June 23, 1970 H. P. SHERMAN 3,516,656

MEANS FOR FEEDING SHEET PAPER INTO MACHINES

Filed Aug. 7, 1968

FIG. 1

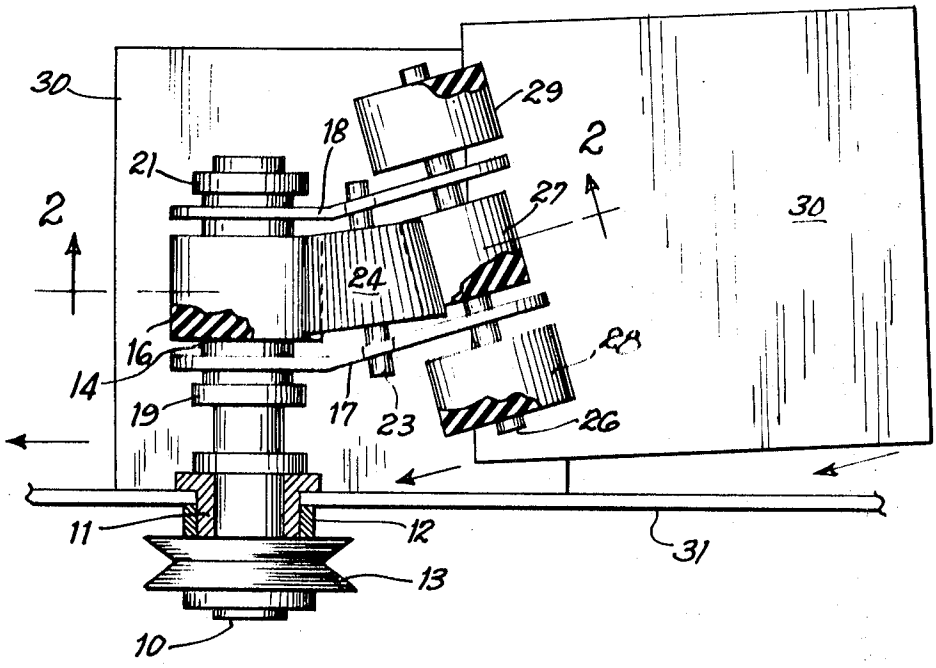


FIG. 2

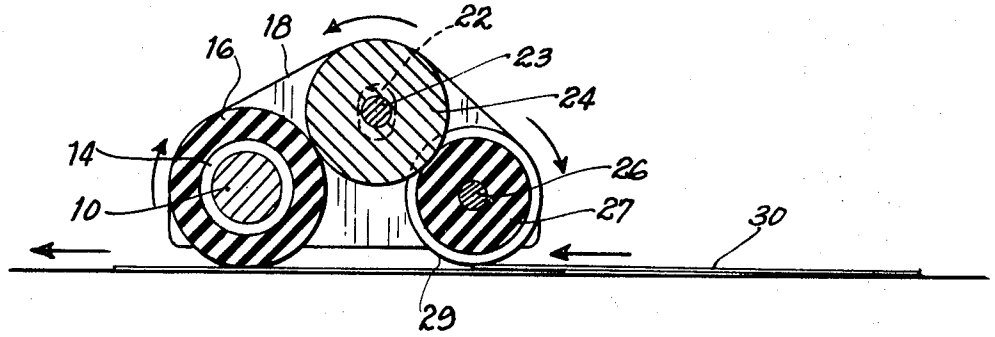
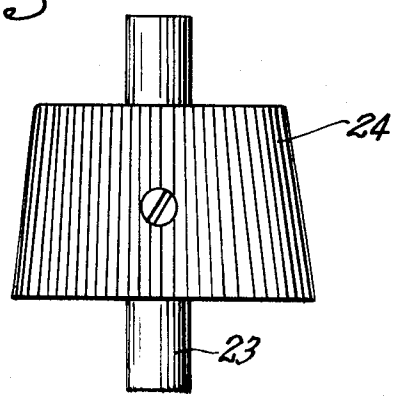


FIG. 3



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MEANS FOR FEEDING SHEET PAPER INTO MACHINES

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ABSTRACT OF THE DISCLOSURE

In accordance with my invention I provide roller means for frictionally engaging sheets of paper or the like and propelling the same angularly in a direction to engage a guide rail whereby the sheets are caused to be separated and accurately alined for entry into a machine which is to operate on the sheets.

This invention relates to means for separating and feeding sheets of paper into machines, such as printing presses, duplicating machines, folding machines, letter opening machines, and the like, wherein it is required that each sheet be separated from a stack and be guided into such machines accurately at a right angle to the point of entry.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a top plan view, partly in cross-section, of a sheet paper feed means, in accordance with my invention;

FIG. 2 is a cross-sectional view taken substantially on line 2—2 of FIG. 1; and

FIG. 3 is a plan view, on an enlarged scale, of a structural detail utilized in my invention.

Referring to the drawings, the numeral **10** indicates a drive shaft suitably journalled for rotation in a bearing **11** supported in a frame member **12** and having fixed thereon at one end a pulley **13** operatively connected by means of a belt, not shown, to a motor. Circumposed about said shaft is a conventional overthrow clutch **14** on the outer periphery of which is secured a cylindrical roller **16** formed of rubber or similar material. The shaft **10**, of course, rotates continuously and the clutch **14** is activated in synchronism with components of the machine, not shown, with which the feed means is associated so that sheets of paper are fed into the machine according to a predetermined cycle of operation.

A pair of frame members **17** and **18** generally triangular in form are secured to bushings **19** and **21** through which the shaft **10** passes. As will be seen clearly in FIG. 1, each of the frame members **17** and **18** is bent intermediately to form two arms providing an obtuse angle therebetween. Corresponding arms of the frame members are in parallel relation.

The frame members **17** and **18** are provided with registering vertically elongated slots **22** and received in said slots are the opposite ends of a shaft **23** on which is fixed a frusto-conical idler roller **24** formed preferably of metal. The bent arms of the frame members **17** and **18** are perforated to journal a shaft **26** on which is fixed intermediately thereof a rubber roller **27** substantially in registration with the frusto-conical roller **24**. As will be seen in FIG. 2, the roller **24** which has a knurled surface is adapted for vertical movement within the limits of the slots **22** and normally rests on the rollers **16** and **27** in peripheral engagement therewith. Identical rubber rollers **28** and **29** are secured to the opposite ends of the shaft **26** exteriorly of the arms of the members **17** and **18**. The outer rollers **28** and **29** are of somewhat larger diameter than the intermediate roller **27** and said outer rollers are adapted to engage the sheets of paper **30** as they are sequentially delivered to said rollers to be propelled in the direction of the arrows, as will be hereinafter explained.

The frame members **17** and **18** are free to pivot about the axis of shaft **10** so that the entire assembly may rock freely about the axis of said shaft and at least a portion of the weight of the assembly rests on each sheet when it is engaged by the rollers **28** and **29**.

A guide rail **31** in the form of a blade or bar is disposed substantially at a right angle to the axis of shaft **10** and serves to properly aline the sheets for entry into the machine which is to operate on the sheets.

In operation, sheets of paper are delivered by conventional means to the feed means in the manner illustrated in FIG. 1, to a point where the leading edge of the sheet **30** is engaged by roller **28** which in this instance is the roller in closer proximity to the guide rail **31**. In this position, the sheet **30** is in condition to be frictionally engaged by the roller **28** so that when the overthrow clutch **14** is actuated causing the roller **16** to rotate, the roller **24** and correspondingly the pair of rollers **28** and **29** are also rotated. The sheet **30** is caused to be moved in the direction indicated by the arrows towards the guide rail **31**. The direction of movement of the sheet is angular in relation to the guide rail, so that as the sheet advances to the left, as viewed in FIG. 1, the edge of the sheet in closer proximity to the guide rail finally completely abuts the guide rail and moves in parallel alinement therewith. Of course during the major part of its travel, the sheet is engaged and propelled by all three rollers **16**, **28** and **29**. However, in the final portion of its travel it is propelled only by roller **16**, the axis of which is at right angles to the guide rail so that the alinement of the sheet is not disturbed. Thus, as the sheet is discharged from the feed means, it is accurately alined for entry into the machine associated therewith for subsequent operations on the sheet.

The roller **16** driven by pulley **13** through overthrow clutch **14** normally rotates at a speed which is substantially less than the rotational speed of the first operating roller of the machine with which the present device is associated. At the instant that the leading edge of a sheet of paper is nipped by such operating roller the sheet is caused to travel at a faster rate, as determined by the operating roller. Since roller **16** is driven by the overthrow clutch **14**, it is free to rotate at a speed greater than normal, which results from contact of roller **16** with the paper sheet. By reason of the abrupt change in speed of roller **16**, roller **24** is caused to be thrown upwardly effecting momentary disengagement of roller **24** from rollers **16** and **27** and for that interval cutting off power to rollers **27**, **28** and **29** which continue to rotate during such interval but under the influence of the paper sheet then in contact with rollers **28** and **29**. I have found that the action of rollers **16**, **28** and **29**, in consequence of the abrupt changes of rotational speed, results in more effective separation of the sheets of paper being fed into the associated machine.

It will be understood that the use of a conical roller in combination with cylindrical rollers will result in relative slippage between the rollers. Such slippage, of course, is permitted by reason of the mounting of the shaft **23** in the elongated slots **22**.

It will be understood that the disposition of the angle of the axis of the rollers **28** and **29** in relation to the guide rail may be varied, as desired, depending upon the angle at which it is desired to move the paper into engagement with the guide rail.

It will be understood that various changes and modifications may be made from the foregoing without de-

parting from the spirit and scope of the appended claims.

I claim:

1. In combination a guide rail, sheet paper feed means comprising, a cylindrical drive roller rotatable on an axis disposed at a right angle to said guide rail, a cylindrical sheet paper feed roller rotatable on an axis disposed in angular relation to said drive roller, a conical intermediate roller in operative engagement with said drive and feed rollers and arranged to transmit rotational movement from said drive roller to said feed roller, said feed roller being adapted to engage a paper sheet and to move the same in a direction to engage said guide rail and thereafter to move said sheet in a direction parallel to said guide rail.

2. The invention as defined in claim 1 in which the drive roller is driven through an overthrow clutch.

3. The invention as defined in claim 1 including a frame supporting said intermediate and feed rollers, said frame being rockable about the axis of said drive roller.

4. The invention as defined in claim 3 in which the intermediate roller is journalled in vertically elongated slots for limited vertical movement.

5. The invention as defined in claim 3 in which the feed roller includes a pair of spaced cylindrical roller segments outside of said frame.

6. The invention as defined in claim 3 in which the feed roller includes a center segment in engagement with said intermediate roller and a pair of spaced cylindrical segments outside of said frame.

7. The invention as defined in claim 1 in which the intermediate roller comprises a plurality of segments each independently rotatable.

8. In combination a guide rail, sheet paper feed means comprising a drive shaft having its axis at a right angle to said guide rail, an overthrow clutch carried on said shaft, a cylindrical feed roller circumposed about said clutch, a pair of frame members rockably supported on said shaft, each of said frame members having an arm bent in a direction away from said guide member with said arms being in substantially parallel relation, a shaft journalled in said arms and having a cylindrical roller portion fixed centrally thereof and a cylindrical feed roller portion at each end, each of said arms having a vertically elongated slot with said slots being in registration, a conical roller carried on a shaft, the ends of which are received in said slots, said conical roller being in operative engagement with said feed roller and with said central roller portion, said feed rollers when driven being adapted to engage a paper sheet and to move the same in a direction to engage said guide rail and thereafter to move said sheet in a direction in parallel alinement with said guide rail.

9. The invention as defined in claim 8 including associated roller means for nipping the leading edge of a paper sheet after passing under said first mentioned feed roller and accelerating the movement of said sheet whereby the abrupt change in linear speed of said sheet effects momentary disengagement of said conical roller from said feed roller and said feed roller portions to momentarily change the rotational speed of said feed roller and feed roller portions to effect separation of sheets being fed by said feed means.

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U.S. Cl. X.R.

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