

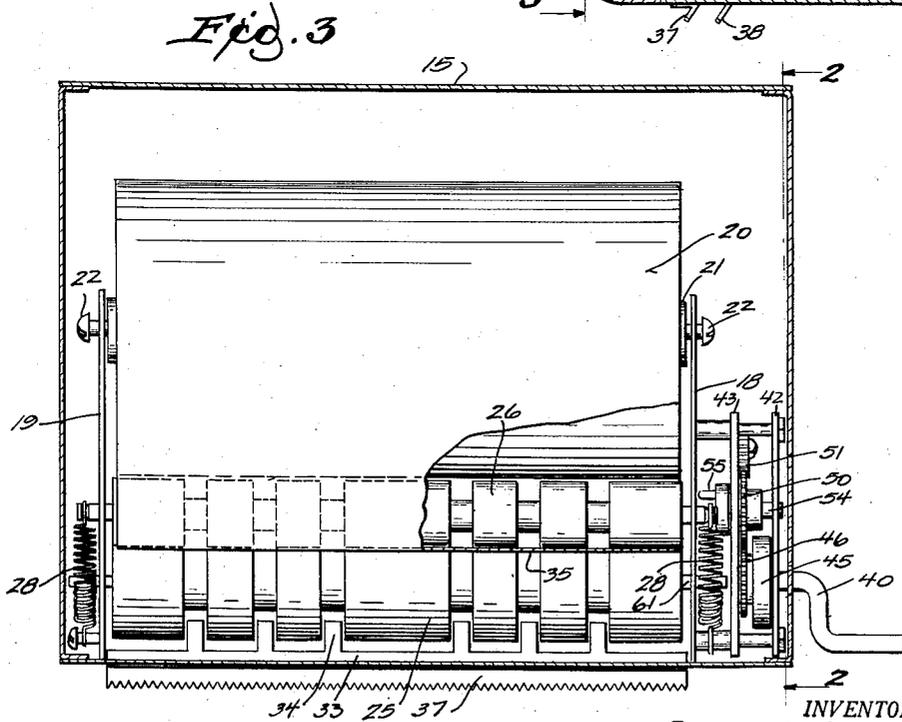
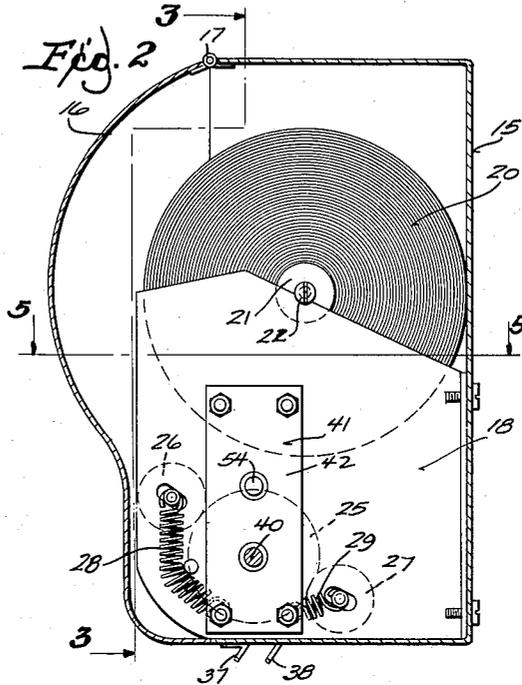
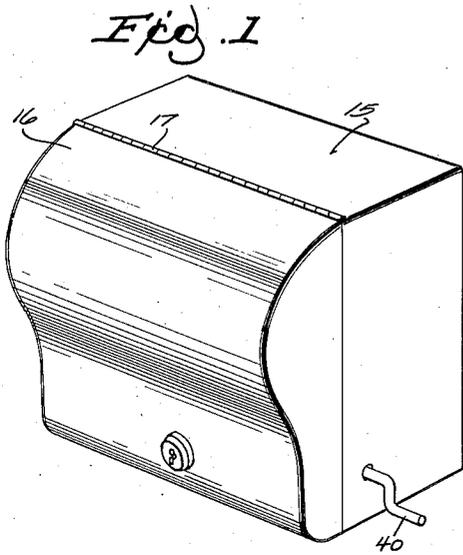
April 15, 1958

B. E. COLBURN ET AL  
DISPENSER FOR PAPER TOWELS AND THE LIKE  
HAVING A CONTROLLED OPERATION

2,830,810

Filed April 4, 1955

3 Sheets-Sheet 1



INVENTORS  
BEARL E. COLBURN  
LEE COLBURN  
BY  
Wheeler, Wheeler & Wheeler  
ATTORNEYS

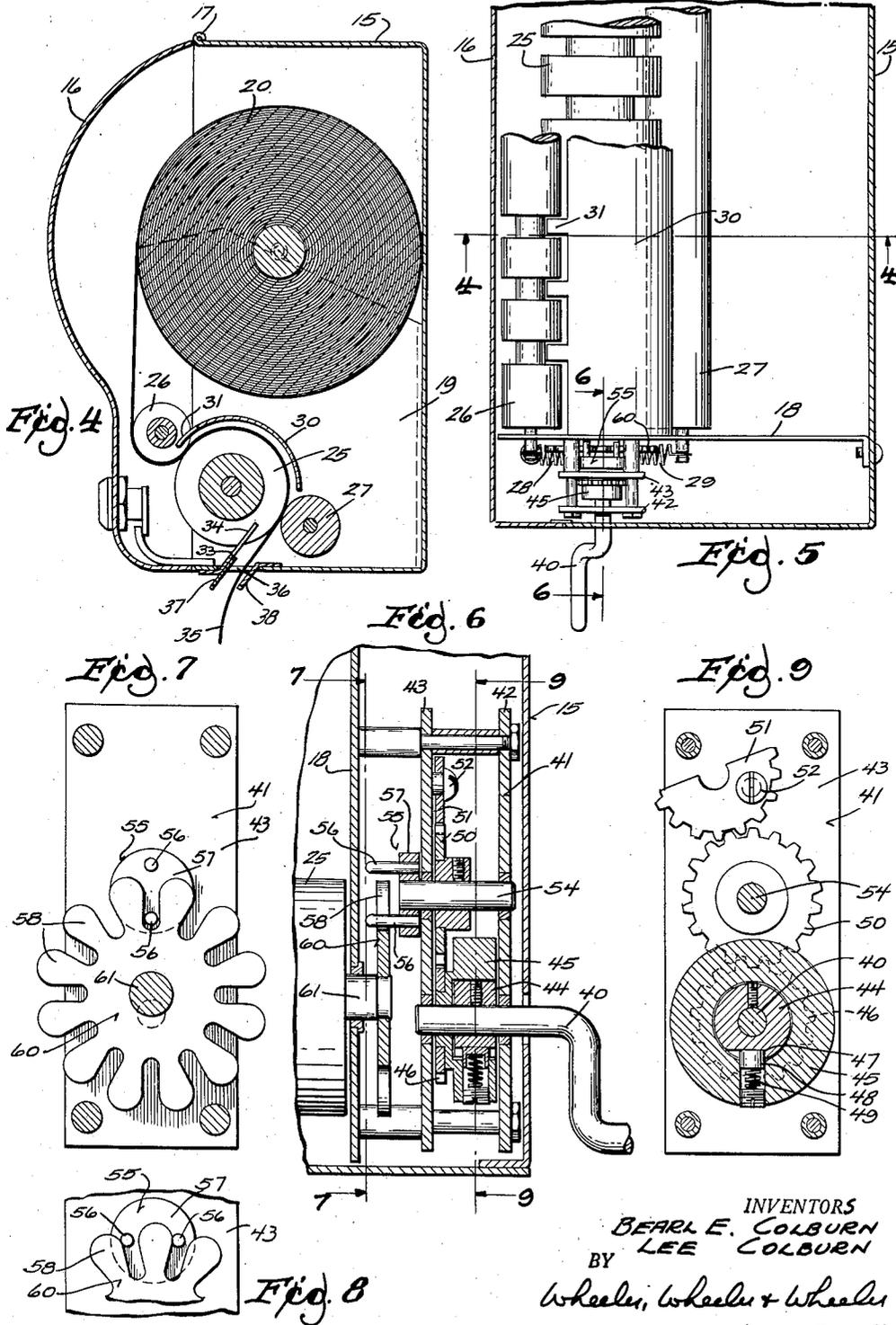
April 15, 1958

B. E. COLBURN ET AL  
DISPENSER FOR PAPER TOWELS AND THE LIKE  
HAVING A CONTROLLED OPERATION

2,830,810

Filed April 4, 1955

3 Sheets-Sheet 2



INVENTORS  
BEARLE E. COLBURN  
LEE COLBURN  
BY  
Wheeler, Wheeler & Wheeler  
ATTORNEYS

April 15, 1958

B. E. COLBURN ET AL  
DISPENSER FOR PAPER TOWELS AND THE LIKE  
HAVING A CONTROLLED OPERATION

2,830,810

Filed April 4, 1955

3 Sheets-Sheet 3

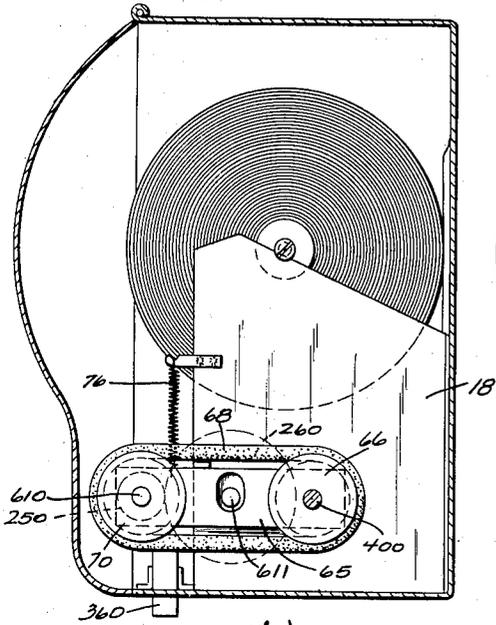


Fig. 10

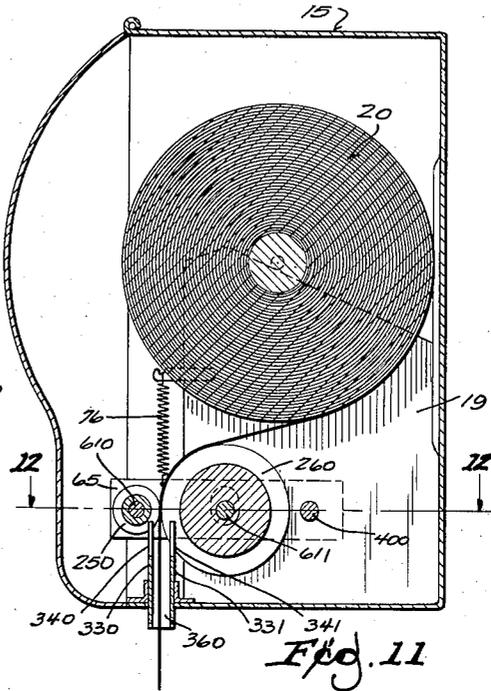


Fig. 11

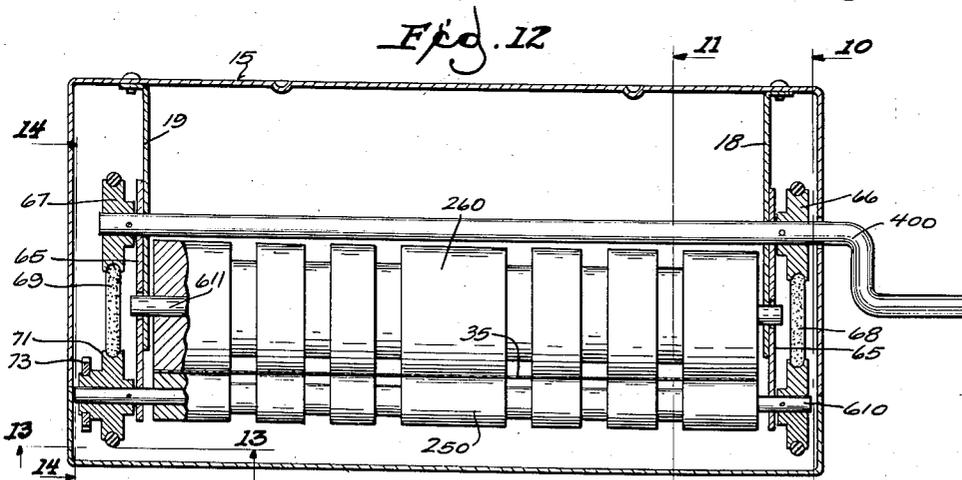


Fig. 12

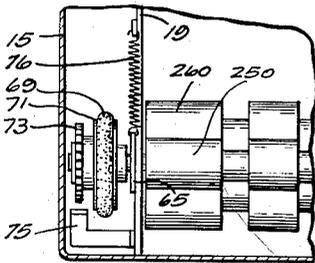


Fig. 13

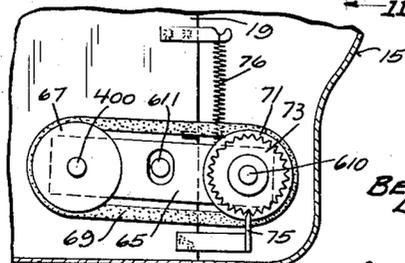


Fig. 14

INVENTORS  
BERNARD E. COLBURN  
LEE COLBURN

Wheeler, Wheeler & Wheeler  
ATTORNEYS

1

2,830,810

## DISPENSER FOR PAPER TOWELS AND THE LIKE HAVING A CONTROLLED OPERATION

Bearl E. Colburn and Lee Colburn, Green Bay, Wis., assignors to Roger F. Williams, Des Moines, Iowa

Application April 4, 1955, Serial No. 498,797

19 Claims. (Cl. 271—2.3)

This invention relates to a dispenser for paper towels and the like having a controlled operation to minimize waste.

Two embodiments of the invention are illustrated. In each, there is means for precluding the discharge of the paper web by pulling on the end thereof. In each, the web can be discharged only at a rate which is relatively low as compared with the number of crank rotations. In each, the mechanism is protected from accidental or intentional jamming.

In the first embodiment, the hand crank drives an irreversible gear set through an overrunning clutch which permits the crank to turn freely in a backward direction, the gear set locking to preclude backward movement. The gear set drives a special type of Geneva motion which is irreversible in another sense in that it will transmit motion from the crank to the feed roll which discharges the web but will not transmit motion from the feed roll backwardly toward the crank but will lock in the event that the user attempts to withdraw towelling by pulling on a free end portion of the web. A feed roll organization is used not only to assure proper feeding of the web around the feed roll, but to preclude any jamming such as might otherwise result from attempts to push any portion of the web back into the cabinet.

The second embodiment disclosed is simpler, the crank shaft being belted to a feed roll, the small diameter of which accomplishes a retarded rate of web delivery to which the Geneva motion contributes in the first embodiment. The feed roll and its complementary roll are both mounted on a yieldable frame and the feed roll is provided with a gear or other toothed wheel that has no function in the normal operation of the parts, but engages a fixed pawl if any attempt is made to withdraw paper by tugging on the end of the web. In that event, the entire frame yields against supporting springs so that the toothed wheel engages the pawl to prevent the feed rolls from rotative movement. A confining throat through which the web is dispensed precludes jamming if the user attempts to thrust any portion of the web back into the cabinet.

In the drawings:

Fig. 1 is a view in perspective of the first embodiment of the invention.

Fig. 2 is a view on an enlarged scale taken in the plane indicated at 2—2 in Fig. 3.

Fig. 3 is a view taken in section on the line indicated at 3—3 in Fig. 2.

Fig. 4 is a view taken in section on the line 4—4 of Fig. 5.

Figure 5 is a fragmentary view taken on the line 5—5 of Fig. 2.

2

Fig. 6 is a view taken in section on an enlarged scale on the line 6—6 of Fig. 5.

Fig. 7 is a view taken on line 7—7 of Fig. 6.

Fig. 8 is a fragmentary detail view showing portions of the parts illustrated in Fig. 7 as they appear in other positions.

Fig. 9 is a view taken in section on the line 9—9 of Fig. 6.

Fig. 10 is a view similar to Fig. 2 showing a modified embodiment of the invention and taken on the line 10—10 of Fig. 12.

Fig. 11 is a view taken on the line 11—11 of Fig. 12.

Fig. 12 is a view taken on the line 12—12 of Fig. 11.

Fig. 13 is a fragmentary detail view taken on the line 13—13 of Fig. 12.

Fig. 14 is a view taken on the line 14—14 of Fig. 12.

The cabinet 15 is provided with a front closure 16 hinged thereto at 17 to give access to the interior mechanism and to the supports 18, 19 for the supply roll 20. The core 21 of the supply roll has projecting screws or the like at 22 which ride on the rearwardly downwardly inclined top margins of the supporting plates 18, 19 as clearly shown in Figs. 2 and 3, whereby the supply roll is urged by gravity against the rear wall of the cabinet which provides frictional resistance to its freedom of rotation, thus tensioning the dispensed web.

The plates 18, 19 not only support the supply roll 20 but also provide bearings for the shaft of the feed roll 25 and the cooperating clamping rolls 26 and 27. Slots are provided for the shafts of the latter rolls, as best shown in Fig. 2, and tension springs 28, 29 act on the shaft to hold rolls 26, 27 in pressure engagement with the feed roll 25. The feed roll 25 and the roll 26 are peripherally grooved. The arcuate guide plate 30 extends circumferentially around the feed roll 25 in spaced relation thereto as best shown in Fig. 4 and has fingers 31 extending into the grooves of roll 26 to facilitate threading the paper web through the apparatus and require the leading edge thereof to follow about the feed roll into the bight between the feed roll 26 and the discharge clamp roll 27. A guide plate at 33 has fingers 34 extending into the peripheral grooves of the feed roll 25, as shown in Figs. 3 and 4 to require the leading end of the paper web 35 to issue through the dispensing slot 36 which is provided between the cabinet lips 37 and 38.

The crank 40 which projects through the end wall of the cabinet operates the feed roll mechanism quite largely mounted on a sub-frame 41 carried by plate 18 as best shown in Fig. 6. The sub-frame comprises a pair of spaced plates 42 and 43 which provide bearings for the crank shaft. Mounted directly on the shaft is the driving element 44 of an overrunning clutch of which the driven element 45 carries a gear 46. The driving element comprises an annulus best shown in Fig. 9 which is provided with a single notch at 47 into which a plunger 48 is urged by the bias of a compression spring 49. The spring and plunger are radially movable in a bore in the driven clutch element 45. In the position of the parts shown in Fig. 9, clockwise rotation of the crank shaft 40 and the driving clutch element 44 will correspondingly rotate the driven clutch element 45. However, a counter-clockwise rotation of the crank shaft will simply cam the plunger 48 out of the path of the driving element 44 without transmitting motion to the driven element.

Reverse motion of the driven clutch element is positively prevented by any suitable pawl. In the specific

embodiment, the gear 46 meshes with gear 50 and gear 50 is normally engaged with a gear segment 51 loosely pivoted at 52 and biased by its own weight to engage with gear 50. When shaft 40 is turned clockwise as viewed in Fig. 9, to dispense a length of paper, gear 50 rotates counter-clockwise and the pawl segment 51 is displaced upwardly to permit such rotative movement. Any attempt to rotate the shaft counter-clockwise would be resisted by pawl 51 while, at the same time, the overrunning clutch would permit free reverse rotation of the crank without transmitting any reverse rotative movement to the dispensing roll.

The gear 50 has its hub 53 mounted on jack shaft 54 for which bearings are provided in the plates 42, 43 of the sub-frame. At the inside of plate 43, the jack shaft 54 carries a toothed pinion 55 comprising a pair of pegs 56 projecting from a disk 57. The pinions engage the successive fan-shaped teeth 58 of a driven gear 60 which functions as a sort of Geneva motion to provide alternate periods of rotation and dwell for its shaft 61 upon which the dispensing roll 25 is mounted.

To exemplify the normal operation of this device, some figures based on the actual commercial structure will be given. In the commercial device, the feed roll is two inches in diameter. Twelve turns of the crank 40 will present a length of paper web totalling ten and three-fourths inches. This compares with the length of twelve and one-half inches which would be dispensed if the dispensing operation were continuous instead of being interrupted by twelve periods of dwell produced by the fan teeth 58 of the driven Geneva gear 60. In this device, there is no positive limit on the amount of paper that can be dispensed through rotation of crank 40, but the amount is limited solely by the laziness of the user, who will not continue to turn the crank beyond the number of turns required to supply his actual need in the way of towelling.

In addition to its function of reducing the amount of dispensed web in relation to the number of turns of the crank, the particular Geneva drive shown blocks itself against transmission of motion from the normally driven part to the normally driving part. This is illustrated in Fig. 8. If the user attempts to speed up the delivery of paper towelling by grasping the projecting end of a web shown in Fig. 4, and pulling the web outwardly, the resulting motion will rotate the Geneva gear 60 sufficiently to oscillate the driving pinion 55 to the position shown in Fig. 8, in which position two successive teeth 58 of gear 60 will be simultaneously engaged with the two peg teeth 56 of pinion 55, one being subject to camming thrust tending to rotate the pinion clockwise and the other being subject to an equal and opposite thrust tending to rotate the pinion counter-clockwise, with the result that the pinion and gear of the Geneva drive will lock against any movement induced by pull on the web. Yet the parts turn freely when the drive through the Geneva motion occurs from the crank to the dispensing roll.

The relation between the fingers 34 and the clamp roll 27 and the lips 37, 38 at opposite sides of the dispensing slot 36 is such as to make it impossible for a malicious person to jam the machine by thrusting paper web back into the slot. No matter how tightly the web may be thrust into the slot, it will free itself instantly when the machine is properly operated by the rotation of the crank.

The device shown in Figs. 10 to 14 uses an identical cabinet 15 and identical plates 18, 19 for the support of the supply roll 20. It also achieves comparable results but with quite different operating mechanism.

In this embodiment, the feed roll 250 has relatively small diameter and its companion roll 260 is of relatively large diameter. Each is grooved and the dispensing slot at 360 is provided with a pair of plates 330 and 331 having fingers 340 and 341, respectively entering the pe-

ripheral grooves of rolls 250 and 260 fastened to the inner peripheries thereof.

The shaft 610 of roll 250 is mounted on a pair of levers 65 which are pivoted on the crank shaft 400 and lie immediately outside of the respective plates 18 and 19. The shaft 611 of the companion roll 260 may be journaled either in the levers or the plates, bearings in the plates 18, 19 being shown in Fig. 12.

The crank 400 carries driving pulleys 66, 67 connected by spring belts or the like at 68, 69 to the driven pulleys 70, 71 on the shaft 610 of the feed roll 250. Connected with the driven pulley 71 is a ratchet gear 73 which is normally free of the fixed pawl 75 carried by plate 19. It is maintained free of pawl engagement by means of one or more tension springs 76 which lift the respective levers 65 about their pivotal mountings on crank shaft 400, the raised position of the parts being shown in Figs. 10, 11 and 13. If an operator attempting to speed up the delivery of the paper web 35 grasps the projecting end thereof shown in Fig. 11 and pulls on the web, the downward tug on the web will be communicated by means of feed rolls 250 to the levers 65 which will swing downwardly from the position of Fig. 13 to the position of Fig. 14, thereby engaging the teeth of the ratchet gear 73 with the fixed pawl 75 to preclude feed roll rotation, thus making it impossible for the operator to get any paper in this manner. When he releases the paper, the spring 76 will draw the feed roll upwardly to the position of Fig. 13 leaving it free to be rotated by the crank shaft 400 in the manner intended. In this instance, the use of an extremely small feed roll is relied upon to retard web delivery so that each crank rotation will deliver a length of web which is equal to the periphery of the feed roll or, in actual practice, about one inch per crank rotation.

Thus the simplified design of Figs. 10 to 14 includes many of the advantages of the construction disclosed in Figs. 1 to 9. It is equally resistant to any attempt on the part of the operator to jam the mechanism by cramming web into the dispensing slot. No matter how tightly the operator may try to wedge the paper in the slot, the paper will always feed out when the crank is rotated.

We claim:

1. In a web dispenser, the combination with a manually operable part and a feed roll, of driving connections from the part to the feed roll and requiring a number of operations of said part to rotate the feed roll for the delivery of a required length of web trained over the feed roll, said connections including a second part freely rotatable in the transmission of motion from the manually operable part to the feed roll, and means for automatically locking said second part against rotation in response to motion initiated in the feed roll by pulling on the web.

2. The device of claim 1 in which said second part and means comprise the pinion and gear teeth of a Geneva drive.

3. The device of claim 1 in which the second part comprises a ratchet gear and the last mentioned means comprises a fixed pawl, in further combination with a yieldable mounting for said ratchet gear, and means whereby the tension on said web is communicated to said ratchet gear to effect bodily displacement thereof toward said fixed pawl whereby to engage said gear with said pawl to preclude rotation of the feed roll.

4. The device of claim 1 in which said first part comprises a crank shaft, the dispensing roll having a driven shaft provided with a mounting yieldable in the direction in which a web trained over the driven roll is dispensed, biasing means acting on said mounting in a direction opposite to the dispensing direction, a fixed pawl toward which said mounting is yieldable in opposition to said biasing means when a web trained over the dispensing roll is subjected to tension in a dispensing direction, the said driving connections from the manually operable

part to said second part including a rotor mounted on the shaft of the dispensing roll and provided with teeth normally maintained free of the fixed pawl by said biasing means and engageable with the fixed pawl to preclude dispensing roll operation when the dispensing roll and shaft and rotor are displaced in opposition to said biasing means by tension on said web.

5. The device of claim 4 in which said mounting means comprises a pair of levers spaced axially of the dispensing roll shaft and pivoted substantially coaxially with the shaft comprising the manually operable part, said biasing means comprising springs urging the mounting means in an upward direction.

6. The combination with a dispensing cabinet provided with a dispensing throat, of a pair of rolls immediately above the throat, one of which comprises a feed roll and the other a clamp roll, means for supplying a web, said web being trained between said rolls and through said throat, a manually operable crank, and driving connections from the crank to the feed roll and including a rotary part, and means engaged by said part for the automatic locking of said part against rotation in a feeding direction when said web is subjected externally of the cabinet to tension in a direction to rotate the feed roll independently of the crank in a feeding direction.

7. The device of claim 6 in which the said rotary part and locking means provides the peg teeth and fan teeth of a Geneva pinion and gear, the pinion having a driven connection with the crank and the gear having a driving connection with the feed roll.

8. The device of claim 6 in which the rotary part and locking means comprise a gear supported on the shaft and provided with mounting means yieldable under the said web tension and relatively fixed pawl means with which the gear is engaged upon the yielding of said mounting means and gear.

9. The device of claim 8 in which the mounting means comprises a pair of levers spaced axially of the shaft, the shaft carrying the dispensing roll and the levers being pivoted at a point remote from the dispensing roll and offset substantially from the path of web movement, and means biasing said levers upwardly, the dispensing roll being movable in the direction in which the web is dispensed to oscillate said levers against said biasing means.

10. A web dispenser comprising a cabinet having a web supply roll and a dispensing throat, a feed roll across which a web is trained between the supply roll and the throat, a clamping roll cooperating with the feed roll to hold the web thereto, a manually operable crank and driving connections from the crank to the feed roll including a Geneva drive having a pinion connected with a crank and a gear connected with the feed roll, said pinion and gear being formed for interlocking engagement against the transmission of motion from the feed roll to the crank.

11. The device of claim 10 in which the pinion comprises a disk having axially projecting peg teeth, the gear having fan-shaped teeth with rounded ends and substantially straight sides.

12. The device of claim 10 in further combination with driving connections from the crank to the Geneva pinion including an overrunning clutch having driven and driving elements, a gear attached to the driven clutch element, a meshing gear connected with the Geneva pinion, and pawl means engaging said meshing gear in a direction to oppose its rotation in a direction opposite to that in which it is actuated through the overrunning clutch.

13. A web dispenser comprising the combination with web supply roll mounting plates and a dispensing feed roll therebetween, of a clamp roll cooperating with the feed roll and having a shaft projecting through said plates and for which said plates have slots, spring means engaging said shaft and biasing the shaft to engage the clamp roll with the feed roll, and means for driving the feed roll comprising a crank, means providing bearing

supports for the crank, an overrunning clutch comprising a driving element fixed to the crank and a driven element operated by the driving element in one direction of rotation respecting the crank, a gear mounted on the driven element to rotate therewith, a driven gear meshing with the gear first mentioned, pawl means engaging one of said gears and yieldable to accommodate rotation in the direction in which motion is transmitted from the crank to the driven element of said clutch, a Geneva pinion connected with the driven gear and comprising a disk having peg teeth projecting axially from its face, a Geneva gear comprising fan-shaped teeth having substantially straight side slots between them and having rounded ends with which said peg teeth interact, and a shaft for the dispensing roll with which said Geneva gear is connected for motion transmission, said Geneva gear and pinion being self-locking against transmission of motion from said last-mentioned shaft to said crank and freely operable to transmit motion from said crank to said shaft, the overrunning clutch and the pawl-controlled gear being effected to transmit motion to said dispensing roll in a web-dispensing direction only.

14. In a cabinet housing a web supply roll and provided with a dispensing slot for the web from said roll, dispensing means which comprises a feed roll having peripheral grooves, a guide plate having fingers in the grooves and leading thence to said slot, a clamp roll having means biasing against the feed roll, the path of the web to the slot from the bite of the clamp roll on the feed roll being substantially tangential to said rolls, a second clamp roll engaged with the feed roll at a point diametrically opposite the engagement of the first clamp roll therewith, the second clamp roll being provided with peripheral grooves, a guard plate partially encircling the feed roll and having fingers in said grooves and leading toward the clamp roll first mentioned, means biasing the second clamp roll toward the feed roll, and a crank projecting from the cabinet and having a shaft within the cabinet, and driving connections from said shaft to the feed roll including means irreversible as to direction of crank drive and self-locking against drive from the feed roll toward the crank.

15. In a web dispensing cabinet housing web supply means and provided with a dispensing slot, the combination with a web feed roll past which a web is trained from said supply means to said slot, a clamp roll cooperating with the web feed roll, a crank, driving connections continuously effective from the crank to the web feed roll for the operation thereof in a web discharging direction, and means for locking the driving connections when web drawn past the feed roll is pulled in a web discharging direction.

16. The device of claim 15 in which the locking means comprises driving connections between the crank and the feed roll.

17. In a web dispensing cabinet housing web supply means and provided with a dispensing slot, the combination with a web feed roll past which a web is trained from said supply means to said slot, a clamp roll cooperating with the web feed roll, a crank, driving connections from the web feed roll, and means for locking the driving connections when web drawn past the feed roll is pulled in a web discharging direction, said locking means comprising a pawl, a yieldable mounting for the feed roll, and a ratchet wheel connected with the feed roll to partake of the yielding thereof on said mounting, the ratchet wheel being bodily movable to engagement with the pawl upon the yielding of said mounting under web tension in a discharge direction.

18. The device of claim 17 in which said mounting comprises a lever upon which the feed roll is provided with a bearing, a spring biasing said lever away from said slot, and a driving connection from said crank to said feed roll.

19. The device of claim 17 in which the feed roll

is provided with a shaft projecting therefrom at the ends of the feed roll, a pair of spaced levers in which the shaft has bearings, means providing pivots for said levers at points remote from the feed roll shaft and about which pivots the feed roll shaft is bodily movable toward and away from said slot, means biasing said levers in directions to move the feed roll from the slot, driving connections from the crank to the feed roll including a rotor on the feed roll shaft adjacent one of said levers, teeth on said rotor, and a fixed pawl engageable by said teeth upon the yielding of the feed roll with the levers against the bias of said biasing means and in response to tension on the web trained past the feed roll.

5

10

## References Cited in the file of this patent

## UNITED STATES PATENTS

1,186,685	Rydquist	June 13, 1916
2,134,631	Birr	Oct. 25, 1938
2,219,570	Vaughan et al.	Oct. 29, 1940
2,260,925	Wooster	Oct. 28, 1941
2,277,051	West	Mar. 24, 1942
2,592,786	Birr	Apr. 15, 1952
2,712,934	Layton et al.	July 12, 1955