet can be caused to slide over the surface of the next adjacent sheet under the pressure exerted on it by the frictional element **36**.

In a further modification, illustrated in FIGURE 8, the flexible tongue comprises an upper section **48** which is secured to the sliding element **17**, as by a rivet **38**, and a lower rigid section **49** corresponding to the lower inflexible section of the tongue **39** of the modification of FIGURES 5, 6 and 7. In this instance, however, flexibility of the tongue is secured by hinging the two sections **48** and **49** together with a suitable pin **52** which engages suitable eyes **53** formed in the lower and upper ends of the sections **48** and **49**, respectively. The tongue is thus free to flex by pivoting of the lower section **49** around the pin **52** when pressure is exerted downwardly on the actuating lever **26**, the action of the mechanism during the dispensing operation being essentially the same as that of the modification of FIGURES 5, 6 and 7. An alternative way of securing the actuating lever **26** to the lower section **49** of the tongue is also illustrated in FIGURE 8. Here the lever extends through the slot **46** and through a suitable aperture in the section **49** of the tongue and is formed with a flange **54** which lies flush along the surface of the section **49** and is secured thereto, as by a rivet **55**.

Although the forwarding apparatus of the invention has been described with particular respect to its utility for forwarding paper sheets, it will be apparent that it can be employed with equal satisfaction for forwarding sheets of many other materials, such as sheets of plastic or metal foil or film or even sheets of certain kinds of fabrics.

We claim:

1. In apparatus useful in dispensing sections of sheet material singly from a pack thereof retained vertically in a dispensing cabinet, the combination including: a base panel adapted to be secured to the inner face of a vertical wall of a dispensing cabinet, said panel having vertically extending, facing channels along opposite edges thereof; a sliding element retained slidably in the facing channels in essentially face-to-face contact with said base panel; means to limit the travel of said sliding element upwardly and downwardly; a substantially vertically extending, flexible tongue connected at its upper end to said sliding element for vertical travel therewith, the unsecured lower end of said tongue carrying a frictional, sheet engaging element facing away from said base panel; an actuating lever fixedly secured to said flexible tongue intermediate its ends and extending substantially laterally outwardly therefrom a substantial distance on the side of said tongue facing toward said base panel and through an opening formed therein permitting unimpeded movement of said lever between said upper and said lower limits of travel; and biasing means operably connected to said sliding element for returning it from its limit of downward travel to its limit of upward travel and to maintain said sliding element at its uppermost limit upon release of said actuating lever at its lowermost limit, said tongue and said frictional, sheet-engaging element normally being spaced a short distance from the face of the front sheet of said pack, said tongue being sufficiently long and sufficiently flexible adjacent the upper end thereof to permit said tongue to flex about said flexible upper end in a direction away from said base panel and to bring said frictional element into engagement with the front and each succeeding sheet of said pack as said sheets are dispensed, said biasing means alone offering sufficient resistance to initial downward pressure on said actuating lever to result in said tongue flexing about said flexible upper end to an extent sufficient to bring said frictional element into contact with the front and each succeeding front sheet of said pack as said sheets are exposed for dispensing, additional downward pressure on said lever sufficient to overcome said biasing means resulting in downward movement of said tongue and of said sliding element to forward the engaged sheet downwardly, release of said actuating lever resulting in disengagement of said frictional element from the downwardly forwarded sheet with the return of said tongue to its normal position and the retraction of said sliding element to the upward limit of travel.

2. Apparatus as claimed in claim 1 wherein the flexible tongue is formed integral at its upper end with the sliding element.

3. Apparatus as claimed in claim 1 wherein the flexible tongue is formed separately from the sliding element and is secured at its upper end to the sliding element.

4. Apparatus as claimed in claim 1 wherein the flexible tongue comprises resilient, flexible material whereby upon relief of downward pressure upon the actuating lever the tongue will become unflexed and extend essentially parallel with the plane of the sliding element.

5. Apparatus as claimed in claim 4 wherein the flexible tongue comprises an upper section secured to the sliding element, a flexible section adjacent to the upper section and a rigid, essentially inflexible section extending from the flexible section to the lower end of the tongue, the

actuating lever being secured to the tongue intermediate the ends of the rigid, essentially inflexible section.

6. Apparatus as claimed in claim 1 wherein the flexible tongue comprises an upper section secured to the sliding element and a rigid, essentially inflexible lower section hinged at its upper end to the lower end of the upper section, the actuating lever being secured to the lower section intermediate the ends thereof.

7. In apparatus useful in dispensing sections of sheet material singly from an assemblage thereof disposed in flat face-to-face relationship parallel with and closely adjacent to a pressure plate of a dispensing cabinet, said cabinet having parallel channels facing each other on the side of said assemblage of sheets opposite said pressure plate and parallel therewith: a sliding element disposed in said channels for reciprocation therein; a tongue of flexible, resilient material connected to and extending from a side of the sliding element in the dispensing direction of travel of the sliding element, a soft, resilient sheet-engaging element secured to the free end of said tongue and facing the assemblage of sheets; an actuating lever fixedly secured to said tongue and extending substantially laterally outwardly therefrom from the side of said tongue opposite the assemblage of sheets and through an opening formed in the side of the cabinet adjacent thereto permitting unimpeded reciprocation of said lever, said actuating lever being secured to said tongue intermediate the free end of the tongue and its point of connection to said sliding element, said tongue being sufficiently long and sufficiently flexible adjacent the end thereof connected to said sliding element to permit said tongue to flex about said connected end in a direction toward said pack solely as a result of pressure applied to said actuating lever in said dispensing direction of travel and to bring said frictional element into engagement with the front and each succeeding front sheet of said pack as said sheets are dispensed, and biasing means operably connected to said sliding element for moving said sliding element in the non-dispensing direction of travel, said biasing means alone offering sufficient resistance to initial pressure on said actuating lever in said dispensing direction of travel to result in said tongue flexing about said flexibly connected end to an extent sufficient to bring said frictional element into contact successively with each sheet of said pack, additional pressure on said actuating lever sufficient to overcome said biasing means resulting in movement of said tongue and said sliding element in said dispensing direction and the forwarding from the assemblage of sheets of the engaged sheet.

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