Jan. 31, 1928. 1,657,568

J. E. DANCKER ET AL

TUBE FEEDING METHOD AND APPARATUS

Filed July 16, 1926 4 Sheets-Sheet 1

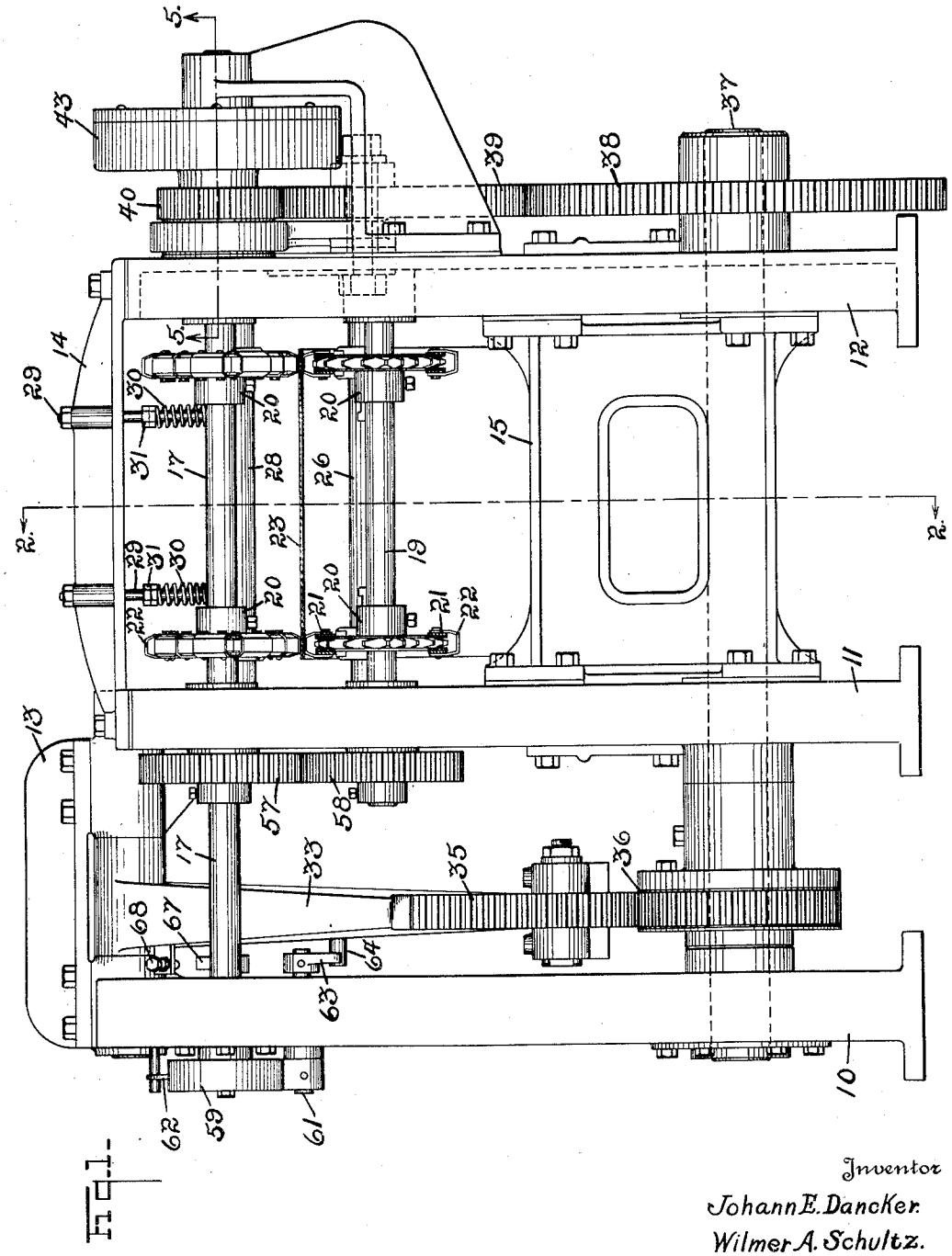


FIG. 1.

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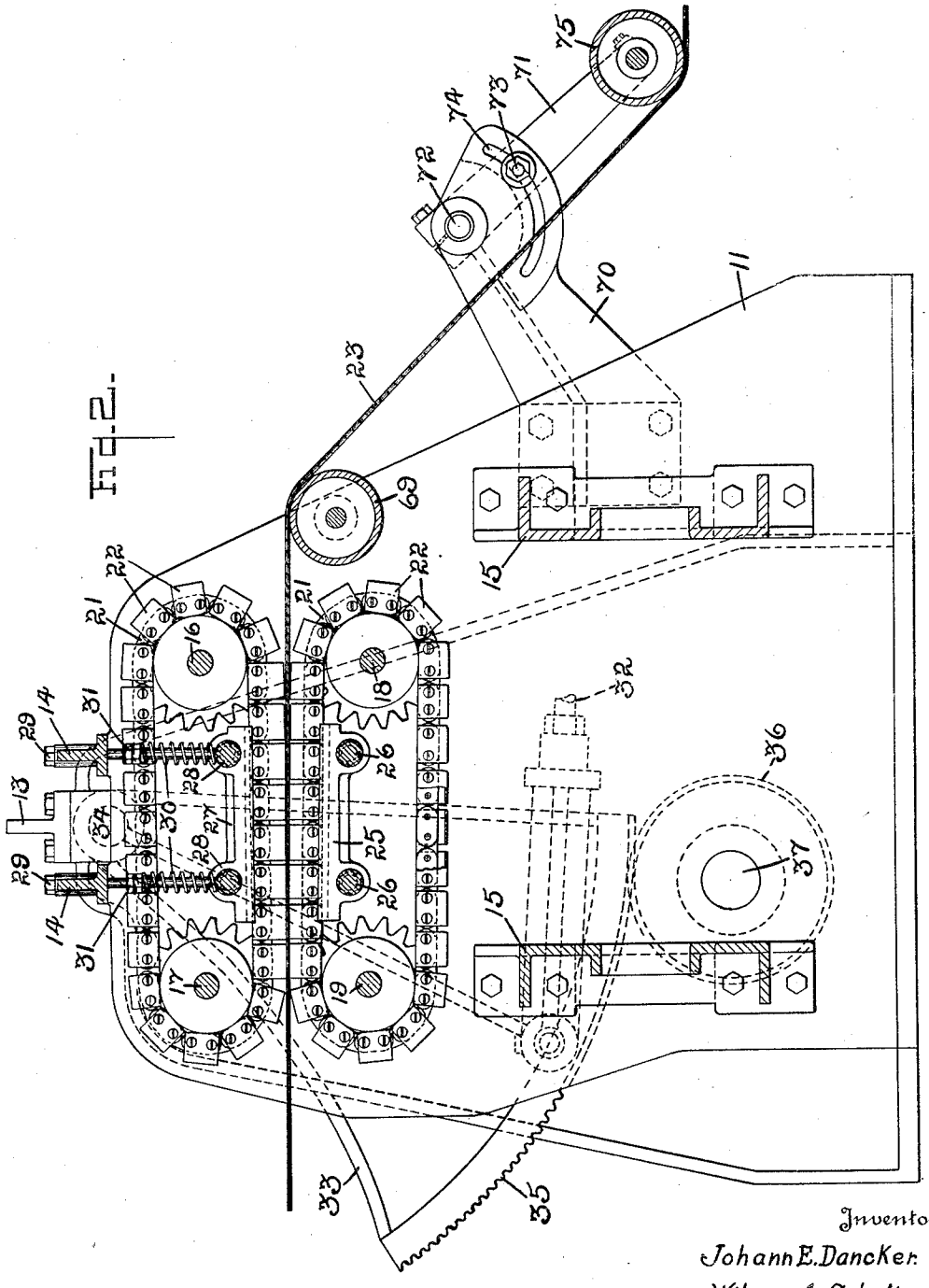
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TUBE FEEDING METHOD AND APPARATUS

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Fig. 2.



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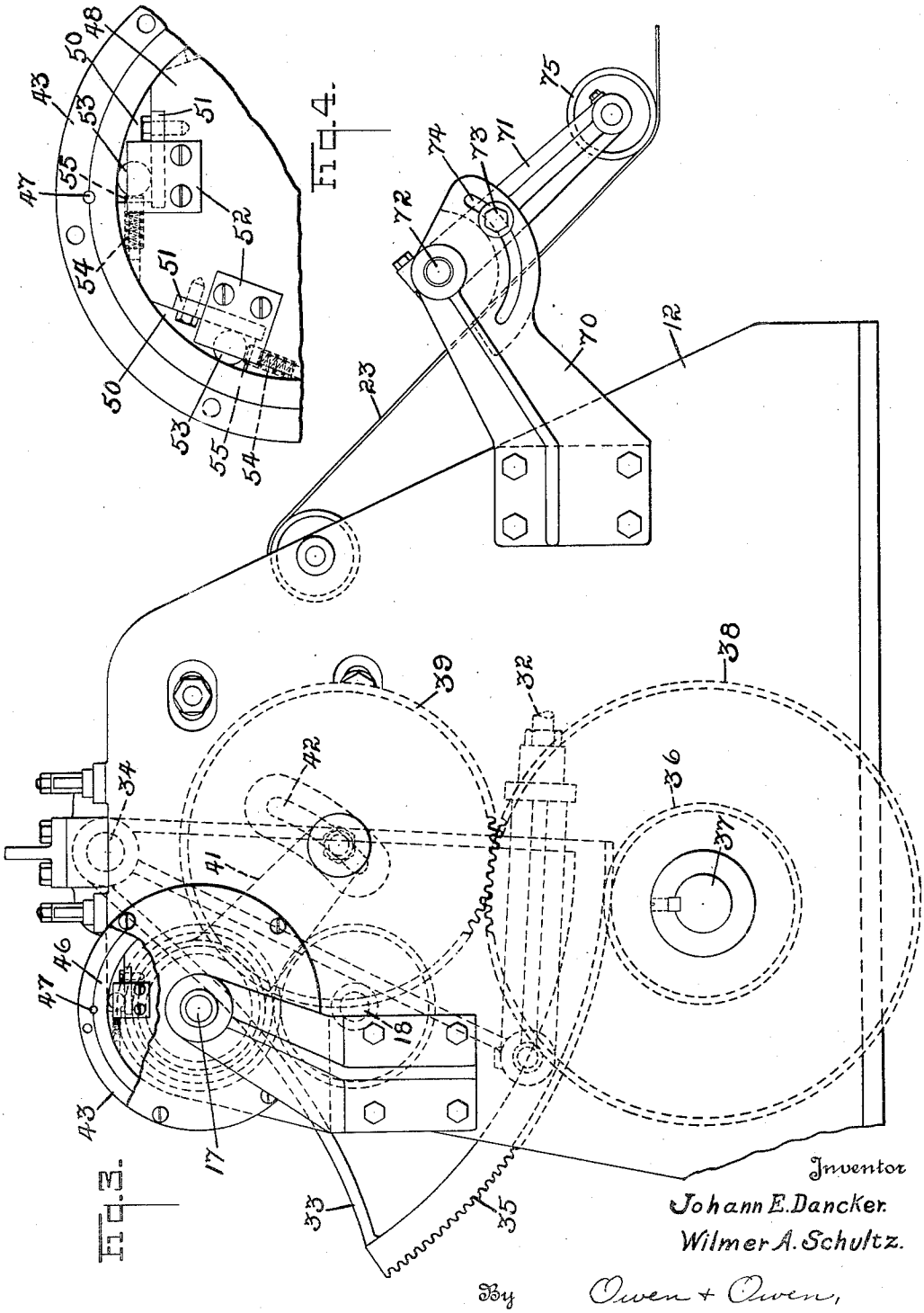
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TUBE FEEDING METHOD AND APPARATUS

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TUBE FEEDING METHOD AND APPARATUS

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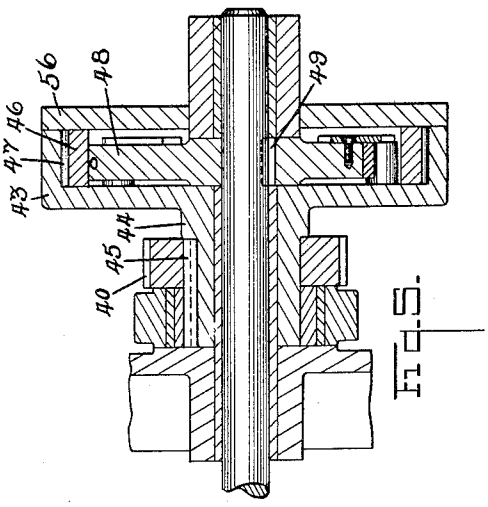


Fig. 5.

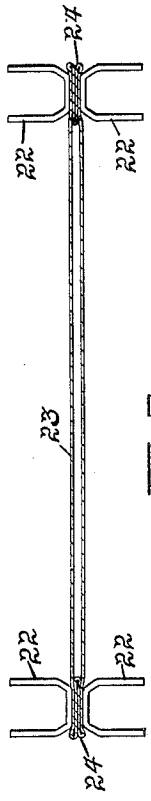


Fig. 7.

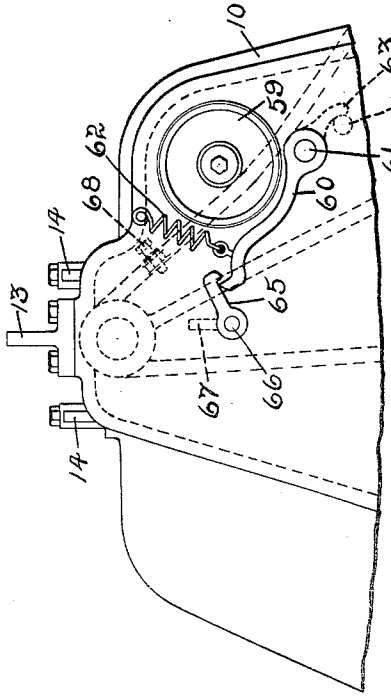


Fig. 6.

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UNITED STATES PATENT OFFICE.

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TUBE-FEEDING METHOD AND APPARATUS.

Application filed July 16, 1926. Serial No. 122,787.

This invention relates to a method and apparatus for feeding tubes, and more particularly for feeding bellows-folded paper tubes. Minor details of the invention will appear as the description proceeds.

In the accompanying drawings forming a part of this specification, Figure 1 is an end elevation of apparatus embodying the invention; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a partially diagrammatic side elevation of the right side of the apparatus as seen in Fig. 1; Fig. 4 is an enlarged detail of a portion of the clutch; Fig. 5 is a section of the clutch on the line 5—5 of Fig. 1; Fig. 6 is an elevation of the upper portion of the apparatus as viewed from the left of Fig. 1; and Fig. 7 is a detail showing the manner in which the tube is gripped.

The apparatus is mounted upon three parallel vertical frame members 10, 11 and 12. Members 10 and 11 are connected at their upper ends by a cross-piece 13. Members 11 and 12 are connected at their upper ends by two cross-pieces 14 and near their lower end by cross-pieces 15.

Mounted in frames 11 and 12 there are four parallel shafts 16, 17, 18 and 19, each shaft carrying a sprocket wheel 20 near its end. Shaft 17 is continued beyond frame 12 and to and beyond frame 10. Shaft 19 is continued beyond frame 11. Shafts 16 and 18 terminate in boxes in frames 11 and 12.

The sprocket wheels on shaft 17 are connected with the sprocket wheels on shaft 16 by chains 21, and similar chains connect sprocket wheels on shaft 19 with those on shaft 18. Connected to each of these chains is a series of grippers 22. These grippers may be of any desired conformation, but are shown as U-shaped shoes of sheet metal having their legs attached to opposite sides of the chain links.

The grippers 22 are adapted to grip a tube 23 of paper or the like. The apparatus is particularly suitable for feeding such tubes where they have bellows-folds, such as shown at 24. The grippers are constructed of such width that they press upon the folded portion of the tube, but do not press where the material is turned. The sprocket wheels may be adjusted upon the shafts to properly feed tubes of different widths and, if necessary, grippers 22 having different widths of gripping surfaces may be used for tubes having different widths of bellows-folds.

Preferably, the shafts 16 and 18, at the entering end of the device, are spaced slightly farther apart than are shafts 17 and 19 at the delivery end of the apparatus. In order to hold grippers 22 in contact with the tube for a considerable length, there are provided guiding shoes beneath the lower chain and above the upper chain, where they grip the tube. Lower shoes 25 are mounted upon shafts 26, which are mounted in any suitable manner in frames 11 and 12. Upper shoes 27 are mounted upon shafts 28, the ends of which are vertically slidable in frame members 11 and 12. Bolts 29 fixed in cross-pieces 14 extend downward into holes in shafts 28. Springs 30 around bolts 29 normally press shafts 28, and with them shoes 27, downward upon the tube, the degree of pressure exerted by the springs being adjustable by means of nuts 31.

Any suitable means may be used for driving the chains, but the apparatus described below has been found satisfactory for the purpose. In this particular instance the tube is being fed from an intermittently operating device, and, therefore, it is desirable to have the movement of the chains intermittent. A rod 32 is reciprocated in any suitable manner in timed relation with the apparatus from which the tube is received. Rod 32 is pivoted to an arm 33, which in turn is mounted upon a pivot 34 supported by frames 10 and 11. The outer end of oscillating member 33 carries a segmental rack 35 in mesh with a spur gear 36 upon a shaft 37. Shaft 37 is mounted in frames 10, 11 and 12 and extends beyond frame 12, where it carries a spur-gear 38. Gear 38 drives an idler gear 39, which in turn drives a clutch gear 40 mounted upon shaft 17. An arm 41 is pivoted on shaft 17 and carries idler gear 39. Arm 41 may be adjusted about shaft 17 to allow the use of different sized gears 38, as required in order to give the desired length of movement to the tube. In Fig. 3 a slot 42 is indicated to allow for this adjustment of arm 41.

Shaft 17, where it extends beyond frame member 12, carries a clutch drum 43 upon

the hub 44 of which gear 40 is mounted. In the construction shown, gear 40 is keyed to hub 44 by means of a key 45. A ring 46 is inserted within drum 43, and is prevented from turning within the drum by means of keys 47. A drive disc 48 is mounted within the drum and is keyed to shaft 17 by means of a key 49. Drive disc 48 has notches 50 around its circumference. In the construction shown, the bottoms of these notches are provided with wear plates 51, and plates 52 are provided on the side of the disc to confine a roller 53 within each notch. The bottoms of the notches, provided with the wear plates, slant outward towards ring 46, and springs 54 press followers 55 against the rollers in order to keep the rollers in contact with the ring and wear plate continuously. The outer end of the drum may be covered by a plate 56 to prevent the entrance of dirt into the clutch.

It will be seen that shaft 17 is driven intermittently by the above described mechanism. On the other end of the shaft, beyond frame members 11, there is a gear 57 in mesh with a similar gear 58 on shaft 19. In this way the upper and lower chains are driven in unison.

In order to prevent continued movement of the chains after the forward movement of the clutch ceases, a brake is provided. In the construction shown there is a brake drum 59 mounted on the end of shaft 17 beyond frame member 10. A shoe 60 is pivoted at 61 in position to press against brake drum 59. A spring 62 normally presses the shoe against the drum. Pivot 61 is extended through frame member 10 to form a rock shaft, and carries an arm 63 adjacent to oscillating member 33. A pin 64 projecting from oscillating member 33 contacts arm 63 at suitable intervals and moves shoe 60 away from drum 59.

A catch 65 is pivoted at 66 in position to lock the end of shoe 60 away from the drum when it is moved away by pin 64 and arm 63. Pivot 66 of catch 65 extends through frame member 10 to form a rock shaft, and has an arm 67 projecting upward from its inner end. A projection is provided on oscillating member 33 to contact arm 67 and release shoe 63 at the end of the operative throw of the member. Preferably, this contact is made adjustable as by means of an adjustable set screw 68, so that the release of the shoe may be adjusted to occur at precisely the desired instant.

The tube may be directed in between the drawing grippers in any desired manner, but in the construction shown there is a roller 69, substantially on a level with the grippers, over which the tube is received. Bracket members 70 project from frame members 11 and 12. Arms 71 pivoted at 72 upon the bracket members are provided with pins 73 extending through arcuate slots 74 in the brackets, providing for any desired angle to the brackets. A roller 75 is mounted on arms 71, and tube 23 is received beneath roller 75.

The chains and grippers act as endless conveyors, and the described apparatus may be used for pulling the tube from any desired source of supply. One use to which it has been put is to draw the tube through a printing press, similar to a Gordon press, which prints brands upon successive lengths of the tube as it is intermittently fed therethrough. When the apparatus is used for this purpose, rod 32 is operated in synchronism with the press so as to move the tube the desired distance between successive impressions.

By having the chain-carrying shafts farther apart at the receiving end of the apparatus than they are at the delivery end, the grippers remain out of contact with the tube until the chain is straightened out between the sprocket wheels. Otherwise, the corners of the grippers might contact the tube before the axes of the grippers were in parallel relation with those previously gripping the tube, and the subsequent change of angle of the grippers relative to each other would result in changing the distance apart of their gripping surface, and so cause unnecessary strain upon the tube. Therefore, it is an advantage to insure that no gripper shall grip the tube before the portion of the chain to which it is attached has become straight. By means of the spring mounting of the upper shoes the grippers are caused to contact the tube with the degree of pressure found necessary. It will be readily understood that the extended surface of the grippers in contact with the tube reduces the pressure which has to be exerted upon the tube in order to properly feed it through the apparatus.

One objection to feeding a paper tube between gripping rollers is that the paper is bent so sharply by this pressure, at the edges where the paper turns, that the fibres are broken and the paper is weakened materially. This objection is particularly pronounced when the tube is provided with bellows-folds, in which case the paper turns three times at each edge, instead of but once, as where the bellows-folds are omitted. By pressing upon the bellows-folds between the lines where the paper is turned, it is possible to exert the necessary pressing action upon the tube adjacent its edges without pressing the paper at the turns sufficiently to break the fibres and weaken the paper. If desired, contact may be made also with the body of the tube between the bellows-fold, but that is not necessary for most purposes.

It will be understood that many of the advantages of this method and apparatus for

applying traction to a tube may be retained whether the apparatus is operated intermittently or continuously, and that various types of intermittently operating mechanism might be used for driving the chains where intermittent motion is desired. The form of clutch shown is very desirable for the purpose where accuracy in registration is desired. With the form of clutch shown, rollers 53 are always in position to wedge between disc 48 and ring 46 the instant that the disc starts movement in its driving direction. In other words, there is no lost motion between the reversal of movement of disc 48 and the beginning of a driving action. Furthermore, by providing a brake which stops the forward movement of the chains exactly at the end of the forward movement of disc 48, any uncertainty as to the length of the drive on that end of the movement is avoided.

It will be readily understood that obvious departures may be made from the exact embodiment of the invention described above without departing from the scope of the appended claims, which set forth the invention.

What we claim is:

1. In apparatus for exerting intermittent traction upon a sheet of material, means for gripping the sheet, means for moving the gripping means intermittently to advance the sheet a predtermined distance, a brake, and means automatically setting the brake at the end of the predetermined advance and releasing the brake at the beginning of the next advance movement.

2. In apparatus for exerting intermittent traction upon a sheet of material, means for gripping the sheet, means for moving the gripping means intermittently to advance the sheet a predetermined distance, a brake, means automatically setting the brake at the end of the predetermined advance and releasing the brake at the beginning of the next advance movement, and an overrunning clutch, without lost motion, connecting the advancing means to the gripping means.

3. In apparatus for exerting traction on a sheet of fabric, opposed endless conveyors adapted to contact opposite sides of a sheet, the conveyors being separated more at their entrance ends than at their discharge ends, and resilient means pressing together the opposed runs of the conveyors against the sheet.

4. In apparatus for exerting traction on a sheet of fabric, opposed conveyors comprising endless flexible members and a series of gripping members extending from each endless member, the entrance ends of the conveyors being farther apart than their discharge ends, and resilient means pressing the opposed runs of the conveyors towards each other.

5. In apparatus for exerting traction on a bellows-folded tube, opposed sets of endless conveyors adapted to engage the folded edges of the tube, the conveyors being separated more at their entrance ends than at their discharge ends, and resilient means pressing together opposed runs of the conveyors against the folded portions of the tube.

6. In apparatus for exerting traction on a bellows-folded tube, opposed endless conveyors comprising flexible members and grippers extending from the members, the grippers being so spaced as to engage the bellows-folded portion of the tube between the lines where the fabric is turned to form the bellows-folds and the entrance ends of the opposed runs of the conveyors being farther apart than their discharge ends, and resilient means for pressing together the opposed runs of said conveyors.

7. The method of advancing a bellows-folded paper tube, which consists in gripping the tube between the lines where the fabric is turned to make the folds and exerting traction on the gripped portions.

8. The method of advancing a bellows-folded paper tube, which consists in gripping a tube along the bellows-folds between the lines where the fabric is turned to form the folds and exerting traction on the gripped portions.

9. The method of advancing a bellows-folded paper tube, which consists in gripping a tube for an extended length along each bellows-folded portion between the lines where the fabric is turned to form the folds, and advancing the tube by exerting traction on the gripped portions.

In testimony whereof we have hereunto signed our names to this specification.

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