March 25, 1941. P. W. CHAPMAN ET AL 2,236,366

MACHINE FOR TREATING PAPER

Filed Nov. 2, 1938 2 Sheets-Sheet 1

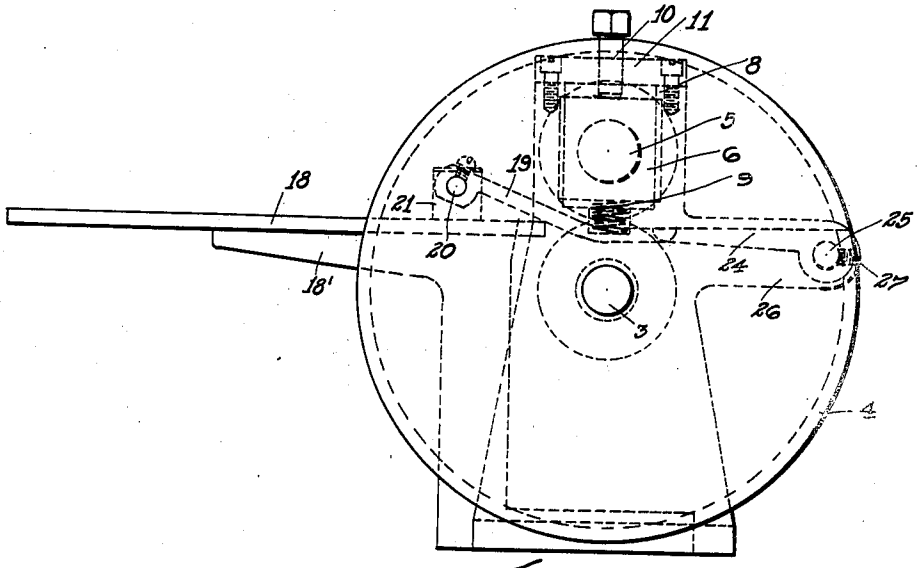


Fig. 1.

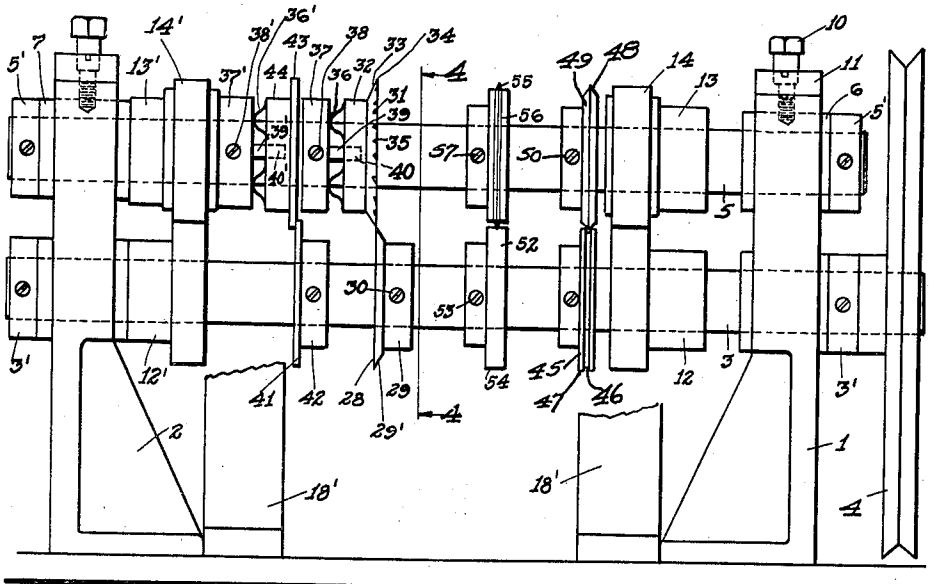


Fig. 2.

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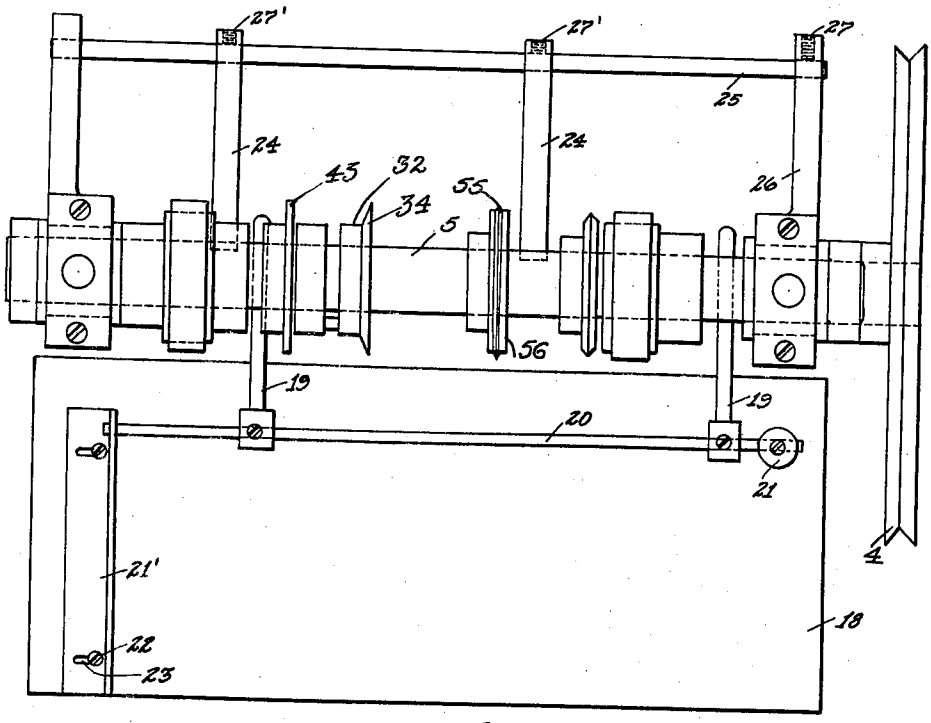


Fig. 3.

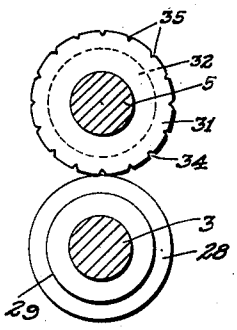


Fig. 4.

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MACHINE FOR TREATING PAPER

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Application November 2, 1938, Serial No. 238,428

1 Claim. (Cl. 164—61)

The present invention relates to improvements in machines for treating paper, cardboard and the like and is directed particularly to an improvement in perforating paper or other similar material.

In the perforation of paper the perforations are generally made by punching, as for example in the Hicks Patent No. 622,682, in which the cooperating rollers between which the paper to be perforated is to be passed have cooperating prongs and slots which form the desired shape of perforation by the shape of the prong. Such apparatus is satisfactory where the perforations extend transversely of the web of paper passing through the machine. Where the perforations extend longitudinally, as for example, to provide for subsequent tearing of the web longitudinally, such an arrangement is impractical, since it will not perforate the paper in such a manner as to leave a substantially smooth torn edge. One of the principal features of the present invention is to provide for perforating a paper web longitudinally thereof.

Slitting means in which two annular disks rotate on parallel axes, and the peripheries of the disks overlapping provide for cutting paper, are well known, but invariably these disks are mounted rigidly in axial relation to each other to assure a suitable cutting of the paper. A further feature of the present invention is to mount a perforating or slitting cutter so that it will be held resiliently against the cooperating cutter and assure a positive cutting action, since the cutting edges will be in proper engagement with each other.

In connection with this resilient mounting of the perforating or slitting structure, the present invention also provides for adjustment of the perforator or slitter relative to other perforating, slitting, creasing or scoring structures, so that the transverse spacing of the perforations, slits, scores or creases on the web of the paper may be adjusted to any extent.

Other and further objects and advantages of the invention will hereinafter more fully appear from the following description taken in connection with the accompanying drawings in which—

Fig. 1 is an end elevation of a machine embodying the invention.

Fig. 2 is a front elevation of the machine of Fig. 1 with the table removed.

Fig. 3 is a plan view of the machine of Fig. 1.

Fig. 4 is a fragmentary sectional view along the line 4—4 of Fig. 2.

Like reference characters refer to like parts in the different figures.

With reference to Figs. 1 and 2, the machine has spaced uprights 1 and 2 in which is journalled a horizontal shaft 3 having mounted on the end thereof a driving pulley 4. Directly above the shaft 3 is a shaft 5, the ends of which are journalled in boxes 6 and 7, vertically slidable in guideways 8, Fig. 1, provided by the uprights. A coil spring 9 urges each of the boxes upwardly and an adjustable clamping screw 10, positioned in a cross bar 11 above each of the boxes, provides for adjustment of the spacing between the parallel shafts 3 and 5. The shaft 3 has collars 3' applied thereto directly outside of the uprights 1 and 2 to hold the shaft against endwise movement, and similar collars 5' are provided on the shaft 5.

The shafts 3 and 5 have cooperating feed rollers 12 and 13 thereon, one of which has a rubber ring 14 extending therearound. The ring is engageable with the periphery of the other roller for rotation of the shafts in unison. In the structure shown, the shafts 3 and 5 have other similar feed rollers 12' and 13', the latter having a rubber ring 14' for more positive rotation of the shafts, and for advancing the sheet or web through the machine.

As shown in Figs. 1 and 3, a table 18 is supported on brackets 18' secured to the same support as the uprights 1 and 2, and has its upper surface substantially in line with the point of contact between the rubber rings 14 and 14' and the cooperating feed rollers 12 and 12', and paper, or other material, is fed from this table underneath projecting arms 19 extending from a shaft 20 turnable in lugs 21 and 21' on the sides of the table. The ends of the arms 19 extend between and beyond the shafts 3 and 5, as shown in Fig. 3. The lug 21' forms a paper guide and is adjustable laterally on the table 18 by means of screws 22 engaging in slots 23 in the lug.

Arms 24 secured to a shaft 25 journalled in projecting elements 26 on the uprights 1 and 2 on the delivery side of the device have their free ends extending inwardly between the shafts 3 and 5 for supporting paper, or other material, as it is discharged from the device. A set screw 27 holds the shaft 25 in adjusted position and a set screw 27' holds each arm in adjusted position on the shaft.

For perforating the paper passing between the shafts 3 and 5 the former has therein a disk 28 having an integral hub 29, the disk being held in position by a set screw 30. The shaft 5 has a

disk 31 slidable thereon and having an integral hub 32, one surface 33 of the disk being beveled to form an outer circumferential cutting edge 34. The edge 34 is provided with spaced notches 35, Fig. 4, which are deep enough so that the bottoms of the notches do not overlap the outer edge of the disk 28 when the machine is in operative position. Thus, as the paper or other material passes between the shafts, the action of the cutting edge 34 in cooperation with the outer periphery of the disk 28 performs a shearing operation on the paper, leaving uncut the portions where the notches 35 are located, thereby performing a perforating operation on the paper. The disk 28 may have a beveled surface 29' to provide a sharp cutting edge, if desired.

The disk 31 is held resiliently against the disk 28 by springs 36 located between the hub 32 and a collar 37 adjustable on the shaft 5, but normally held in fixed position by a set screw 38. A pin 39 extending axially from the collar 37 engages in a recess 40 in the hub 32 to assure a rotation of the disk 31 and collar 37 in unison with the shaft 5.

Since the disk 31 and collar 37 are slidable on the shaft 5, and since the disk 28 is adjustable on the shaft 3, the position of the perforating structure axially of the shafts may be adjusted to control the position of the perforations relative to the edge of the paper. The position of the edge of the paper is controlled by the guiding lug 21' as will be apparent. Adjustment of the collar 37 toward or away from the disk 28 varies the tension of the spring 36 and thus the axial pressure of the disk 31 against the disk 28.

For slitting a web of paper passing through the device, the shaft 3 carries a disk 41 having an integral hub 42, said disk being of a diameter to assure an overlapping between the peripheral edge of this disk and a similar disk 43. The disk 43 has an integral hub 44 adjustable on the shaft 5. The two disks are placed in sidewise contact, as shown. A collar 37' normally held against movement on the shaft 5 by a set screw 38' carries a pin 39' engageable in a recess 40' in the hub 44 to assure a rotation of the disk 43 with the shaft 5. Springs 36' urge the disk 43 toward the right, Fig. 2, to hold the disks 41 and 43 against each other during a slitting operation.

The cooperating disks 28 and 31 constitute cutting disks which rotate in unison for perforating the paper or other material passing through the device. The disks are held resiliently against each other by the spring 36 and since the disk 31 is notched in its periphery, the resultant action on the paper is one of perforating with uncut sections where the notches occur. Similarly the disks 41 and 43 constitute cutting disks whose outer edges overlap and which slit the paper passing through the machine, these disks being resiliently urged against each other by the spring 36'.

In addition to the perforating or slitting structures above described, the machine may incorporate, at the same time, a structure for performing a scoring or creasing operation. To this end, the shaft 3 may have thereon a disk 45 having a circumferential groove 46 in its outer cylindrical surface 47 to cooperate with a projecting V-shaped creasing edge 48 on the periphery of a disk 49 secured, as by a set screw 50, on the shaft 5. The disk 45 is held against rotation on the shaft 3 by a set screw 51.

For scoring a web passing through the device, the shaft 3 may have a disk 52 secured thereon, as by a set screw 53 and presenting a substantially cylindrical outer surface 54 to cooperate with a peripheral scoring edge 55 on the outer periphery of a disk 56 secured against rotation on the shaft 5 by a set screw 57. Obviously, the diameter of the several disks are so controlled that the edge 48 will enter the notch 46 for creasing the web or sheet and the edge 55 will be spaced from the cylindrical surface 54 a distance materially less than the thickness of the web for scoring the web or sheet.

It will be understood that any one or more of the perforating, scoring, or creasing devices may be used separately or in combination with any of the other devices dependent upon the operation or operations to be performed at one time on the web or sheet of paper or other material passing through the device. In any event the several devices are adjustable for changing the spacing of the several operations performed. Obviously, two or more perforating devices as above described may be utilized for forming spaced lines of perforations.

We claim:

In a device for perforating paper or the like, a pair of parallel rotary shafts, a cutting disk on each shaft, said disks having their outer edges overlapping and one of said disks having spaced peripheral notches radially deeper than the amount that the cutting disks overlap, means for adjusting one of said shafts toward or away from the other, and driving means for rotating said shafts in unison, said means including a resilient ring on one of said shafts having driving engagement with the other shaft.

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