Aug. 27, 1963 C. D. DAVIS 3,101,913

APPARATUS FOR DISPENSING ROLLED PAPER

Filed April 11, 1961 2 Sheets-Sheet 1

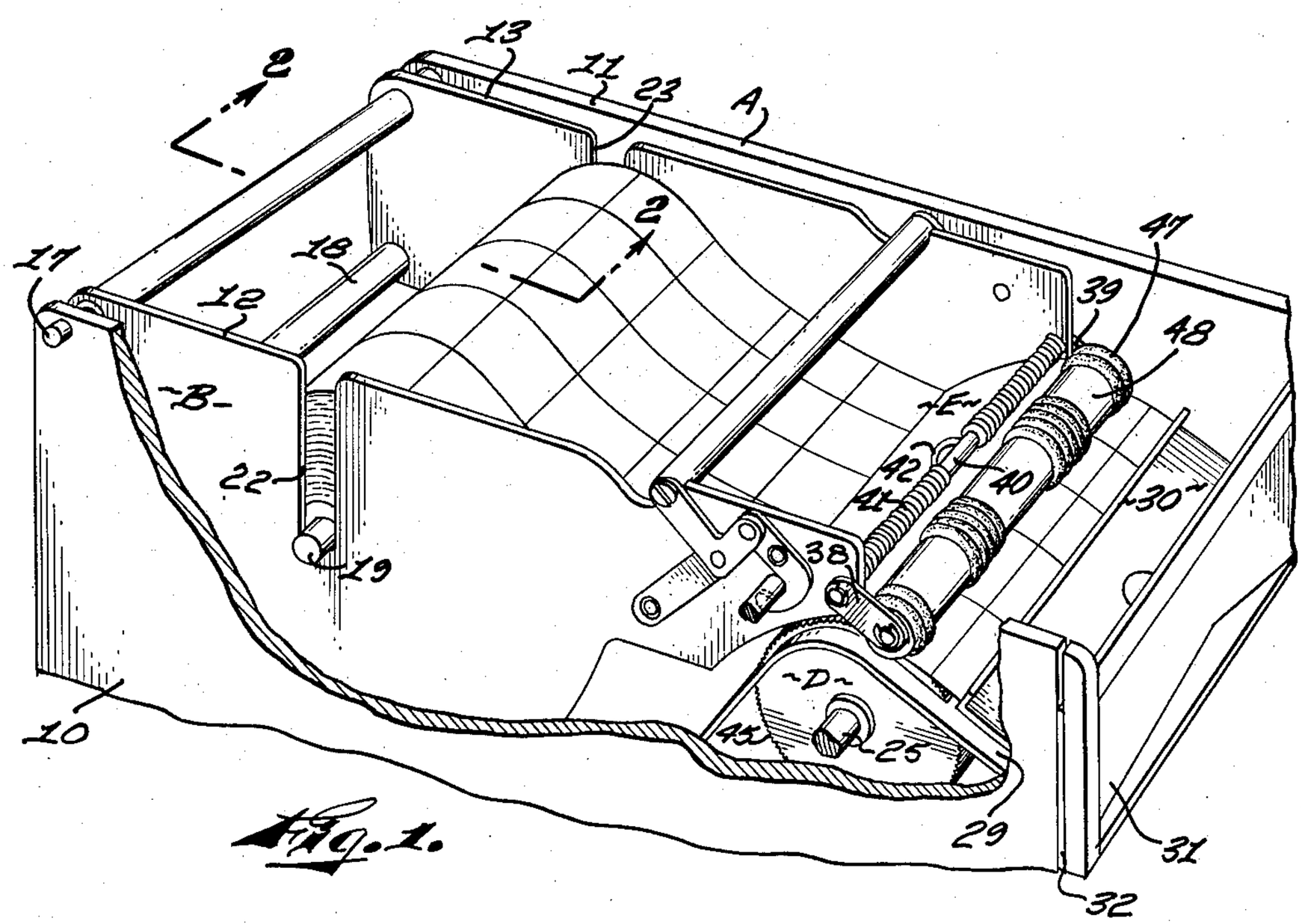

Fig. 1.

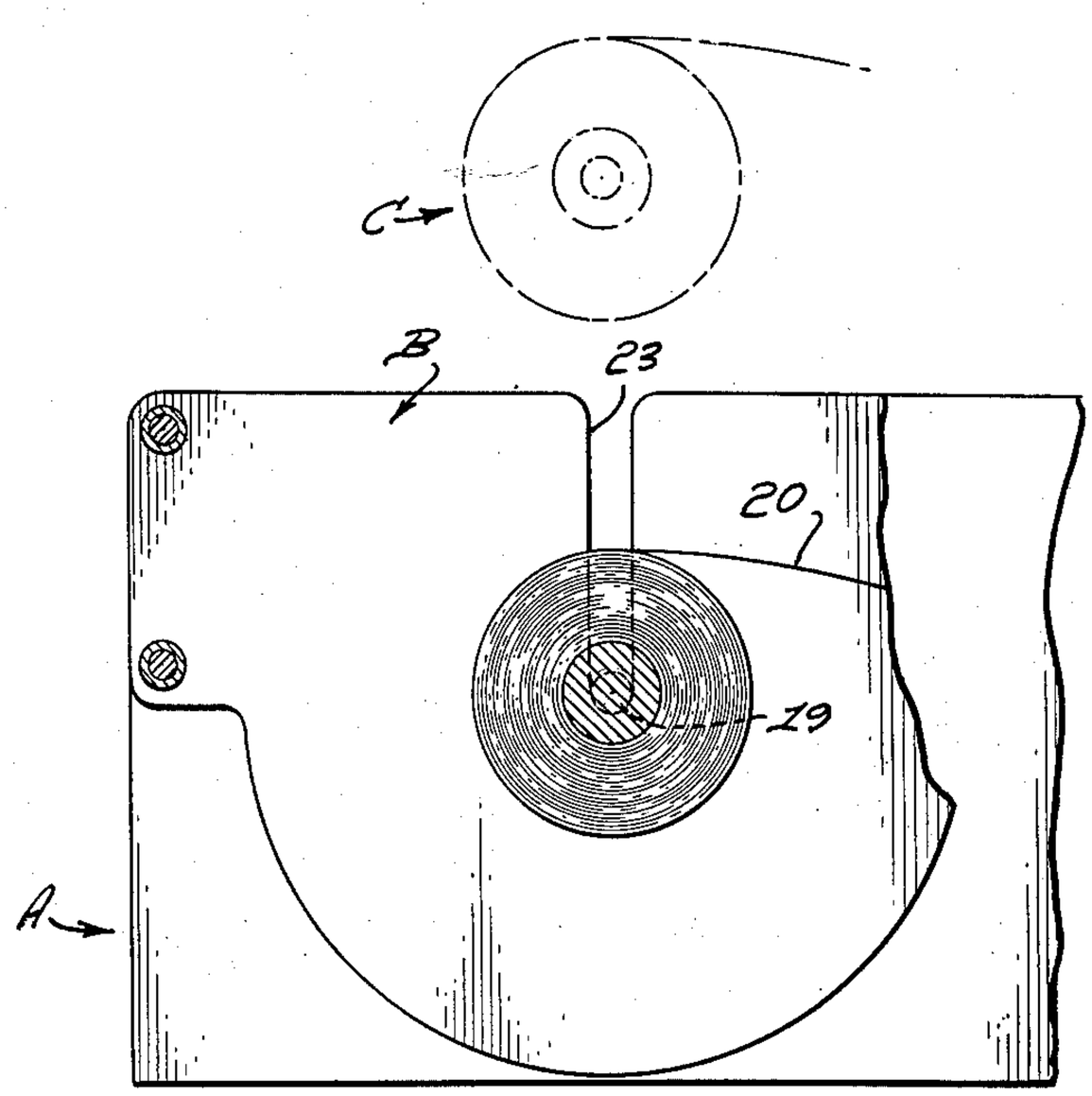

Fig. 2.

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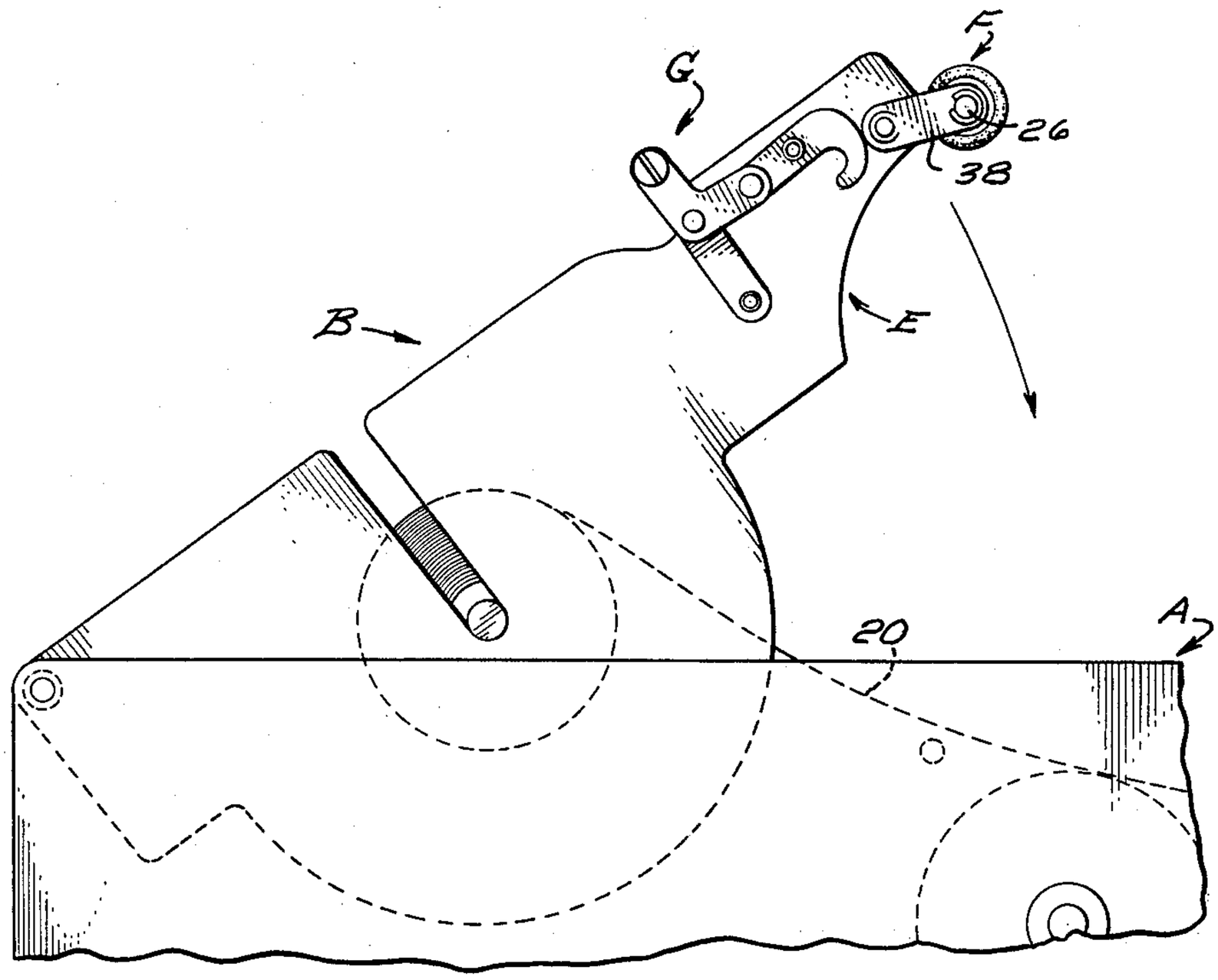

Fig. 3.

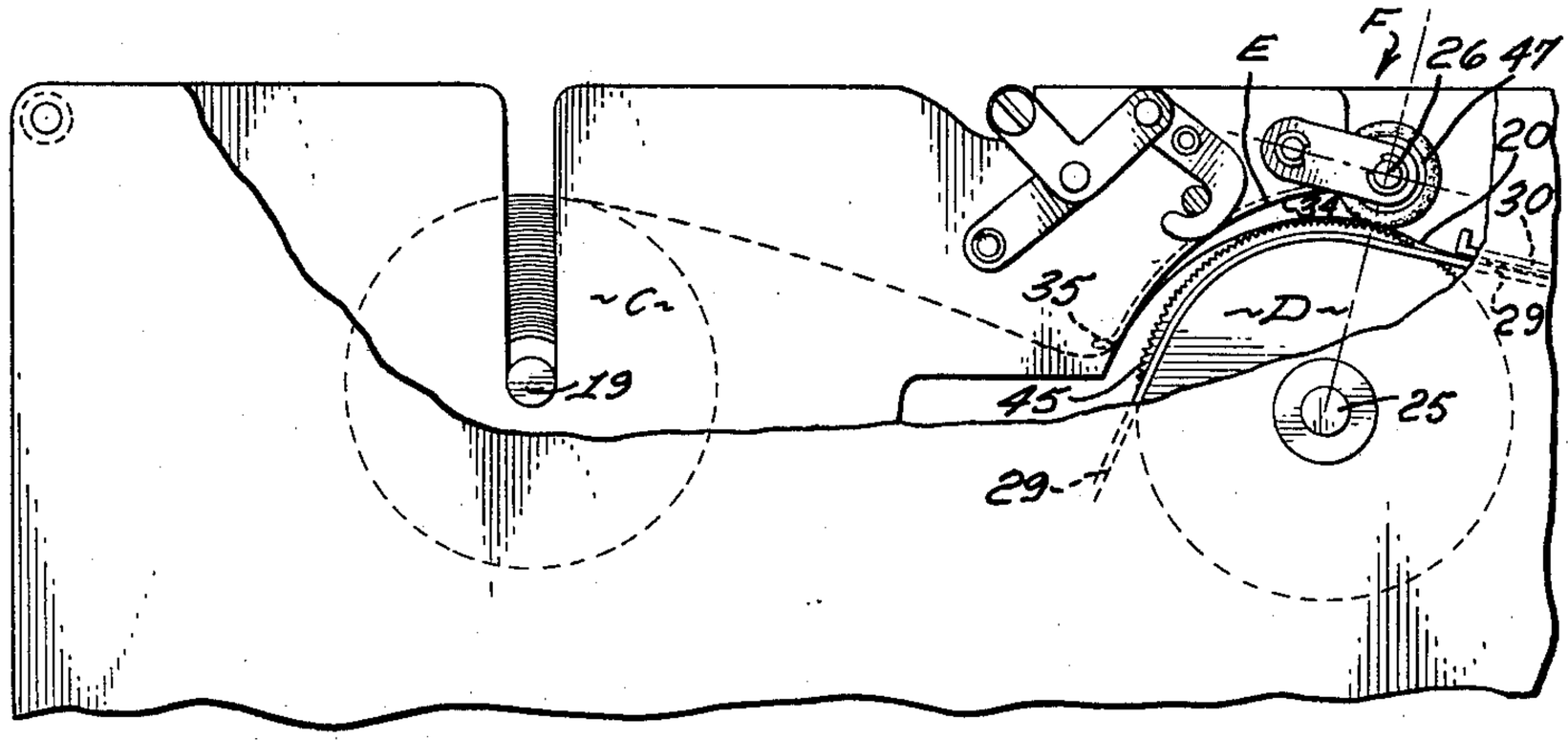

Fig. 4.

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APPARATUS FOR DISPENSING ROLLED PAPER

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4 Claims. (Cl. 242—55.53)

The present invention relates to apparatus for dispensing paper in precisely measured lengths from a roll of paper.

In dispensing premium stamps, postage stamps, or precisely measured lengths of paper for other purposes, certain unique problems have arisen which had not heretofore been satisfactorily solved. A basic mechanical dispensing apparatus that was entirely satisfactory did not exist. Side slippage and longitudinal slippage of the paper roll resulted in jamming the machine, errors of measurement, or both. Machines that were reliably constructed were too complex, too bulky, and too difficult to operate.

One object of the invention, therefore, is to provide an apparatus for dispensing paper in precisely measured lengths from a roll of paper, which has a higher degree of measurement accuracy than machines heretofore available.

Another object of the invention is to provide an apparatus of the foregoing type which is simple in construction, cheap to manufacture, and easy to operate.

A further object of the invention is to provide an apparatus of the foregoing type in which the replenishment of the paper roll supply may be quickly and easily accomplished by an unskilled operator.

An additional object of the invention is to provide an apparatus as aforesaid which is particularly well adapted to be automatically controlled by electronic means.

The above and other objects and advantages of the invention will be more readily apparent from the following description considered in conjunction with the accompanying drawing, in which:

FIGURE 1 is a perspective, partially cutaway view of the presently preferred form of the invention in fully assembled form;

FIGURE 2 is a cross-sectional view taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a side view of the machine with the carriage raised for replenishing the paper supply; and

FIGURE 4 is a side view of the machine partially cutaway to illustrate the paper drive mechanism.

Referring now to the drawings, an elongated housing indicated generally as A has parallel side walls **10**, **11** within which the operating parts of the apparatus are housed. A paper roll carriage B is also of rectangular configuration, having parallel side walls **12** and **13**. A paper roll C is removably carried in the mid-portion of carriage B and is rotatable about an axis transverse to the side walls **12**, **13**. A drum D is transversely disposed within one end of housing A and rotatably carried thereby. A paper guide E is carried by the corresponding end of carriage B, and adjacent thereto and carried on the extreme end portion of carriage B is a guide roller F.

The other end of the carriage B is pivotally supported from the other end of housing A, this being accomplished by a shaft **17** having one end which passes through the side walls **10**, **12** while its other end passes through the side walls **11**, **13**. A latch mechanism G is carried on the carriage B just above the paper guide E, and this latch mechanism is utilized for the purpose of securing carriage B in place when the machine is to be operated.

Carriage B has an aligned pair of vertical slots **22**, **23** which are formed in its side walls **12**, **13** respectively. Paper roll C is carried on a shaft **19** whose ends rest in the bottoms of the slots **22**, **23**. The carriage B is a generally open structure so that the paper roll C is easily accessible either from above or below. More specifically, at its pivoted end the carriage B is closed off only by the pivot shaft **17** and a fixed cross piece **18**. At its free end, which swings up and down when the machine is opened for replenishing the paper supply or for other purposes, the carriage B is entirely open except for the structural members associated with paper guide E, guide roller F, and latch mechanism G.

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When carriage B is in its locked or operating position the guide roller F engages the surface of drum D somewhat to the right of center, as best seen in FIGURE 4. The axis of rotation **19** of paper roll C, the axis of rotation of drum D represented by a shaft **25**, and the axis of rotation of guide roller F represented by its shaft **26**, are then all precisely parallel. The angle between paper roll C and guide roller F, as viewed from drum axis **25**, is somewhat more than 95°, and preferably about 105°. A paper output chute **29** is rigidly supported from the side walls **10**, **11** of housing A, and thus assures that the free end **20** of paper coming off the roll goes onto and over the drum D rather than beneath it. A portion of the chute **29** extends on the output side of drum D as best seen in FIGURES 1 and 4. A paper weight **30** rests upon paper strip **20** above the output portion of chute **29**. Guillotine blade **31** is carried in vertical slots **32** in the ends of side walls **10**, **11** of housing A and may be actuated up and down for cutting off that portion of the paper roll which protrudes beyond the output chute **29**.

In the operating position of carriage B, paper guide E occupies a position as best seen in FIGURE 4. More specifically, the paper guide is a solid piece which extends transversely between side walls **12**, **13** of carriage B but which is curved in the plane of the side walls. The radius of curvature of paper guide E is somewhat greater than the radius of drum D. The upper extremity of the paper guide as seen in FIGURE 4 lies at a point **34** adjacent the guide roller F, and the lower extremity lies at a point **35** which is almost in longitudinal alignment between axis **19** of paper roll C and axis **25** of drum D. At its lower extremity **35** the guide is provided with an upwardly curved edge which smoothly guides the moving paper strip **20**.

The shaft **26** of guide roller F is received in the outer ends of a pair of supporting arms **38**, **39**. A shaft **40** extends between the side walls **12**, **13** above the upper extremity **34** of paper guide E. The outer ends of shaft **40** are rotatably carried in and protrude beyond the respective side walls **12**, **13**, where they are rigidly fastened to the ends of corresponding arms **38**, **39**. Thus as shaft **40** rotates the shaft **26** moves up or down, bringing guide roller F out of or into engagement with the surface of drum D. A torsion spring **41** is carried on shaft **40** and has a projecting tongue **42** that engages the upper surface of paper guide E. The effect of torsion spring **41** is to at all times cause shaft **40** to tend to rotate in a clockwise direction, as viewed in FIGURE 4, and it therefore biases guide roller F toward drum D.

It is significant to note, as seen in FIGURE 4, that the longitudinal axis of arms **38**, **39** is exactly perpendicular to the radius of drum D that passes through the center of shaft **26**. Therefore, a slight up or down movement of guide roller F creates no longitudinal change in the position of the guide roller that would affect the precision of measurement of the paper length to be dispensed.

The driving action is imparted to drum D, via its shaft **26**, or through other suitable means. A direct drive arrangement is used in which the drum is rotated a predetermined amount so as to feed a corresponding length of paper from roll C through the output chute **29** and thence beyond the guillotine blade **31**. A change

in the longitudinal tension of the paper occurs at the beginning and end of each dispensing operation. The purpose of paper weight 30 is to prevent any backfeed of the paper at the end of a dispensing operation when the forward rotation of drum D has been stopped.

A very significant feature of the present invention is the interaction between drum D and guide roller F in precisely controlling the longitudinal movement of the paper. Drum D has a cylindrical surface with longitudinally extending rigid serrations 45 formed thereon, these serrations being best seen in FIGURES 1 and 4. Drum D has a metal driving surface in which longitudinal grooves are cut so as to form the rigid serrations 45. Guide roller F has a cylindrical surface upon which circumferentially extending resilient serrations 47 are formed. Guide roller F includes a rigid cylindrical base member 48 upon whose exterior surface a number of neoprene O-rings are stretch-fitted. Each of these O-rings provides one of the resilient serrations 47.

The action of paper guide E is such as to draw the paper tightly against the drum surface prior to the point where the paper is grasped between drum D and guide roller F. The cooperative action of drum D and guide roller F is such that the paper being dispensed exhibits no measurable longitudinal slippage relative to the surface of drum D. Furthermore, the paper is not torn or distorted. If the paper strip being presented to the guide E should happen to be skewed sidewise, as for example, in connection with loading a new roll of paper into the machine, this would create no difficulty because the normal operation of drum D and guide roller F in dispensing the paper causes any such error in alignment to be corrected.

An important feature of the guide roller construction is that the neoprene material displaces or flows, rather than compressing. It is also significant that the neoprene material has a high coefficient of friction with paper. The spring pressure is so adjusted that a certain amount of distortion or flow of the neoprene rings takes place, but well within the range of the maximum possible distortion or flow. The interaction between the metal serrations of drum D and the neoprene rings of guide roller F is similar to that of two gear wheels in a gear drive. However, the paper is not damaged, as it would be if fed through conventional gear wheels.

As seen in FIGURE 1 the guide roller F is provided with several groups of the neoprene rings, with all of the rings of each group being placed tightly together while a considerable space exists between adjacent groups. In accordance with the invention this mode of construction is preferred, with drum D having a corresponding circumferential groove (not shown) corresponding to each gap between groups of neoprene rings, the drum groove in turn being occupied by a corresponding separate section of the paper output chute 29.

While in the illustrated mechanism the power drive is supplied to drum D it is equally feasible to supply the power drive to guide roller F. The arrangement could also be inverted in another manner by placing the neoprene rings upon drum D while forming the rigid longitudinal serrations upon the surface of guide roller F, and satisfactory operation would still be achieved.

The invention has been described in considerable detail in order to comply with the patent laws by providing a full public disclosure of at least one of its forms. However, such detailed description is not intended in any way to limit the broad features or principles of the invention, or the scope of patent monopoly to be granted.

I claim:

1. Apparatus for dispensing paper in precisely measured lengths from a roll of paper, comprising, in combination: an elongated housing; a drum transversely disposed within one end of said housing and rotatably carried thereby, said drum having a cylindrical surface with longitudinally extending rigid serrations formed thereon; a paper roll carriage having parallel side walls, disposed within said housing and carrying a rotatable guide roller at one end thereof, said guide roller having a cylindrical surface with circumferentially extending resilient serrations formed thereon, the other end of said carriage being pivotally supported from the other end of said housing; a paper roll removably carried in the midportion of said carriage and rotatable about an axis transverse to said side walls thereof; latch means for latching said one end of said carriage in a fixed position relative to said housing and drum, in which the axes of rotation of said drum, paper roll, and guide roller are precisely parallel to each other, the surface of said guide roller is engageable with said drum surface, and the angle of separation between said guide roller and said paper roll is somewhat more than 95° measured relative to said drum axis; a paper guide fixedly carried by said carriage, and in said fixed position of said carriage extending adjacent said drum from a point near said guide roller to a point nearly in longitudinal alignment between the axes of said paper roll and said drum, so that paper drawn from said paper roll is held tightly against said drum prior to the point where it is grasped between said drum and said guide roller; and means for rotatable driving said drum.

2. Paper dispensing apparatus, comprising, in combination: a drum having a cylindrical surface with longitudinally extending rigid serrations formed thereon; a guide roller having a cylindrical surface with circumferentially extending resilient serrations formed thereon; support means for rotatably supporting said guide roller and said drum with their axes of rotation parallel to each other whereby the respective serrations thereof are mutually perpendicular, and including spring means for biasing said guide roller and said drum together in surface-to-surface engagement; paper guide means for presenting a strip of paper in a direction perpendicular to the axes of said drum and said guide roller and parallel to said engaging surfaces thereof so as to be grasped therebetween; and drive means for drivingly rotating one of said drum and guide roller.

3. Paper dispensing apparatus, comprising, in combination:

a drum having a cylindrical surface with longitudinally extending rigid serrations formed thereon;

a guide roller having a cylindrical surface with circumferentially extending resilient serrations formed thereon;

support means for rotatably supporting said guide roller and said drum with their axes of rotation parallel to each other, and including spring means operable for biasing said guide roller toward said drum in a direction radial to the drum axis;

paper guide means for presenting a strip of paper in a direction perpendicular to the axes of said drum and said guide roller and parallel to the engaging surfaces thereof so as to be grasped therebetween, including a paper roll rotatably supported upon an axis precisely parallel to said drum axis in a position such that the angular separation between said guide roller and said paper roll is somewhat more than 95° measured relative to said drum axis, a fixed paper guide extending adjacent said drum from a point near said guide roller to a point nearly in longitudinal alignment between the axes of said paper roll and said drum so that paper drawn from said paper roll is held tightly against said drum surface prior to the point where it is grasped between said drum and guide roller surfaces;

and drive means for drivingly rotating said drum in a predetermined direction so as to draw the paper from said paper roll.

4. Paper dispensing apparatus, comprising, in combination:

a drum having a cylindrical surface with longitudinally extending rigid serrations formed thereon;

a guide roller including a rigid cylindrical base member, and a plurality of neoprene O-rings stretch-fitted therearound to form circumferentially extending resilient serrations thereon;

support means for rotatably supporting said guide roller and said drum with their axes of rotation parallel to each other, and including spring means for biasing said guide roller and said drum together in surface-to-surface engagement;

paper guide means for presenting a strip of paper to said drum and said guide roller so as to be grasped therebetween;

and drive means for drivingly rotating one of said drum and guide roller.

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