Dec. 7, 1965 E. B. BAHNSEN 3,221,586

WEB DISPENSER HAVING A GRAVITY OPERATED CUTTING BLADE

Filed June 14, 1961 6 Sheets-Sheet 1

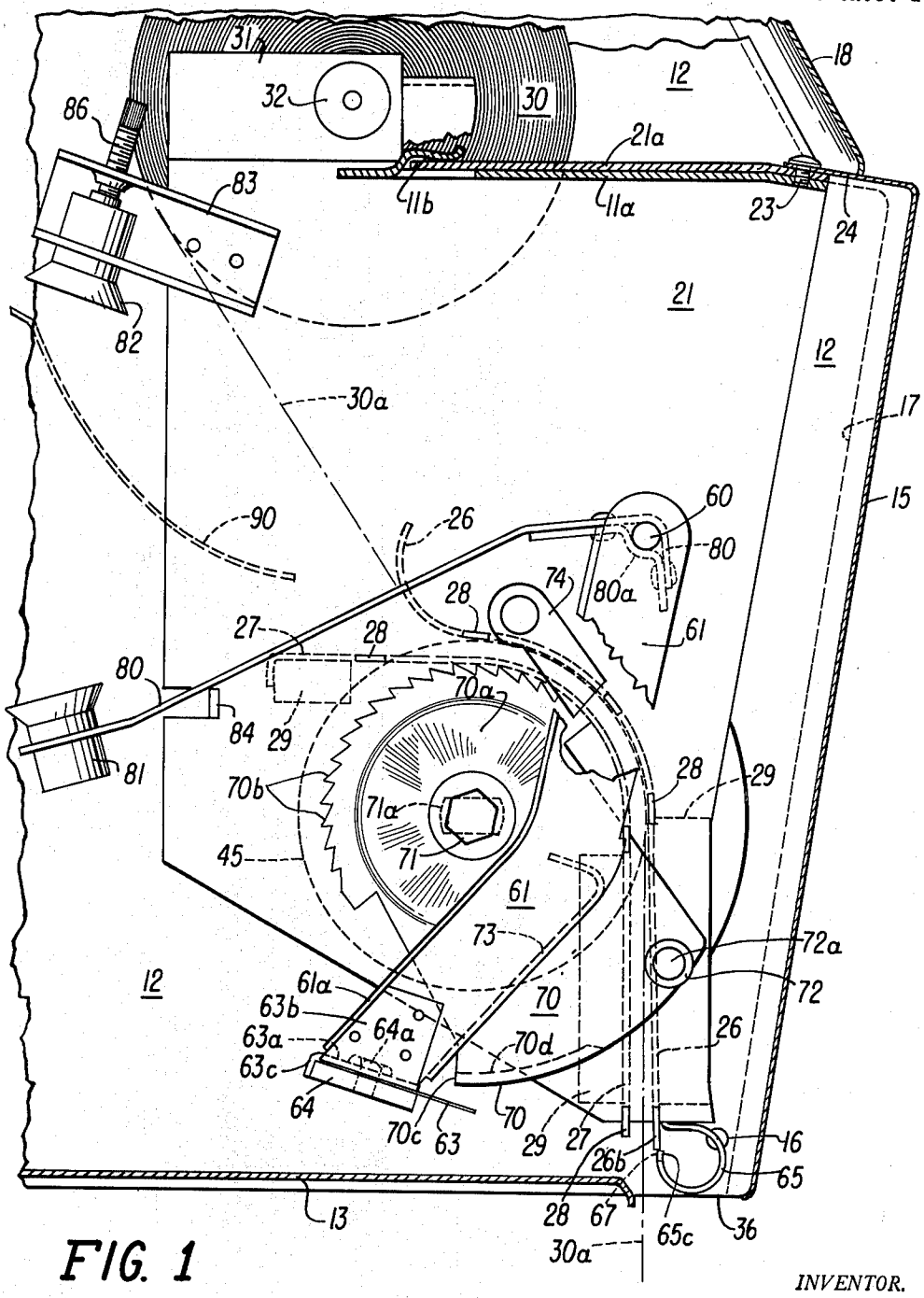


FIG. 1

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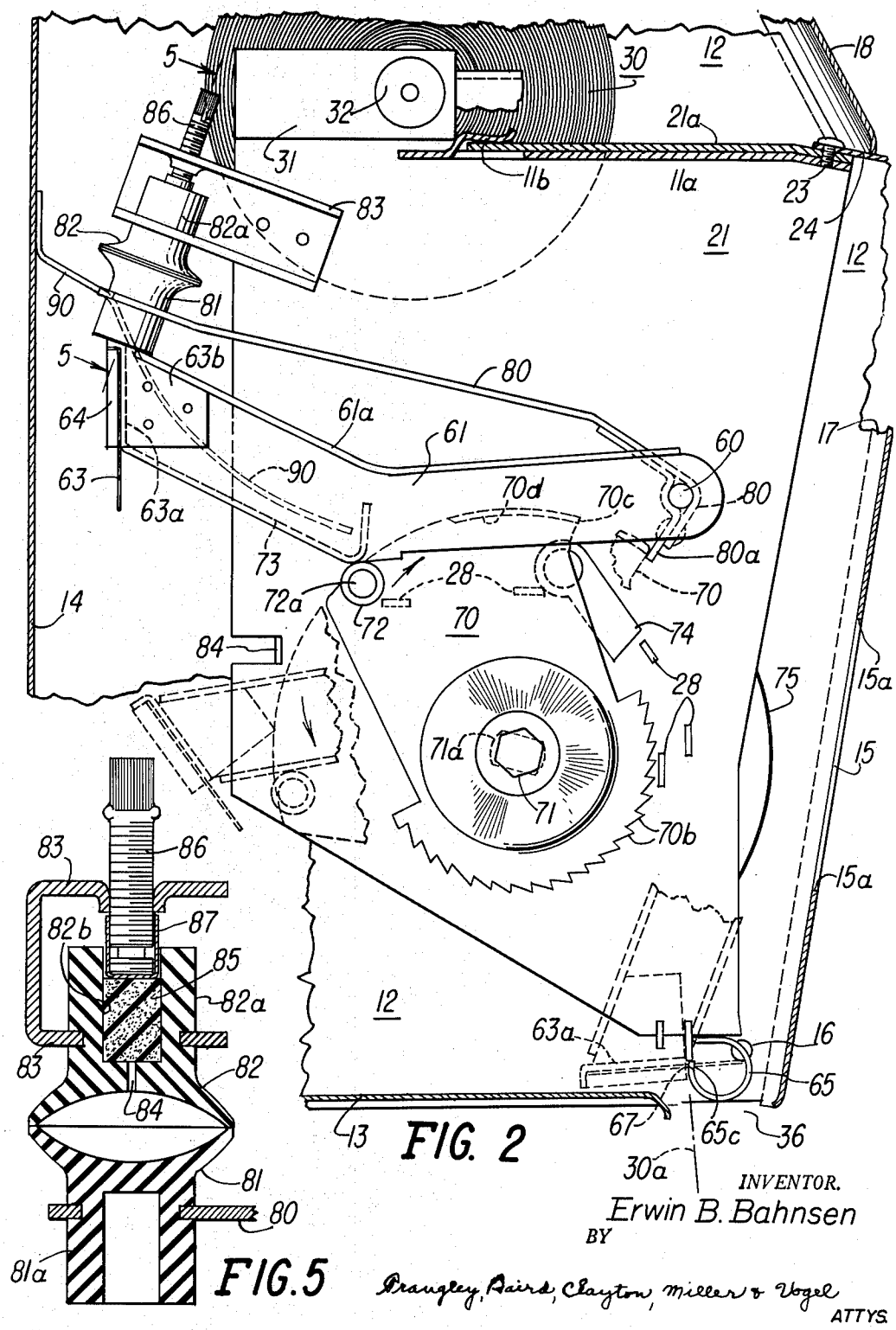


FIG. 2

FIG. 5

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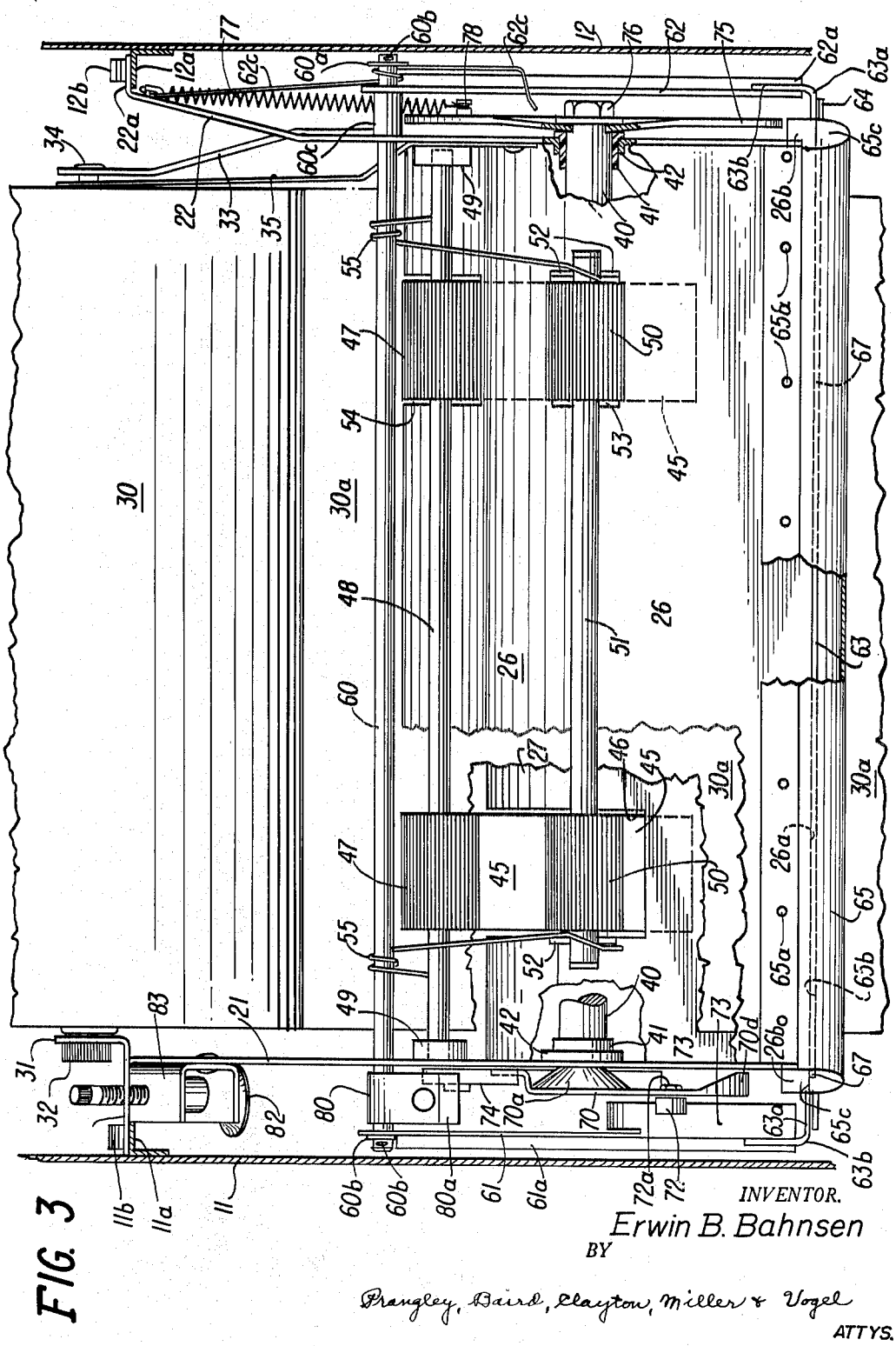


FIG. 3

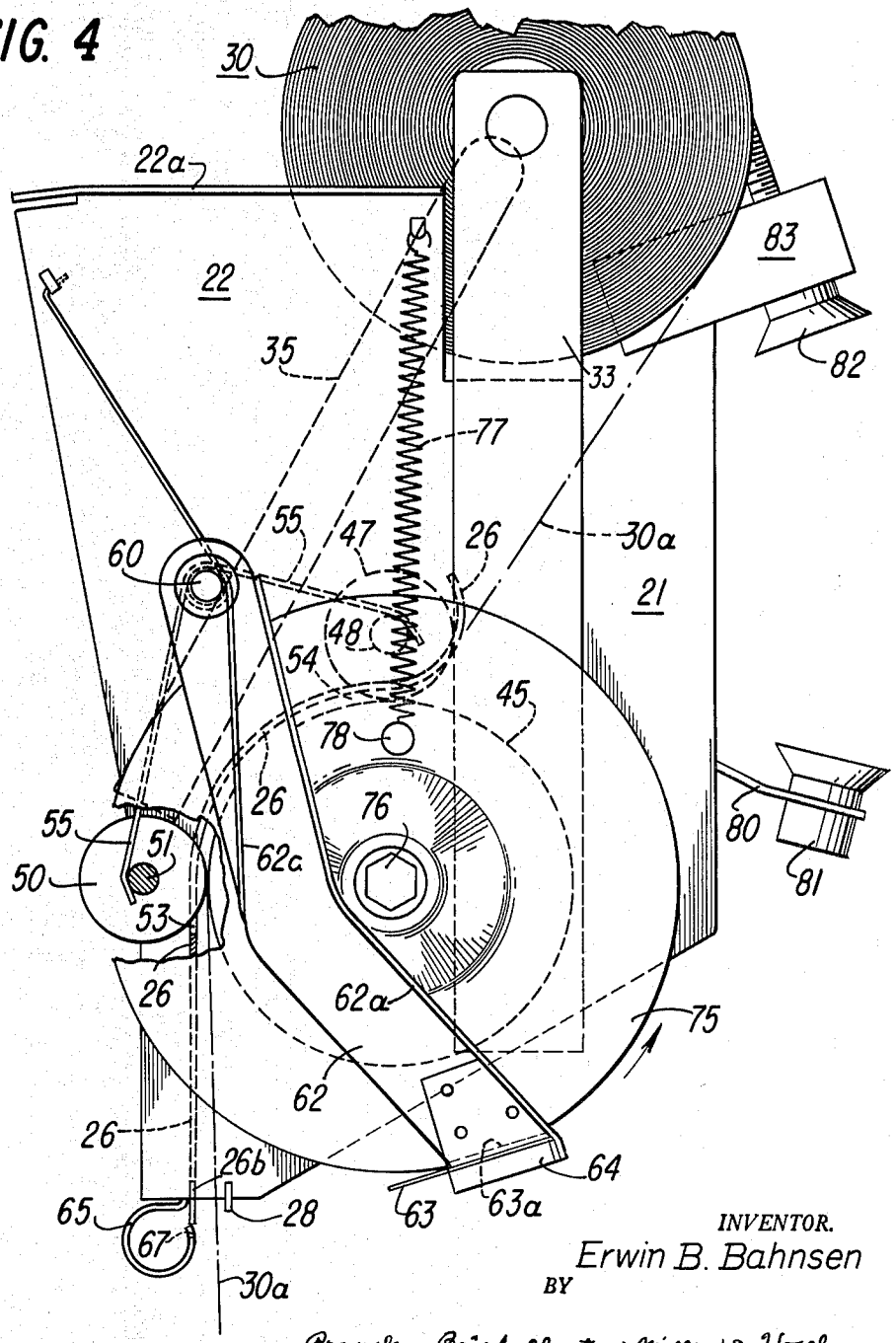
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FIG. 4



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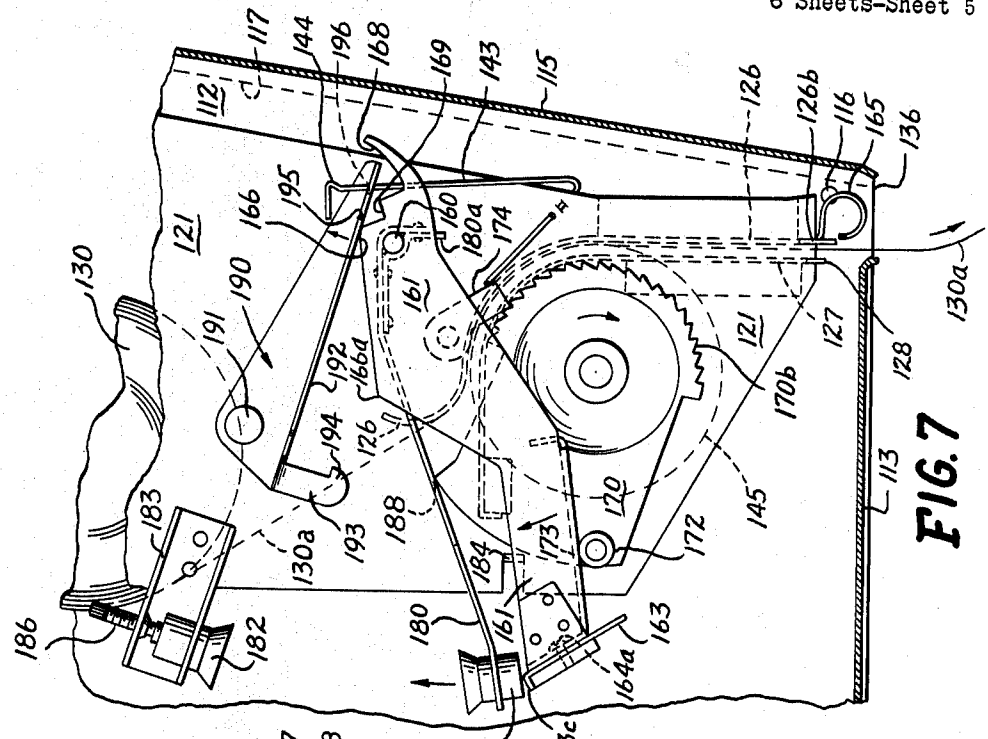


FIG. 7

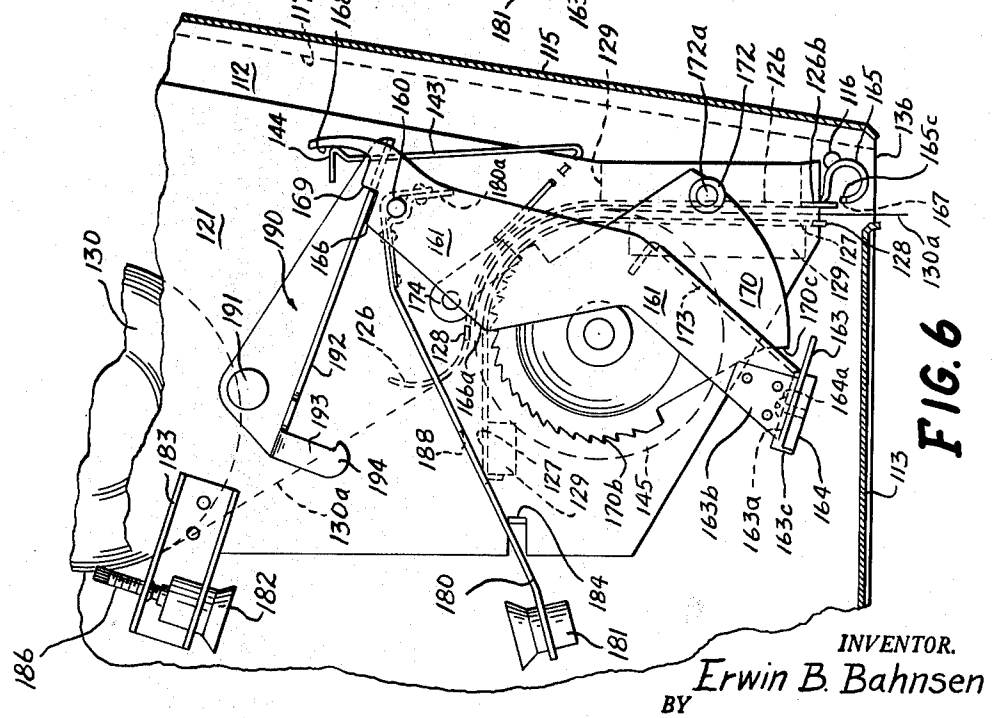


FIG. 6

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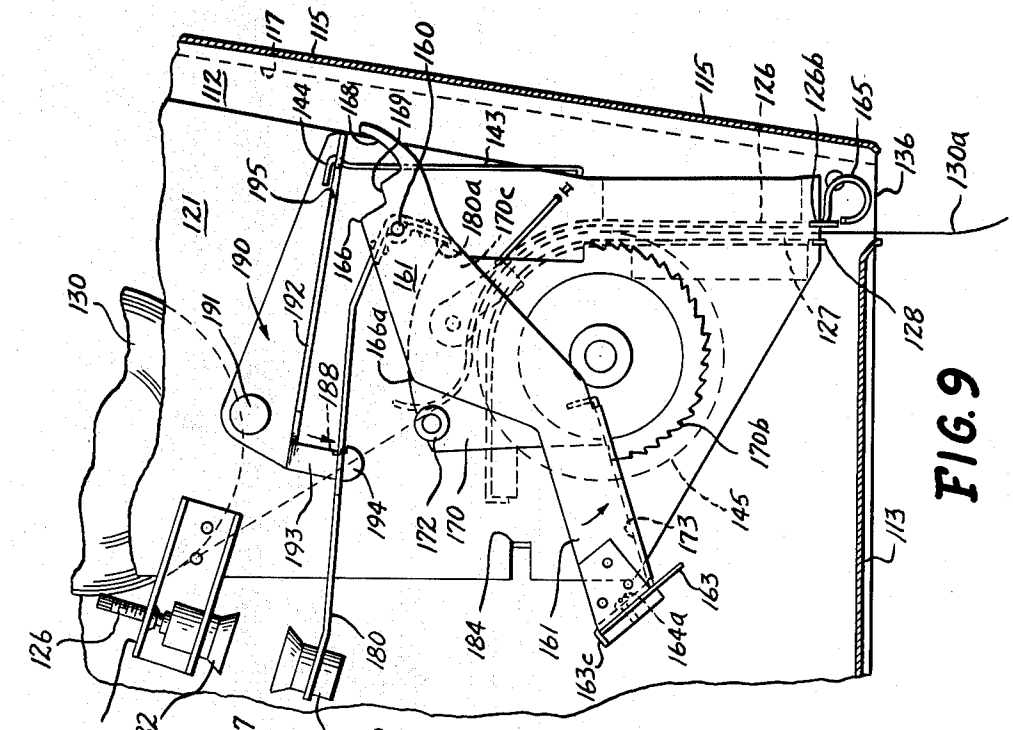


FIG. 9

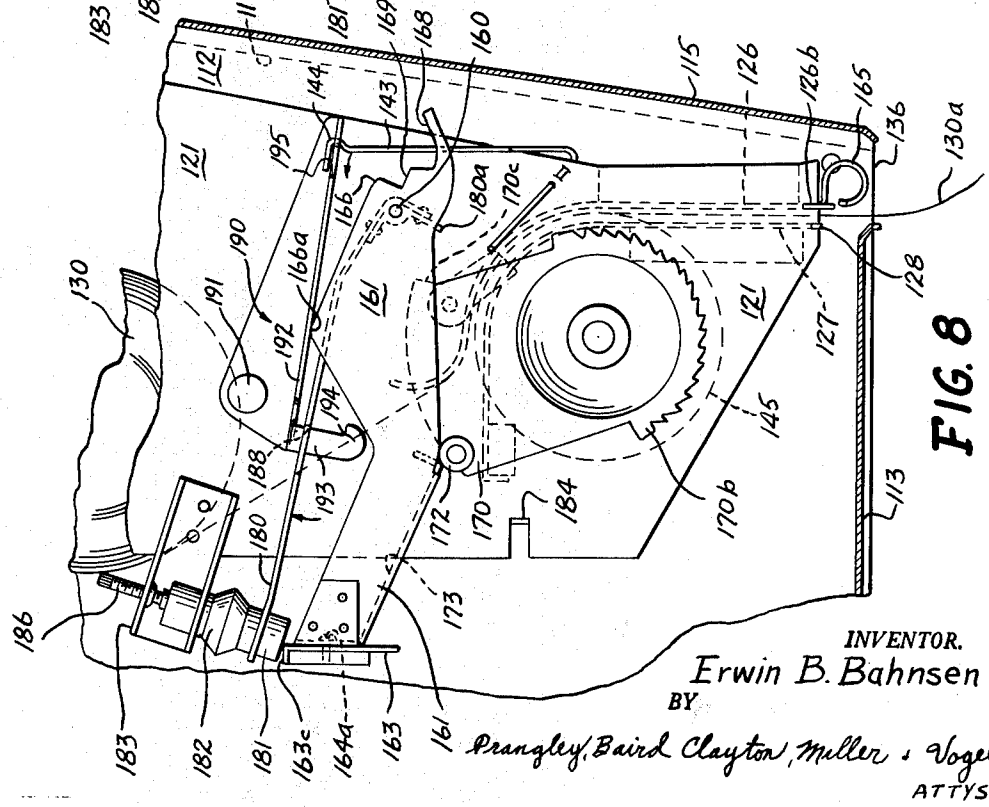


FIG. 8

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United States Patent Office 3,221,586 Patented Dec. 7, 1965

3,221,586

WEB DISPENSER HAVING A GRAVITY OPERATED CUTTING BLADE

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Filed June 14, 1961, Ser. No. 117,188
20 Claims. (Cl. 83—224)

This application is a continuation-in-part of the copending application Serial No. 68,087, filed November 8, 1960, now abandoned, for Dispensing Apparatus. This invention relates to dispensing apparatus, and more particularly to a highly improved paper web or paper towel dispensing device and time stop for dispensers.

Previously known paper towel dispensers have been characterized by one or more undesirable features resulting in inconvenience in use and in refilling, unreliability in operation, and high cost. In most previously known devices for dispensing an uninterrupted roll of paper toweling the user has been called upon manually to tear the toweling after he has withdrawn a prescribed length of toweling from the dispenser. A few previously known dispensers have incorporated means for severing the toweling after a prescribed length of toweling has been withdrawn from the dispenser, thereby sparing the user the inconvenience of having to tear the toweling, but such dispensers have invariably been inconsistent and unreliable in operation. Frequently these prior dispensers have required a firm, steady pull of the toweling by the user as a prerequisite to clean, effective severing of the toweling.

One of the principal objects of the present invention is to provide an improved paper web or paper towel dispenser of the type which automatically severs prescribed lengths from an uninterrupted roll of toweling, wherein the cutting action is independent of the rate of withdrawal of the toweling by the user.

It is still another object of the invention to provide an improved paper towel dispenser having a towel severing blade which cooperates in a novel manner with apparatus for advancing the leading edge of the remaining toweling past the knife blade to and exposed position, after a cutting operation has been performed, where it may be grasped by the next user.

It is a further object of the invention to provide an improved paper towel dispenser having a towel severing blade which cooperates in a novel manner with time delay apparatus which delays the next possible withdrawal of toweling, thereby avoiding waste of the toweling.

It is a still further object of the invention to provide an improved time delay device for a paper towel or other type dispenser.

Still another object of the invention is to provide an improved paper towel dispenser having a cutting blade for automatically severing the toweling, wherein the energy required for severing the toweling is progressively stored in the cutting blade and associated parts during a substantial portion of the towel withdrawing operation.

A further object of the invention is to provide an improved paper towel dispenser having a gravity operated cutting blade for severing the toweling, wherein the cutting blade is progressively raised to an elevated or energized position, to store potential energy therein, throughout a substantial portion of the towel withdrawing operation.

A still further object of the invention is to provide an improved paper towel dispenser which is efficient, durable, reliable in operation and, by virtue of its general arrangement and structural details, is economical to manufacture.

A still further object of the invention is to provide an

improved paper towel dispenser having a gravity operated cutting blade for severing the toweling, wherein additional paper cannot be fed from the towel supply roll until the cutting blade has completed its cycle of cutting operation.

Further features of the invention pertain to the particular arrangement of the elements of the paper towel dispenser, whereby the above outlined and additional features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the inner working apparatus of a paper towel dispenser, as viewed from immediately inside the left-hand wall of the dispenser cabinet, and illustrating a preferred embodiment of the invention, with parts of the cabinet and a paper roll being cut away for convenience of illustration;

FIG. 2 is a similar view of the inner working apparatus but showing the apparatus in a different operating position;

FIG. 3 is a front elevational view, on a slightly reduced scale, of the inner working apparatus of the same towel dispenser as viewed from immediately inside the front side or door of the cabinet, various parts of the dispensing mechanism and cabinet being cut away;

FIG. 4 is a side elevational view of the same apparatus as viewed from immediately inside the right-hand wall of the cabinet, with all walls of the cabinet omitted from the view;

FIG. 5 is a cross-sectional view, greatly enlarged, of time delay apparatus incorporated in the paper towel dispenser of FIGS. 1–4, the view taken substantially along the line 5—5 in FIG. 2;

FIG. 6 is a side elevational view of the inner working apparatus of a second preferred embodiment of a paper towel dispenser similar to FIG. 1, as viewed from immediately inside the left-hand wall of the dispenser cabinet, with parts of the cabinet and the paper roll being cut away for convenience of illustration;

FIG. 7 is a view similar to FIG. 6 but showing the parts of the apparatus in the positions assumed part way through a paper towel dispensing operation;

FIG. 8 is a view of the parts of FIG. 6 in a position similar to that illustrated in FIG. 2 and more particularly showing the parts at the end of the paper towel pull-down operation; and

FIG. 9 is a view similar to FIG. 8 illustrating the parts in the position assumed during the fall of the cutting blade and illustrating the paper towel feed mechanism in the locked position which is maintained until the completion of the paper towel cutting operation.

A paper towel dispenser constructed in accordance with the present invention preferably includes a protective and decorative outer cabinet having side walls **11** and **12** (see FIG. 3) and cooperating bottom and rear walls **13** and **14** respectively (see FIG. 2). The front wall of the cabinet is in the form of a door **15** which is pivotally mounted near its lower edge on the side walls **11** and **12**, as by pins **16**, and has rearwardly turned side edges or flanges **17** which overlay the side walls **11** and **12** when the door **15** is in closed position, as shown in FIGS. 1 and 2. The top of the cabinet is closed by a door-like hood **18** which is preferably pivoted at its rear edge on the side walls **11** and **12** or upon the rear wall **14** by suitable connections not shown in the drawings, and which may be secured in its downward or closed position by a suitable lock, also not shown in the drawings.

The entire inner working apparatus of the towel dispenser is mounted on a pair of upright side plates **21**

and 22, each of which has near its upper edge an outwardly turned flange 21*a* or 22*a*. The two side walls 11 and 12 of the cabinet are respectively provided with an inwardly directed flange or bracket 11*a* or 12*a* upon which the corresponding flanges 21*a* and 22*a* of the side plates rest. Through this means the side plates 21 and 22 and the entire inner working apparatus are supported within the cabinet.

Referring to FIGS. 1 and 3, it may be seen that small spring clips 11*b* and 12*b* are punched upwardly out of the brackets 11*a* and 12*a* whereby the rearward ends of the flanges 21*a* and 22*a* of the side plates are clipped down against the flanges 11*a* and 12*a*. As shown in FIGS. 1 and 2, screws 23 are provided for securing the side plate flanges 21*a* and 22*a* to the cabinet side wall flanges or brackets 11*a* and 12*a*, the latter flanges preferably being tapped to receive the screws 23. It may also be seen that the screws 23 pass through an inwardly directed flange 24 on the upper edge of the door 15 to retain the door 15 in its closed position. Upon unlocking and opening the hood 18 the screws 23 may be removed, whereupon the door 15 may also be opened and the entire inner working apparatus, mounted on and between the side plates 21 and 22, may be withdrawn forwardly and upwardly from the cabinet. While not shown in the drawings, it will be appreciated that a screw 23 is preferably provided at each side of the cabinet.

The two side plates 21 and 22 are rigidly oriented in spaced-apart relative position by curved, spaced apart paper guide plates 26 and 27. These guides have a plurality of tongues 28 formed on their opposite ends which extend into slots provided therefor in the side plates 21 and 22, and have flanges 29 (FIG. 1) provided along their lower portions and at the upper end of guide plate 26 which are secured to the side plates 21 and 22 as by tack welding. The side plates 21 and 22 and the paper guide plates 26 and 27 thereby form a rigid frame upon which the other working portions of the dispenser are mounted.

A roll of paper toweling 30 may be supported in the top rear portion of the dispenser. To this end, the left side plate 21 has an inwardly and then upwardly turned flange 31, best seen in FIGS. 1 and 3, which carries a suitable rotatable spindle 32 for receiving and supporting one end of the roll 30. The side plate 22, as best seen in FIGS. 3 and 4, has a flexible metal strip 33 secured thereto as by tack welding, this strip 33 extending upwardly beyond the rear upper portion of the side plate 22 and carrying a spindle 34 for receiving and rotatably supporting the other end of the roll 30. The strip 33 is made sufficiently flexible and resilient that it may be sprung outwardly to permit easy removal and insertion of rolls 30. A leaf spring 35 is also secured to the side plate 22 and is arranged resiliently to bear against the right-hand side of the roll 30 to prevent free rotation of the roll. As an alternate, not shown, the spindle 34 may have a radial flange that bears on the end of the roll, and the upper end of the leaf spring 35 may in turn slidably bear upon that flange to prevent free rotation of the roll.

As perhaps best seen in FIG. 1, the web of paper toweling 30*a* extends from the rear of the roll 30 and forwardly and then downwardly between the guide plates 26 and 27 and out of the opening at the lower edges thereof and thence directly downwardly out of an opening 36 defined by the forward edge of the bottom wall 13 of the cabinet and by the lowermost edge of the door 15.

As best seen in FIG. 3, a shaft 40 is rotatably mounted in suitable bearings 41, preferably of nylon, which are illustrated as being pressed into punched openings in the respective side plates 21 and 22. These punched openings provide short lips or flanges 42 for better supporting the bearings 41. Fixedly secured to the shaft 40 is a pair of relatively large axially spaced friction rollers 45, the peripheries of which extend through slots 46 (FIG. 3) in the paper guide 27 such that they may make contact with paper toweling 30*a* extending between the paper guides 26 and 27.

Arranged directly above the rollers 45 and riding thereon are a pair of smaller rollers 47. These latter rollers are fixed on a shaft 48, the opposite ends of which are rotatably confined behind inwardly and vertically extending pairs of tabs 49 which are punched out of the side plates 21 and 22. Another pair of rollers 50 is secured to a shaft 51 which is rotatably confined between two pairs of spaced apart tabs 52 which are punched forwardly out of the outer paper guide plate 26. Slots 53, formed in part by the punching out of the tabs 52, permit the rollers 50, which, like the rollers 47, are located outside the outer paper guide 26, as best seen in FIG. 4, to ride upon the rollers 45. Slots 54 (FIGS. 3 and 4) are also provided in the outer paper guide 26 to permit the rollers 47 to extend into the space between the two paper guides 26 and 27 and ride upon the rollers 45 with the paper web 30*a* therebetween. A pair of springs 55 extends around a shaft 60 and has the opposite ends thereof in resilient pressing engagement with the shafts 48 and 51 to bias the rollers 47 and 50 firmly toward and against the rollers 45. The rollers 45 are friction rollers, that is, their peripheral surfaces are of material having a high coefficient of friction such as rubber, and the surfaces of the rolls 45, 47 and 50 may have ribbed or knurl-like formations thereon so that there will be no tendency for the paper web 30*a* to slip with respect to these rolls. Thus, it will be appreciated that when the leading end of the paper web 30*a*, which extends through the opening 36 and below the cabinet, is grasped in the hand and pulled downwardly to withdraw a length of the paper, the rollers 45 (which have the paper pressed tightly thereagainst by the rollers 47 and 50) will be caused to turn. This will of course rotate the shaft 40.

The shaft 60, referred to above, extends through openings in the side plates 21 and 22 and is supported thereby. Two arms 61 and 62 are pivotally mounted on the opposite ends of the shaft 60, the arms 61 and 62 being retained thereon by suitable washers 60*a* and cotter pins 60*b* as illustrated in FIG. 3, or by other suitable means. The arm 61 is spaced from the side plate 21 by the hub portion of an arm 80, more fully described below, and the arm 62 is spaced from the side plate 22 by a short sleeve 60*c* provided for that purpose. The arms 61 and 62 normally hang downwardly from the shaft 60, as illustrated in FIGS. 1 and 3. These arms have outwardly turned flanges 61*a* and 62*a* for greater rigidity, and the lower or free ends of the two arms 61 and 62 are joined by a rigid knife blade supporting bar 63*a* which extends from one arm to the other. This knife blade supporting bar has upturned opposite ends 63*b* which are rigidly secured to the arms 61 and 62, as by spot welding, so that two arms 61 and 62 and the bar 63*a* provide a rigid, yoke-shaped pendulum suspended from the shaft 60 and adapted to swing about the axis of that shaft. The rear edge of the knife blade supporting bar 63*a* is turned down to provide a flange 63*c*. A thin knife blade 63 is secured on the under side of the bar 63*a* by means of a clamp bar 64. This clamp bar may extend substantially the full length of the knife blade supporting bar 63*a* and is secured thereto by a plurality of screws 64*a* which extend through the bar 63*a* and the knife blade 63 and are threaded into the clamp bar 64. The knife blade 63 is thus clamped between the two bars 63*a* and 64, as best seen in FIG. 1, with the rear edge of the blade in substantial abutment with the flange 63*c*, and with the forward or leading edge of the blade extending well forwardly of the two bars 63*a* and 64. The forward edge of the blade is preferably provided with tooth-like serrations (not shown) and may be slightly curved from one end to the other so that the opposite ends of the blade ex-

tend forwardly from the support bar **63***a* the same distance but a slightly greater distance than the central portion of the length of the blade. The blade, of course, may extend substantially the full length of the support bar **63***a* and, in any event, has a length somewhat greater than the width of the paper web **30***a*. It will be appreciated that the blade **63** may be quickly and easily removed and replaced simply by removing the screws **64***a* and the clamp bar **64**.

The arms **61** and **62**, and the knife blade **63** with the bars **63***a* and **64**, as previously indicated, form a pendulum which is pivotable about the shaft **60**. A spring **62***c* best seen in FIGS. 3 and 4, is wrapped about the shaft **60** outwardly of the arm **62** and has one end secured to the side plate **22**, with its other or lower end resiliently and forcefully engaging the forward edge of the right-hand arm **62**, whereby this pendulum is biased rearwardly to a normal or "at rest" position illustrated in FIGS. 1 and 4, this position being somewhat rearwardly of the position that the pendulum would occupy in the absence of the spring **62***c*. It may be seen, however, that if this pendulum is raised to the elevated or energized position illustrated by the solid lines in FIG. 2 and then released, it will swing downwardly past its normal position just referred to and to the position illustrated by the lowermost phantom lines in FIG. 2. As the pendulum closely approaches this last mentioned position the knife blade **63** engages and cuts the paper toweling.

A suitable backing member **65** is provided in conjunction with the lower edge portion of the paper guide plate **26** to support the paper toweling **30***a* when it is struck and severed by the knife **63** and also to provide a slot **67** into which the forward cutting edge of the knife may pass after the severing edge has cut the paper. The backing member, in the form in which it is illustrated in the drawings, is comprised of a heavy sheet of metal secured to the forward side of the outer paper guide **26** adjacent its lower edge as by spot welding at **65***a*. Below the row of weld spots the backing member extends forwardly and then in a curve downwardly and rearwardly and then upwardly directly below the lowermost edge **26***a* of the paper guide plate **26**. Along most of its length the upper edge **65***b* of this rearwardly curved portion of the backing member **65** terminates slightly below the opposed lowermost edge **26***a* of the paper guide **26** to form the slot **67** therebetween (see FIG. 3). This slot may extend along the full length of the lower edge of the paper guide plate **26** and the opposed edge of the backing member if desired. In the present drawings, however, the opposite ends of the backing member **65** are shown to be flared outwardly, and upwardly extending tabs **65***c* are provided on the flared portions in firm abutment with laterally extending tabs **26***b* that are provided on the side edges of the guide plate **26** adjacent to the slot **67**. This abutment of the tabs **65***c* and **26***b* insures proper spacing of the edge **65***b* of the backing member **65** from the lowermost edge **26***a* of the paper guide plate **26**, thereby establishing the proper width of the blade receiving slot **67**. However, it will be appreciated that the tabs **65***c* are not essential, particularly when the backing member is formed of metal that is sufficiently rigid to resist deformation. It will also be appreciated that, although the edge **65***b* of the backing member and the lower edge **26***a* of the paper guide plate **26** are not sharpened, each of them backs up or supports the paper web **30***a* as it is struck and severed by the knife blade **63**, and each cooperates with the blade **63** in the severing. In this sense, therefore, each of these edge portions may be considered to be a stationary knife blade which cooperates with the movable blade **63**. Each edge portion, of course, is also a backing means for supporting the paper in the area immediately adjacent the line along which it is cut by the blade **63**.

It will be observed from the lowermost phantom lines in FIG. 2, showing the position of the pendulum at the end of its forward cutting stroke, that the forward motion of the pendulum assembly is stopped by engagement of the forward edge of the blade supporting bar **63***a* with the lowermost edge portion of the guide plate **26** after the paper web **30***a* has been cut.

The pendulum is raised to its elevated or energized position by an actuating arm **70** which is suitably fixed to the shaft **40** to which the friction rollers **45** are also secured. As suggested in FIG. 1, the actuating arm **70** may be secured to the shaft **40** by a screw **71** which extends through the actuating arm **70** and is threaded into a tapped opening in the left-hand end of the shaft **40**. Also as suggested in FIG. 1, the actuating arm **70** may have a key slot for receiving a key **71***a* of like shape formed on the end of the shaft **40** in order to prevent relative rotation of the actuating arm **70** and the shaft **40**. As indicated in FIGS. 1 and 3, the actuating arm **70** may have a dished configuration in its central portion **70***a* in order to provide clearance between various operating parts associated with the arm **70**.

A roller **72**, of nylon or the like, is rotatably mounted on the arm **70** as by a rivet-like post **72***a*, see FIGS. 1 and 2, and is engageable with an inturned flange **73**, formed on the pendulum arm **61**, when the pendulum is in its normal position.

By reference to FIG. 1 it may now be seen that when the lower end of the toweling **30***a* is grasped by the fingers and pulled downwardly to withdraw further toweling through the slot **36**, the withdrawal of toweling rotates the friction rollers **45** and hence the shaft **40** and the actuating arm **70**. The roller **72** on the actuating arm engages the flange **73** on the pendulum arm **61** with the result that the pendulum is progressively pivoted in a clockwise direction, as viewed in FIGS. 1 and 2, to its elevated or energized position illustrated by the solid lines in FIG. 2. As the pendulum reaches its fully energized or uppermost position the roller **72** passes off the radially inner end of the flange **73** and no longer supports the pendulum. The pendulum thereupon drops by gravity in a counterclockwise movement through the phantom line position represented at the left of FIG. 2 and into paper severing cooperation with the backing member **65** and the lower edge of the paper guide plate **26**. A pawl **74**, pivotally mounted on the side plate **21**, is gravity or spring biased into engagement with ratchet teeth **70***b* provided on the actuating arm **70** to prevent return movement of the actuating arm and premature falling of the pendulum should the user discontinue withdrawal of the toweling prior to full lifting and release of the knife pendulm. After the paper towel has thus been severed, the pendulum swings back to its normal position, illustrated in FIG. 1, under the influence of the spring **62***c*, whereby the movable knife blade **63** is removed sufficiently from towel severing cooperation with the stationary knife blade to permit subsequent passage of the leading edge of the remaining paper toweling therebetween.

Apparatus for automatically feeding or "spitting out" an initial short length of paper toweling through the opening **36** for grasping by the next user, and novel time delay means for controlling this automatic feeding of paper toweling are described next. At the right-hand end of the shaft **40** as viewed in FIG. 3, and outside the right-hand end plate **22** there is secured a hand wheel **75** as by a screw **76**, the hand wheel also having a dished central portion to provide adequate clearance between various associated or adjacent parts. The hand wheel is connected to the shaft **40** in such manner that relative rotation of these parts is prevented. A narrow, vertically elongated finger slot **15***a* (see FIG. 1) preferably is provided in the door **15** of the cabinet directly in front of the hand wheel **75** to permit manual or finger rotation of the hand wheel from outside the cabinet, and the periphery of the hand wheel **75** is preferably knurled or provided with smoothly rounded teeth (not shown) to facilitate such manipulation.

A coil spring **77** is secured at its upper end to the side

plate 22 and at its lower end rotatably engages a pin 78 mounted on the hand wheel 75, see FIGS. 3 and 4. The hand wheel 75, the pin 78 and the spring 77 are shown in their normal positions in FIG. 4. As paper toweling is withdrawn from the dispenser in the manner described above, the hand wheel 75, being secured to the shaft 40, is rotated in a counterclockwise direction, as viewed in FIG. 4. When the pin 78 reaches its lowermost position and passes slightly therebeyond, the spring 77 tends to urge the hand wheel 75, and hence the shaft 40, the friction rollers 45 and the actuating member 70, to complete one revolution and return to their normal positions. The knife pendulum is not released to sever the paper toweling until the friction rollers 45 and connected parts have been rotated through an angle of somewhat more than 180 degrees. Thus, when the user withdraws a sufficient length of paper toweling to cause severance thereof by the knife pendulum, the hand wheel 75 and the friction rollers 45 and interconnected parts will thereupon, and after the severing, be urged to complete one revolution by the spring 77. This action of the spring, causing completion of the revolution, automatically causes a length of the remaining toweling to be advanced or "spit out" of the opening 36 at the bottom of the cabinet so that the end of the remaining toweling may thereafter be grasped by the next user preparatory to the next withdrawal and automatic severance of another length of toweling.

Novel means are employed for delaying this automatic ejection of a length of toweling in order that successive lengths of toweling may not be rapidly and wastefully withdrawn from the dispenser by users. To this end, a time delay arm 80 is rotatably mounted near the left-hand end of the same shaft 60 upon which the pendulum arms 61 and 62 are mounted, the arm 80 being bent partially around the shaft 60 and having a strap 80*a* riveted thereto to form a bearing which freely receives the shaft 60. Secured to the free end of the arm 80 there is a suction cup 81 of relatively soft rubber or the like which is arranged to cooperate with a similar stationary suction cup 82. The latter suction cup is mounted on a bracket 83 of U-shaped cross section secured to the side plate 21. The arm 80 is normally in the position illustrated in FIG. 1 wherein it rests upon an outwardly turned tab 84 struck from the side plate 21. When the knife pendulum is caused to pivot and be raised in a clockwise direction (as viewed in FIG. 1) by withdrawal of paper, the rearward side or flange 63*c* of the knife support bar 63*a* engages the lower side of the suction cup 81 and drives or carries the latter upwardly with the arm 80 to the position illustrated by the solid lines in FIG. 2, wherein the suction cup 81 operatively engages the suction cup 82. The various operating parts are so dimensioned that the roller 72 may pass off the flange 73 of the pendulum arm 61 only after the suction cups 81 and 82 have been pressed firmly together. The knife pendulum is then free to fall and sever the paper toweling, but the suction cups 81 and 82 temporarily retain the arm 80 in its elevated position.

As the spring 77 (see FIG. 4) urges continued rotation of the shaft 40 and connected parts farther in the same direction, the leading edge 70*c* of a partial peripheral flange 70*d* formed on the actuating arm 70 engages the arm 80, and more particularly the lower portion of the free end of the strap 80*a*, which forms a stop. In FIG. 2 this leading edge 70*c* is shown in phantom lines in position of engagement with the stop 80*a*, this position of the actuating arm 70 representing a sufficient angular advance thereof beyond the position in which the roller 72 is disengaged from the knife pendulum, that release of the pendulum prior to engagement of the stop 80*a* by the edge 70*c* of the actuating arm 70 is assured. The actuating arm, and hence the shaft 40 and other connected parts, are thus prevented by the stop 80*a* from completing a revolution under the influence of the spring 77 until the suction cups 81 and 82 separate to permit dropping of the suction cup 81 and of the arm 80 and withdrawal of the stop 80*a* from the path of the edge 70*c* of the actuating arm 70. When the stop 80*a* is thus removed from the path of the actuating arm 70, the shaft 40 and connected parts are caused by the spring 77 to continue their revolution to their normal positions illustrated in FIGS. 1 and 4 as described above. As previously explained, a length of paper toweling is ejected through the opening 36 in the bottom of the cabinet by the friction rollers 45 during this final portion of the revolution of the shaft 40 and the connected parts. Also as previously explained, the knife pendulum, and in particular the movable knife blade 63, will have returned by this time to its normal position (illustrated in FIG. 1) by the action of the spring 62*c* to permit this ejection of a length of paper toweling.

The suction cups 81 and 82, which are the timing heart of the time delay apparatus, are of novel form best seen in FIG. 5. In this novel form the two suction cups may be of the same basic construction, having tubular base portions 81*a* and 82*a* extending from the basic cup. The lower suction cup 81, however, has a continuous cup proper while the upper suction cup 82 has a small opening 82*c* interconnecting the cup proper and the interior 82*b* of the tubular base portion 82*a* thereof. A cylinder 85 of spongy material, such as sponge rubber, having many interconnected small air passages therethrough, is arranged in the tubular extension 82*a*. An adjusting screw 86 threadedly engages a punched and tapped opening in the upper leg of the bracket 83 and is arranged in alignment with the interior of the tubular extension 82*a* of the suction cup 82. The outer end of the screw 86 is knurled to facilitate rotation thereof and the inner end extends into the tubular extension 82*a*. A closed ended sleeve or ferrule 87 is preferably loosely arranged over the inner end of the screw to avoid rotational contact between the screw and the cylinder 85 of spongy material. The sleeve or cap 87 fits loosely within the tubular extension 82*a* in order that air may pass freely thereby.

When the suction cups 82 and 83 are pressed together by the knife pendulum, air between the cups is expelled and atmospheric exterior air pressure holds the cups together until such time as air may seep into the space defined by the two cups. Such leakage occurs through the opening 82*c* and the tubular extension 82*a* but is retarded by the spongy material 85. It will thus be apparent that as the screw 86 is threaded toward the suction cup 82 it will progressively compress the spongy material and further retard and regulate the seepage of air required to break the vacuum and permit dropping of the suction cup 81. Rotation of the screw 86 inwardly or outwardly thereby selectively regulates the time delay action and selectively adjusts the time which elapses between the severing of the paper towel and the moment when the leading end of the remaining toweling within the cabinet will be projected (by the action of the spring 77) outwardly through the opening 36 in the bottom of the cabinet where it may be grasped in the hand preparatory to withdrawal and severing of another length of paper toweling. This time delay between the severing of one length of toweling and the time when the remaining toweling is made accessible to the user for another withdrawal operation, prevents rapid successive withdrawals of toweling and thus tends to discourage wasting of the paper.

The use of the spongy mass 85 to control the rate at which air is bled into the space between the cups 81 and 82 has been found to be far superior to the use of a needle valve or the like since it is much easier and cheaper to produce and assemble, and the spongy mass, unlike a needle and needle valve seat, has no tendency to bind or become damaged when the screw 86 is turned down excessively.

As will now be apparent to those skilled in the art, a service man, after unlocking and lifting the hood 18,

may readily position a roll of paper toweling on the spindles 32 and 34 with the free end of the toweling hanging downwardly at the rear of the roll. The free end of the toweling is then fed between the outer and inner paper guide plates 26 and 27. A paper guide shelf 89 is preferably mounted on the interior of the back wall 14 of the cabinet and arranged as shown in FIGS. 1 and 2 to assist in the feeding of the free end of the toweling between the paper guide plates. The service man may then lift the shaft 48 against the force of the springs 55 and advance the leading edge of the toweling under the spring biased rollers 47, or he may feed the toweling between the paper guide plates while rotating the friction rollers 45 by means of the hand whel 75. Subsesquent rotation of the hand wheel will further advance the toweling and cause one complete operation of the dispenser, leaving the dispenser in position to be operated through repeated, time-delayed cycles by simple withdrawal of the paper toweling through the opening 36 as described above, the toweling during each cycle being automatically cut to a predetermined length.

A paper towel dispenser has now been described which automatically cuts off prescribed lengths of toweling upon withdrawal of the toweling by the user. Since the operative or cutting stroke of the movable knife blade is independent of other operating parts of the dispenser, proper cutting action is not dependent upon the amount of force exerted by the user or the speed at which the toweling is withdrawn. The movable knife blade is biased toward a normal position sufficiently removed from the normal path of the paper that the leading edge of the remaining towel may be automatically ejected without interference by the blade. The means for effecting the automatic ejection of the leading edge of the remaining toweling is delayed in its operation by time delay means which are preferably of the novel form disclosed above. These novel time delay emans are not only more economical to manufacture, but are more reliable in operation than previously known time delay devices. The above disclosed time delay device, employing a mass of spongy material having interconnected passages, furthermore has been found to be more stable in its adjustment than devices employing prior art means for adjusting the rate of air bleeding.

In addition to the several advantages of the present invention described above, it will be further noted that the paper or other webs dispensed from the dispensing apparatus requires no special conversion preparatory to use, such as transverse scoring or the like. The web of the roll 30, on the contrary, may be continuous, thereby saving the expense that is often involved in special preparation or transverse scoring of the webs at uniform intervals for use in prior dispensers. A further advantage of the present dispenser is that there need be no delicate alignment of the shear blade 63 with the cooperating edges 26*a* and 65*b*. The shear blade 63 merely drives through the paper and into the slot 67 between these two edges to sever the paper, and no close shearing action between the edges and the blade is required. This simplifies and renders less expensive the manufacture of the present dispenser inasmuch as close tolerances between the shearing blade 63 and the cooperating parts need not be observed.

Another important advantage inherent in the construction of the present dispenser resides in the cushioning and shock absorbing action of the vacuum cups 81 and 82 when the stop edge 70*c* of the arm 70 strikes the stop arm 80*a* immediately after the pendulum assembly has been released from its raised position and permited to swing downwardly to sever the paper. If, for example, the operator or user of the dispenser has pulled downwardly on the web 30*a* with great force and vigor, the stop edge 70*c* is likely to make a rather forceful impact against the stop arm 80*a*. The force of this impact is absorbed by the vacuum cups 81 and 82, the impact forces being transmitted to these cups through the stop arm 80*a* and the pivoted arm 80. The stopping impact tends to move the two cups 81 and 82 in a direction toward separation, thereby causing the force of the impact to be absorbed by the resiliency of the cups themselves and by the counteracting forces on the vacuum cups created by the presence of the vacuum between the cups. This shock absorbing action prevents undesired tearing of the web and protects the parts of the dispensing apparatus from damage that might otherwise result from violent or forceful withdrawal of the web from the dispenser by the operator.

Referring to FIGS. 6 to 9 of the drawings, there is shown a second preferred embodiment of the invention which is particularly useful in those instances wherein the time delay provided by the suction cups 81 and 82 is very short or substantially zero as may be the case when the cups are substantially worn or are contaminated with some material which prevents a suction action therebetween. If no time delay is provided between the cutting movement of the blade 63 and the advancement of the web 30*a* by the automatic feed mechanism spring 77, the web 30*a* may become jammed within the cabinet and in certain instances the knife 63 may also become jammed in the cutting position thereof thereby to interrupt service from the towel dispensing cabinet. Accordingly, mechanism has been provided in this second embodiment of the invention to insure that the cutting knife completes its cutting operation prior to the automatic feed of the web 30*a* by means of the spring 77 and also mechanism has been provided to insure that the knife is held in its retracted rest position during the feeding of the web 30*a* at the end of a dispensing cycle.

Inasmuch as the basic structure of the towel dispensing cabinet illustrated in FIGS. 6 to 9 is substantially identical to that illustrated in FIGS. 1 to 5, numbers from the "100" series have been applied to parts corresponding to like parts in the first embodiment of the invention whereby the supply roll of paper toweling in FIG. 6 is designated by the number 130 and corresponds to the roll 30 in FIGS. 1 to 4, the other like parts being numbered in a similar manner.

Referring specifically to FIG. 6 of the drawings, the second embodiment of the invention illustrated therein includes in addition to the parts illustrated in FIGS. 1 to 5 a retaining spring 143 and an interlock and stop lever 190 as well as additions to the knife supporting arm 161. The lever 190 is mounted on the side plate 121 by means of a shaft 191 fixedly attached to the side plate 121, the lever 190 being adapted to pivot about the shaft 191 in a vertical plane. Extending outwardly from the lower edge of the lever 190 and perpendicular thereto is a flange 192 which carries on the left hand thereof as viewed in FIG. 6 a depending arm 193 provided at the lower end thereof with a hook 194. The hook 194 is directed to the right as viewed in FIG. 6 and is adapted to be received in an aperture 188 provided in the arm 180, the hook 194 passing therethrough and engaging beneath the arm 180 as will be described more fully hereinafter. The right-hand end of the flange 192 is provided with a cutout to form an abutment 195 which is adapted to cooperate with certain cams provided on an extension of the arm 161.

The arm 161 is provided with an upwardly directed extension beyond the pivot shaft 160 as viewed in FIG. 6 and includes two lifting cams 166 and 166*a* which are adapted to engage the lower surface of the lever flange 192 thereby to pivot the lever 190 in a counterclockwise direction about the shaft 191. Spaced from the lifting cam 161 is a flange 169 disposed perpendicularly with respect to the body of the arm 161 and in a position to engage the abutment 195 on the lever 190 thereby to hold the arm 161 and the attached knife 163 in the retracted rest position illustrated in FIG. 6 of the drawings. Extending upwardly and away from the flange 169 is a

release cam **168** which is adapted also to engage the abutment **195** on the lever **190** at a particular point in the operation of the parts as will be described more fully hereinafter.

The retaining spring **143** has the lower end thereof fixedly positioned and attached to the side plate **121** and extends upwardly from the point of attachment above the flange **192** on the lever **190**. The upper end of the spring **143** is in general horizontal alignment with a notch **196** formed in the lever flange **192** and is normally urged thereinto and is in operating contact therewith. The upper end of the spring **143** carries a hook portion **144** which is adapted to move into engagement with the notch **196** and then into engagement therewith releaseably to hold the lever **190** in the then assumed position illustrated in FIGS. 8 and 9 of the drawings. A downward pressure upon the lever **190** such as that exerted by the release cam **168** is sufficient to dislodge the lever flange **192** from the hook portion **144** thus to permit a clockwise rotation of the lever **190** about the pivot shaft **191**.

The parts of the dispensing cabinet as illustrated in FIG. 6 of the drawings are in a position to begin the web dispensing operation and it is noted that the web **130***a* has a short portion extending through and below the opening **136** to be grasped by the hands of a user. The movable suction cup arm **180** is in its lowermost position, the lever **190** is in its furthermost clockwise position and the abutment **195** thereon is engaging the flange **169** on the arm **161** to hold the knife **163** in the retracted rest position away from the web **130***a*. The spring **143** is in engagement with the notch **196** and the lever flange **192** but the hook portion **144** is out of engagement therewith.

The user grasps the web **130***a* and pulls downwardly withdrawing toweling from the roll **130** and across the friction rollers **145** thus to rotate the shaft **140** (not shown) and thus to rotate the actuating arm **170** in a clockwise direction as viewed in FIG. 6 to bring the roller **172** into engagement with the flange **173** thus to rotate the arm **161** in a clockwise direction about the pivot shaft **160**. Continued withdrawal of the web **130***a* will eventually bring the flange **163***c* into engagement with the lower side of the suction cup **181** and will thus pivot the suction cup **181** upwardly toward the suction cup **182**. Movement of the arm **161** in a clockwise direction also pushes the lifting cam **166** against the lower edge of the lever flange **192** to pivot the lever **190** in a counterclockwise direction. When the arm **161** has lifted the arm **180** a sufficient distance, the hook **194** will pass through the opening **188** in the arm **180** as is illustrated in FIG. 8 of the drawings. Prior to the time the parts arrive in the position illustrated in FIG. 8, the lifting of the lever **190** is shifted from the lifting cam **166** to the lifting cam **166***a* on the arm **161** and eventually the notch **196** in the flange **192** is raised sufficiently high to engage the hook portion **144** on the spring **143**.

Very shortly after the parts have arrived at the position illustrated in FIG. 8, the roller **172** moves out of contact with the flange **173** thus to permit the knife **163** and the associated arm **161** to pivot in a counterclockwise direction about the shaft **160** to effect a severing of the web **130***a* in cooperation with the backing member **165**, the knife **163** being shown in a partially lowered position prior to severance in FIG. 9 of the drawings. It will be noted that the lifting cam **166***a* drops as the arm **161** pivots downwardly and thus would permit the lever **190** to pivot in a clockwise direction if it were not for the presence of the spring **143** and its hook portion **144** which holds the lever **190** in a position illustrated in FIGS. 8 and 9 of the drawings until the completion of the web cutting operation by the knife **163**. Even if there is no suction between the suction cups **181** and **182**, whereby the cups immediately separate and prior to the cutting movement by the knife **163**, the arm **180** will be held in the upward position as illustrated in FIG. 9 of the drawings by the hook **194** extending through the opening **188** therein and thus will prevent a feeding movement of the web **130***a* by means of the spring **177** (not shown) prior to the cutting of the web **130***a* by the knife **163** because of the engagement of the leading edge **170***c* with the stop **180***a*. In fact the parts are held in the position of FIG. 9 until the severing of the web **130***a* by the knife **163** has been accomplished, after which the release cam **168** moves into contact with the abutment **195** and forces the lever **190** in a clockwise direction to remove the notch **196** from the hook portion **144** on the spring **143**. Such clockwise movement of the lever **190** will remove the hook **144** from its supporting position and will permit the arm **180** to drop so as to remove the stop **180***a* from the path of the edge **170***c* and thus to permit the automatic feeding movement of the rollers **145** by means of the spring **177** (not shown). However, it will be noted that the cutting of the web **130***a* by the knife **163** has been accomplished and the spring urging the arm **161** in a clockwise direction will have moved the knife **163** substantially to the retracted rest position illustrated in FIG. 6. In this position the abutment **195** has moved downwardly into engagement with the flange **169** thus to hold the arm **161** and the knife **163** in the retracted rest position thereof until the next dispensing operation.

From the above description it will be clear that there is no automatic feeding of the web **130***a* until after completion of the web severing and cutting movement of the knife **163** and therefore there will be no jamming of the web or the knife by a premature automatic feeding of the web **130***a*. Furthermore, the knife **163** is held in the retracted rest position thereof by the flange **169** contacting the abutment **195** until the next dispensing operation. Accordingly, there will be no jamming of the dispensing cabinet even if the suction cups **181** and **182** are adjusted to have zero time delay, or are damaged or are completely removed.

It will of course be appreciated that the present invention is not limited in its usefulness to the dispensing of paper toweling alone since the exact nature of the web dispensed is of no great consequence. Thus, the present invention may be employed for the dispensing of various kinds of paper webs for any desired purpose. For example, in addition to paper toweling per se, the present invention may be used in dispensing toilet tissue, waxed paper, and paper and foil webs of a variety of kinds and uses. The use of the term "paper towel dispenser" in the accompanying claims is intended to include all such webs and uses.

While there has been described what is at present considered to be certain preferred embodiments of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement, a knife blade carried by said pendulum, a backing member, said knife blade being movable by said pendulum into paper towel severing cooperation with said backing member, means for biasing said pendulum to a normal position sufficiently removed from severing cooperation with said backing member to permit passage of paper toweling therebetween, and an actuating member driven by said roller and engageable with said pendulum in its normal position to pivot said pendulum upwardly and away from said backing member and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade past its normal position and momentarily into paper towel severing cooperation with said backing member.

2. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a

pendulum mounted for pivotal movement, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, and an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade.

3. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade, and means for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling.

4. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade, means for rotating said friction roller farther in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for delaying operation of said roller rotating means for a period of time after release of said pendulum.

5. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade, means for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for delaying operation of said roller rotating means for an adjustable period of time after release of said pendulum, said delaying means including a suction cup having a bleed hole therein, a mass of spongy material having interconnected air passages therein covering said bleed hole, and means for adjustably compressing said mass of spongy material.

6. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, an actuating member rotatable with said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade, means for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for delaying operation of said roller rotating means for an adjustable period of time after release of said pendulum, said delaying means including a pair of suction cups, and a pivoted arm, one of said cups being fixedly positioned and the other being carried by said arm and movable by said pendulum into operative engagement with said fixed cup, said arm having a stop shoulder engageable by said actuating member when said cups are in engagement and said actuating member has rotated beyond pendulum releasing position, to prevent further rotation of said actuating member until said cups disengage.

7. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement about an axis parallel to and displaced from the axis of said roller, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, and an actuating member rotatable with said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade, the engaging portions of said actuating member and said pendulum traveling non-concentric arcs and becoming disengaged when said pendulum reaches a substantially elevated position, whereby said pendulum may fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade.

8. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement about an axis parallel to and displaced from the axis of said roller, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, an actuating member rotatable with said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade, the engaging portions of said actuating member and said pendulum traveling non-concentric arcs and becoming disengaged when said pendulum reaches a substantially elevated position, whereby said pendulum may fall and carry said movable knife blade into paper towel severing cooperation with said stationary knife blade, means for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for delaying operation of said roller rotating means for a period of time after release of said pendulum, said delaying means including a pair of suction cups, and an arm pivotal about the same axis as said pendulum, one of said cups being fixedly positioned and the other being carried by said arm and movable by said pendulum into operative engagement with said fixed cup, said arm having a stop shoulder engageable by said actuating member when said cups are in engagement and said actuating member has rotated beyond pendulum releasing position, to prevent further rotation of said actuating member until said cups disengage.

9. A paper towel dispenser, comprising a cabinet hav-

ing at least one openable side for permitting access to the interior thereof, a pair of flanges secured to and protruding inwardly from opposite walls of said cabinet, a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, an outwardly protruding flange on each of said side plates engageable with said first mentioned flanges to support said frame in said cabinet, a shaft rotatably supported in and extending through said side plates, a friction roller secured to said shaft and extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser, a second shaft supported by and extending through said side plates, a pair of pendulum arms mounted on opposite ends of said second shaft, a movable knife blade secured to the free ends of said pendulum arms and forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable into paper towel severing cooperation with said stationary knife blade, and an actuating arm secured to one end of said first mentioned shaft and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade past its normal position and momentarily into paper towel severing cooperation with said stationary knife blade.

10. A paper towel dispenser, comprising a cabinet having at least one openable side for permitting access to the interior thereof, a pair of flanges secured to and protruding inwardly from opposite walls of said cabinet, a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, an outwardly protruding flange on each of said side plates engageable with said first-mentioned flanges to support said frame in said cabinet, a shaft rotatably supported in and extending through said side plates, a friction roller secured to said shaft and extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser, a second shaft supported by and extending through said side plates, a pair of pendulum arms mounted on opposite ends of said second shaft, a movable knife blade secured to the free ends of said pendulum arms and forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable into paper towel severing cooperation with said stationary knife blade, an actuating arm secured to one end of said first mentioned shaft, and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade past its normal position and momentarily into paper towel severing cooperation with said stationary knife blade, and spring biased crank means secured to the other end of said first-mentioned shaft for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling.

11. A paper towel dispenser, comprising a cabinet having at least one openable side for permitting access to the interior thereof, a pair of flanges secured to and protruding inwardly from opposite walls of said cabinet, a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, an outwardly protruding flange on each of said side plates engageable with said first-mentioned flanges to support said frame in said cabinet, a shaft rotatably supported in and extending through said side plates, a friction roller secured to said shaft and extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser, a second shaft supported by and extending through said side plates, a pair of pendulum arms mounted on opposite ends of said second shaft, a movable knife blade secured to the free ends of said pendulum arms and forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable into paper towel severing cooperation with said stationary knife blade, an actuating arm secured to one end of said first mentioned shaft and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade past its normal position and momentarily into paper towel severing cooperation with said stationary knife blade, spring biased crank means secured to the other end of said first-mentioned shaft for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for delaying operation of said crank means for a period of time after release of said pendulum, said delaying means including a pair of suction cups, and an arm pivotal about said second shaft, one of said cups being fixedly positioned on said frame and the other being carried by said arm and movable by said pendulum into operative engagement with said fixed cup, said arm having a stop shoulder engageable by said actuating arm when said cups are in engagement and said actuating arm has rotated beyond pendulum releasing position, to prevent further rotation of said actuating arm until said cups disengage.

12. A paper towel dispenser, comprising a cabinet having at least one openable side for permitting access to the interior thereof, a pair of flanges secured to and protruding inwardly from opposite walls of said cabinet, a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, an outwardly protruding flange on each of said side plates engageable with said first-mentioned flanges to support said frame in said cabinet, a first shaft rotatably supported in and extending through said side plates, a friction roller secured to said first shaft and extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser, a second shaft supported by and extending through said side plates, a pair of pendulum arms mounted on opposite ends of said second shaft, a movable knife blade secured to the free ends of said pendulum arms and forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable into paper towel severing cooperation with said stationary knife blade, an actuating arm secured to one end of said first mentioned shaft and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade past its normal position and momentarily into paper towel severing cooperation with said stationary knife blade, spring biased crank means secured to the other end of said first-mentioned shaft for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for delaying operation of said crank means for an adjustable period of time after release of said pendulum, said delaying means including a suction cup having a bleed hole therein, a mass of spongy material having interconnected air passages therein covering said bleed hole, and means for adjustably compressing said mass of spongy material.

13. In a web dispenser, the combination comprising means defining a path through which the web may be

discharged from the dispenser, pivotally suspended knife means adapted to swing through an arc intersecting said path, means actuated by discharge of the web for raising said knife means against the force of gravity and along said arc to store potential energy therein and for then releasing said knife means to cause the same to swing downwardly by gravity into severing contact with the web, and means operative after the raising of said knife means for preventing movement of the web prior to completion of the severing of the web by said knife means.

14. In a web dispenser, the combination comprising, a friction roller rotatable by the passage thereover of a length of the web, means defining a path through which the web is discharged from said roller, pivotally suspended knife means adapted to swing through an arc intersecting said path, an actuating member driven by said roller and engageable with said knife means for raising said knife means against the force of gravity and along said arc to store potential energy therein and for then releasing said knife means to cause the same to swing downwardly by gravity into severing contact with the web, means for rotating said friction roller further in a web ejecting direction, and means for ensuring completion of the web severing movement of said knife means before operation of said roller rotating means.

15. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement, a movable knife blade carried by said pendulum, a stationary knife blade, said movable knife blade being movable by said pendulum into paper towel severing cooperation with said stationary knife blade, an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum upwardly and away from said stationary knife blade and disengageable from said pendulum when said pendulum reaches a substantially elevated position to permit said pendulum to fall and carry said movable knife blade into paper toweling severing cooperation with said stationary knife blade, means for rotating said friction roller further in a paper towel ejecting direction after said movable knife blade has severed said toweling, and means for preventing operation of said roller rotating means until after completion of the severing movement of said movable knife blade.

16. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement with respect to said friction roller and carrying a movable knife blade thereon, a stationary knife blade mounted adjacent to the path of movement of said movable knife blade, said movable knife blade being movable from a rest position to an elevated position and to a paper toweling severing position adjacent to said stationary knife blade for severing paper toweling disposed therebetween, an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum from said rest position upwardly to said elevated position and disengageable from said pendulum when said pendulum reaches said elevated position to permit said pendulum to fall and carry said movable knife blade into paper toweling severing position adjacent to said stationary knife blade, means for rotating said friction roller further in a paper toweling ejecting direction after said movable knife blade has severed the toweling, means for preventing operation of said roller rotating means until after completion of the severing movement of said movable knife blade, and means for returning said pendulum to said rest position and for holding said pendulum in said rest position during operation of said roller rotating means.

17. In a paper towel dispenser, a friction roller rotatable by the passage thereover of a length of paper toweling, a pendulum mounted for pivotal movement with respect to said friction roller and carrying a movable knife blade thereon, a stationary knife blade mounted adjacent to the path of movement of said movable knife blade, said movable knife blade being movable from a rest position to an elevated position and to a paper toweling severing position adjacent to said stationary knife blade for severing paper toweling disposed therebetween, an actuating member driven by said roller and engageable with said pendulum to pivot said pendulum from said rest position upwardly to said elevated position and disengageable from said pendulum when said pendulum reaches said elevated position to permit said pendulum to fall and carry said movable knife blade into paper toweling severing position adjacent to said stationary knife blade, means for rotating said friction roller further in a paper toweling ejecting direction after said movable knife blade has severed said toweling, means for delaying operation of said roller rotating means for a period of time after the release of said pendulum, and means for positively preventing operation of said roller rotating means until after completion of the severing movement of said movable knife blade regardless of the time delay provided by said delaying means.

18. A paper towel dispenser, comprising a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, a first shaft rotatably mounted on said side plates and carrying a friction roller extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser, a second shaft supported by said side plates and having a pair of pendulum arms mounted on the opposite ends thereof and carrying a movable knife blade forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable from a rest position to an elevated position and to a paper toweling severing position adjacent to said stationary knife blade, an actuating arm secured to one end of said first shaft and engageable with said pendulum to raise it upwardly away from said rest position to said elevated position and disengageable from said pendulum when said pendulum reaches said elevated position to permit said pendulum to fall and carry said movable knife blade past said rest position and momentarily into said paper toweling severing position to sever the toweling in cooperation with said stationary knife blade, spring biased crank means secured to the other end of said first shaft for rotating said friction roller further in a paper toweling ejecting direction, a first lever mounted on one of said side plates adjacent to said actuating arm and driven by said pendulum and having a stop member thereon movable into an engaging position to engage said actuating arm when said pendulum reaches said elevated position to prevent ejecting movement of said first shaft, a second lever pivoted on said one side plate and driven by said pendulum between a release position and a catch position, a hook mounted on said second lever and movable into engagement with said first lever when said second lever is pivoted to the catch position thereof by said pendulum to hold said first lever in the engaging position thereof to stop rotation of said first shaft, spring means for releasably holding said second lever in the catch position thereof, a release cam on said pendulum engaging said second lever to move it to the release position thereof to release said first lever and said first shaft when said pendulum reaches the paper toweling severing position thereof, and means for returning said pendulum from said severing position to said rest position.

19. A paper towel dispenser, comprising a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, a first shaft rotatably mounted on said side plates and carrying a friction roller extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser,

a second shaft supported by said side plates and having a pair of pendulum arms mounted on the opposite ends thereof and carrying a movable knife blade forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable from a rest position to an elevated position and to a paper toweling severing position adjacent to said stationary knife blade, an actuating arm secured to one end of said first shaft and engageable with said pendulum to raise it upwardly away from said rest position to said elevated position and disengageable from said pendulum when said pendulum reaches said elevated position to permit said pendulum to fall and carry said movable knife blade past said rest position and momentarily into said paper toweling severing position to sever the toweling in cooperation with said stationary knife blade, spring biased crank means secured to the other end of said first shaft for rotating said friction roller further in a paper toweling ejecting direction, a first lever mounted on one of said side plates adjacent to said actuating arm and driven by said pendulum and having a stop member thereon movable into an engaging position to engage said actuating arm when said pendulum reaches said elevated position to prevent ejecting movement of said first shaft, a second lever pivoted on said one side plate and driven by said pendulum between a release position and a catch position, a hook mounted on said second lever and movable into engagement with said first lever when said second lever is pivoted to the catch position thereof by said pendulum to hold said first lever in the engaging position thereof to stop rotation of said first shaft, spring means for releasably holding said second lever in the catch position thereof, a release cam on said pendulum engaging said second lever to move it to the release position thereof to release said first lever and said first shaft when said pendulum reaches the paper toweling severing position thereof, means for returning said pendulum from said severing position to said rest position, and a time delay mechanism connected to said first lever to hold said first lever in the shaft holding position thereof for a predetermined time interval after the return of said pendulum to the rest position thereof.

20. A paper towel dispenser, comprising a rigid frame including a pair of side plates and a pair of paper guide members extending between and rigidly orienting said side plates, a first shaft rotatably mounted on said side plates and carrying a friction roller extending through an opening in one of said guide members to engage paper toweling extending between said guide members and to be rotated by withdrawal of toweling from said dispenser, a second shaft supported by said side plates and having a pair of pendulum arms mounted on the opposite ends thereof and carrying a movable knife blade forming a pendulum therewith, a stationary knife blade, said movable knife blade being movable from a rest position to an elevated position and to a paper toweling severing position adjacent to said stationary knife blade, an actuating arm secured to one end of said first shaft and engageable with said pendulum to raise it upwardly away from said rest position to said elevated position and disengageable from said pendulum when said pendulum reaches said elevated position to permit said pendulum to fall and carry said movable knife blade past said rest position and momentarily into said paper toweling severing position to sever the toweling in cooperation with said stationary knife blade, spring biased crank means secured to the other end of said first shaft for rotating said friction roller further in a paper toweling ejecting direction, a first lever mounted on one of said side plates adjacent to said actuating arm and driven by said pendulum and having a stop member thereon movable into an engaging position to engage said actuating arm when said pendulum reaches said elevated position to prevent ejecting movement of said first shaft, a second lever pivoted on said one side plate and driven by said pendulum between a release position and a catch position, a hook mounted on said second lever and movable into engagement with said first lever when said second lever is pivoted to the catch position thereof by said pendulum to hold said first lever in the engaging position thereof to stop rotation of said first shaft, spring means for releasably holding said second lever in the catch position thereof, a release cam on said pendulum engaging said second lever to move it to the release position thereof to release said first lever and said first shaft when said pendulum reaches the paper toweling severing position thereof, and a cam on said pendulum engaging said second lever to prevent movement of said pendulum from the rest position to the severing position thereof until after said pendulum has been raised to the elevated position thereof.

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