

March 4, 1958

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2,825,555

FOLDING MACHINE WITH ARTICLE GROUPING MEANS

Filed Nov. 3, 1954

5 Sheets-Sheet 1

Fig. 4

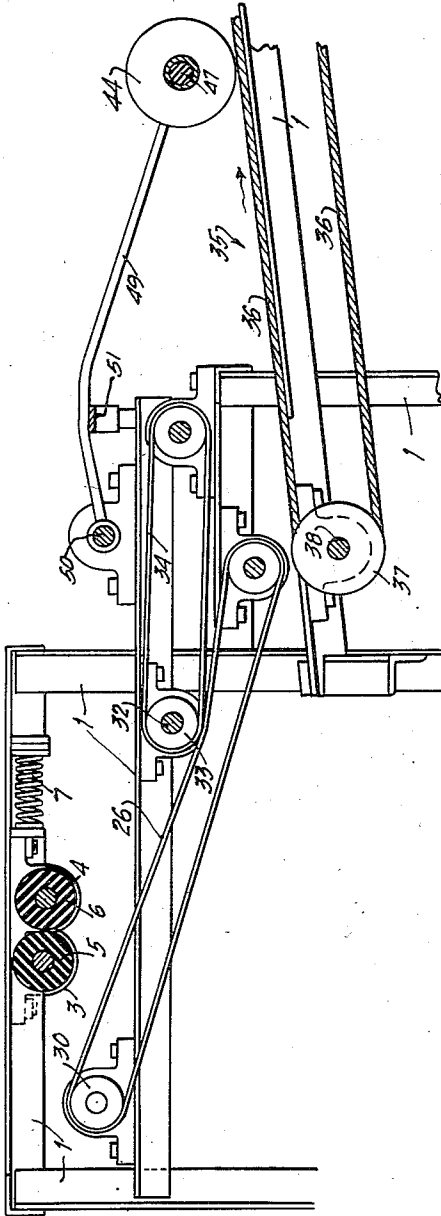
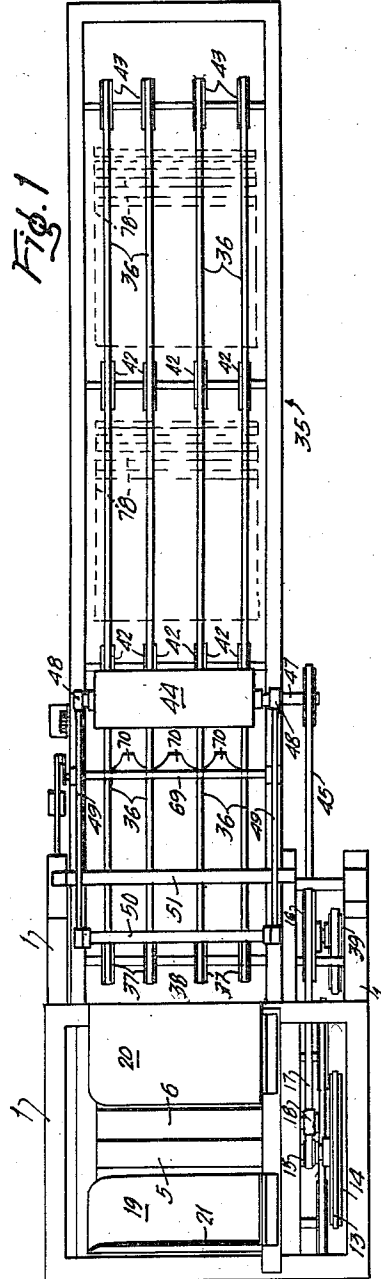


Fig. 1



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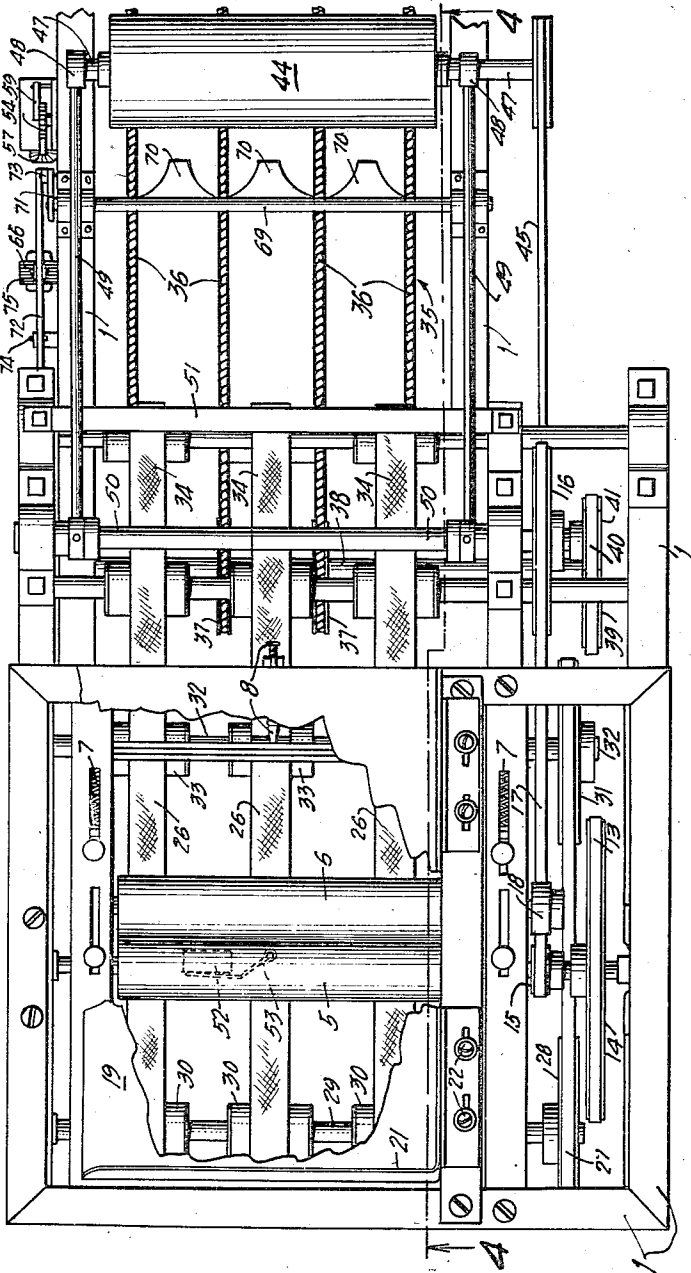


Fig. 2

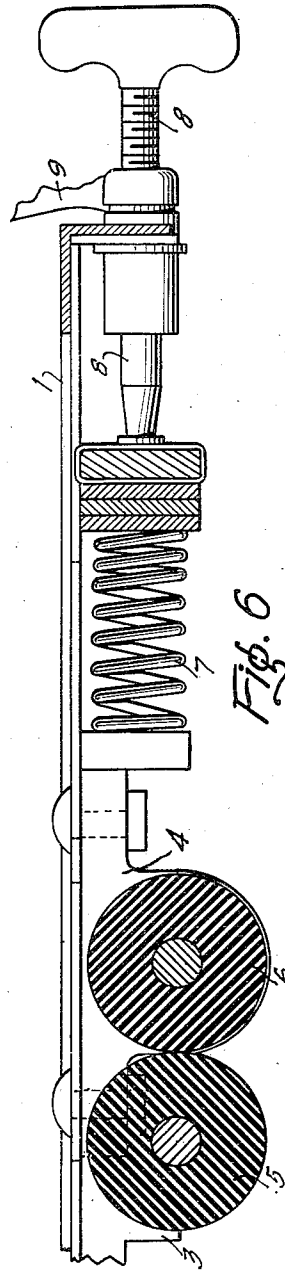


Fig. 6

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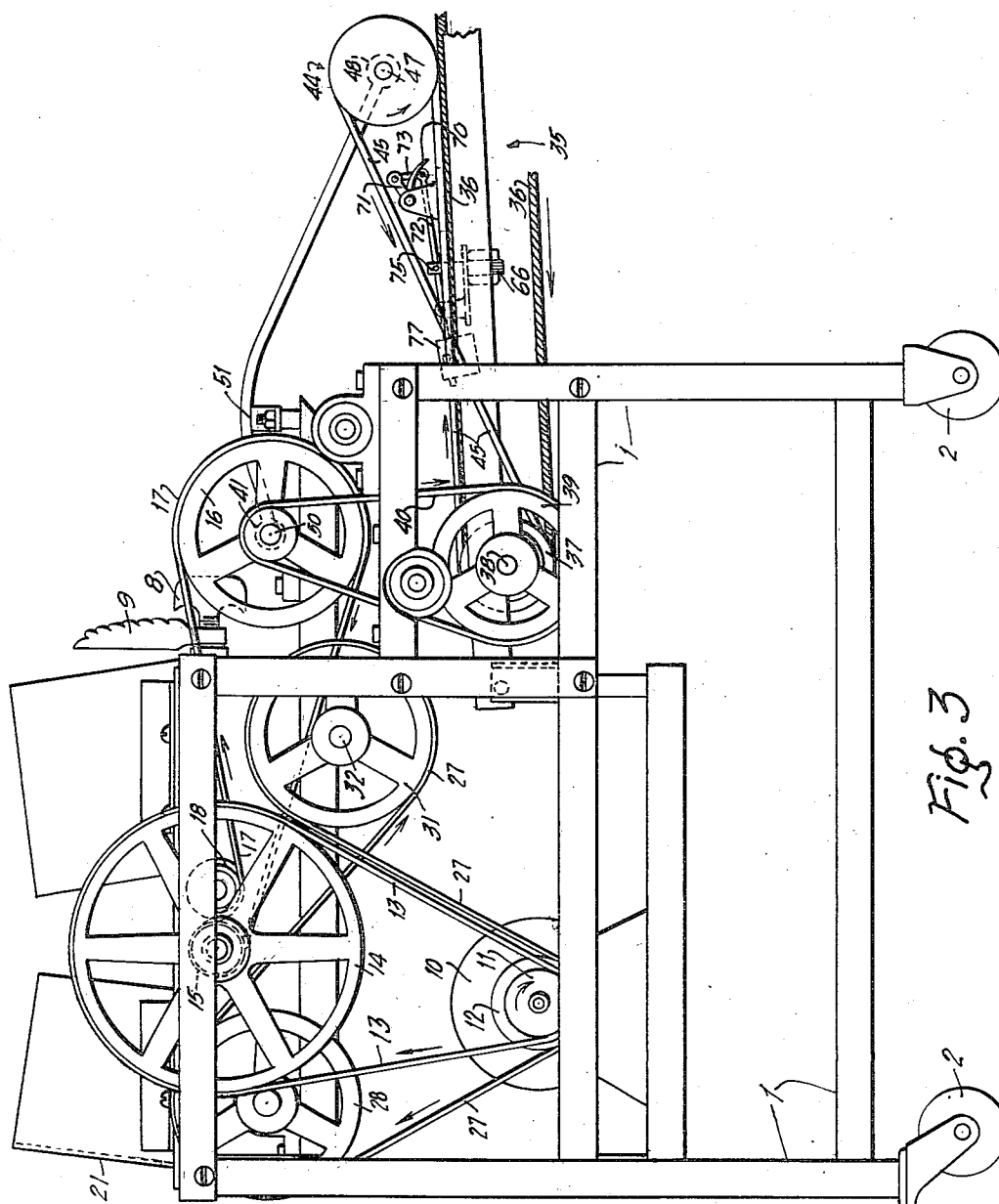


Fig. 3

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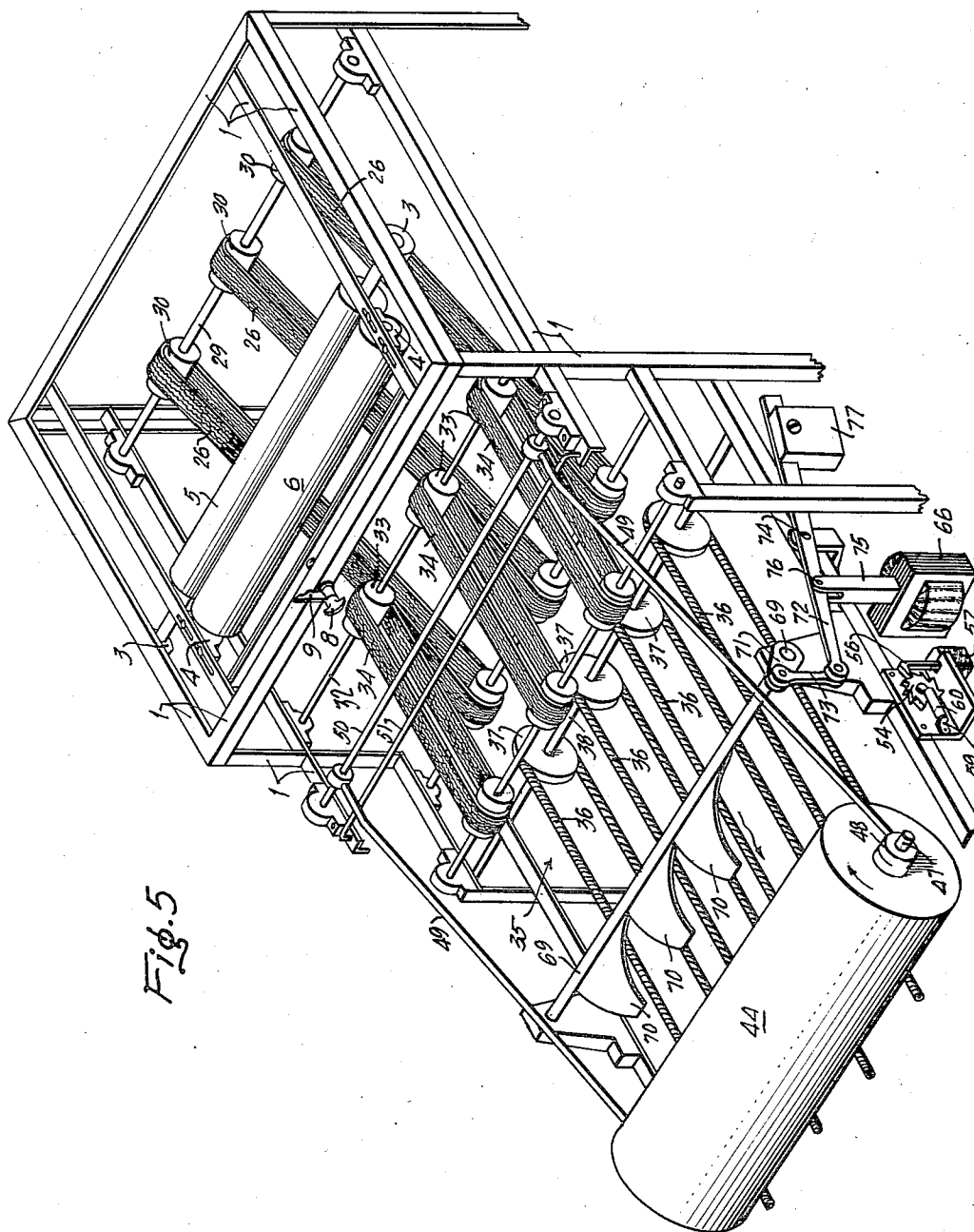


Fig. 5

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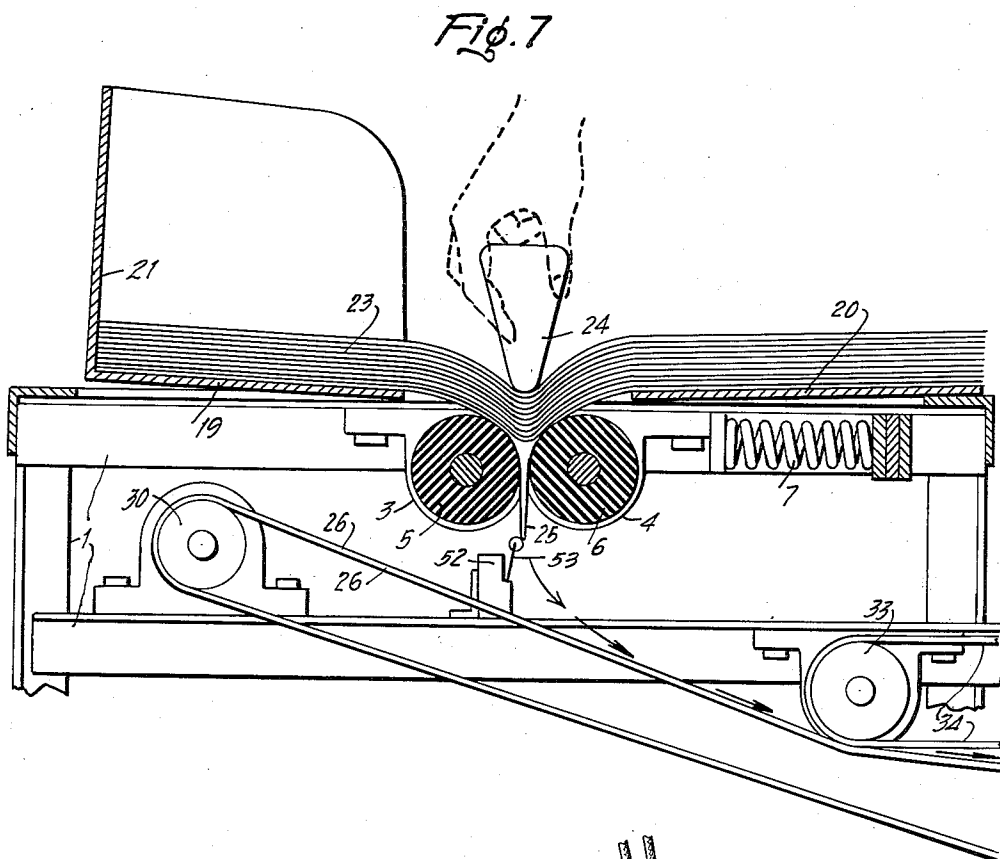
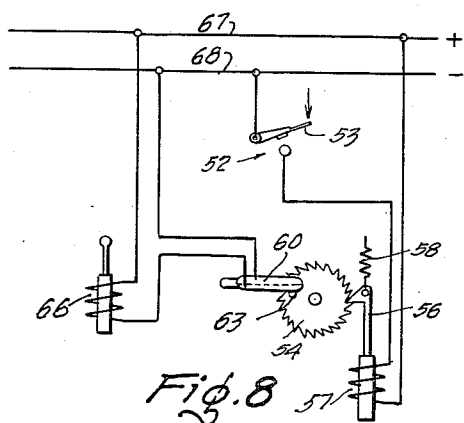
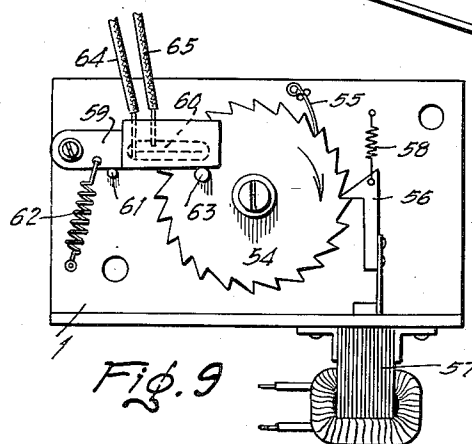
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FOLDING MACHINE WITH ARTICLE GROUPING MEANS

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FOLDING MACHINE WITH ARTICLE GROUPING MEANS

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Application November 3, 1954, Serial No. 466,553

3 Claims. (Cl. 270—68)

My invention relates to machines for folding paper, magazines, newspapers and the like.

One of the objects of my invention is to provide a machine in which a stack of paper sheets, newspapers or magazines may be positioned therein, and consecutively folded and automatically conveyed away from the folding mechanism in folded condition. Another object is to provide a device of this character which is provided with means for automatically counting the folded material. Another object is to provide a device in which the folded material will be conveyed away from the folding mechanism and deposited in separate groups, each containing a predetermined number of the folded articles so that the necessity for counting is eliminated.

I accomplish these and other objects, which will be apparent as the description proceeds, by means of the apparatus hereinafter described and illustrated in the accompanying drawings in which:

Fig. 1 is a top plan view of my machine with certain portions omitted;

Fig. 2 is an enlarged top view, with portions broken away, of the left hand end of the machine, as shown in Fig. 1;

Fig. 3 is a side elevation view, with certain portions omitted, of the portion of the machine shown in Fig. 2;

Fig. 4 is a section of Fig. 2 in the plane 4—4;

Fig. 5 is a perspective view, with certain portions omitted, of that portion of the machine shown in Figs. 2, 3 and 4;

Figs. 6 is an enlarged vertical section through the folding rollers showing the adjustable resilient means for normally urging them into tangential contact;

Fig. 7 is a vertical section view through the rollers showing how a plurality of sheets of material to be folded are positioned in the machine, to be consecutively engaged and folded by the rollers, and carried away on a conveyer positioned below the rollers;

Fig. 8 is a wiring diagram of the means for counting the folded material; and

Fig. 9 is a diagrammatic elevation view showing a detail of the counting mechanism.

Referring to the drawings:

My device comprises a suitable frame, the various portions of which are indicated by the numeral 1, and which serves to support the folding mechanism, the counting mechanism, the conveyer for carrying the folded material away, the means for separating the folded material into stacks or groups containing a predetermined number of folded specimens, and the driving motor. The device may be mounted on wheels or casters 2 (see Fig. 3) so that it is easily moved from place to place. Mounted in separate bearings 3 and 4 in the upper part of the frame is a pair of rubber rollers 5 and 6. The bearings 3 are fixed (see Fig. 5), while the bearings 4 are slidably mounted to move the roller 6 towards and away from the roller 5. Helical compression springs 7 cooperate with the slidable bearings of the roller 6 and urge this roller into tangential contact with the roller 5. The compression of the springs

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7 may be adjusted by means of the screw 8 (see Fig. 6), and 9 is a safety device which may merely be pushed to release the pressure of the springs 7 in the event that any part of the operator or his clothing becomes caught between the rollers. 10 (see Fig. 3) is a motor having pulleys 11 and 12 mounted on the shaft thereof, and the roller 5 is driven by means of said motor, pulley 11, belt 13 and pulley 14. The roller 6 is driven in the opposite direction from that of the roller 5 by means of the pulley 15 on the shaft of roller 5, pulley 16, and the belt 17 which runs over the pulley 15 and under the pulley 18 on the shaft of the roller 6.

Supported on top of the frame (see Figs. 1, 2 and 7) above the rollers is a pair of spaced platforms 19 and 20, one of which has an upstanding back 21 and which is adjustably secured to the top of the frame by means of the screws 22, whereby it may be moved towards or away from the rollers in order to position the material 23 to be folded, when placed on the platform against the back 21, so that the lines along which it is to be folded will be properly centered over the rollers. When pressure is exerted on top of the material by means of a block 24, as shown in Fig. 7, the lowermost piece will be pressed into contact with the surfaces of the rollers and be engaged and folded thereby, as shown at 25.

Under the rollers is a first conveyer, which is illustrated in Figs. 2 and 5 as comprising a plurality of horizontally spaced belts 26 which are driven by pulley 12 on the shaft of motor 10, belt 27 and pulley 28 which is mounted on shaft 29 carrying the rolls or pulleys 30 around which the conveyer belts 26 run. The belt 27 also runs around the pulley 31 and drives it in the opposite direction from the pulley 28. On the shaft 32 of the pulley 31 (see Figs. 3, 4 and 5) are mounted horizontally spaced rolls or pulleys 33 which drive conveyer belts 34. These belts overlie portions of the belts 26 and, where they run around the rolls 33, are in contact with the upper runs of the conveyer belts 26, as best shown in Figs. 4 and 7.

It will be noted from Figs. 4, 5 and 7 that the conveyer formed by the belts 26 is inclined downwardly in the direction in which they carry the folded material.

Beginning at the end of the first conveyer is a second conveyer, represented generally by the numeral 35, which is positioned to receive folded material discharged from the first conveyer. The second conveyer, as illustrated, comprises four, horizontally spaced cables 36 which run over pulleys 37 on shaft 38 having pulley 39 thereon which is driven by belt 40 from pulley 41 on the shaft of pulley 16. The second conveyer is comparatively long and is upwardly inclined; the cables 36 running over longitudinally spaced idlers 42 between the driven pulleys 37 and the end idler pulleys 43. It will be apparent from the comparative diameters of the pulleys driving the first conveyer and those driving the second conveyer that the second conveyer moves at a somewhat slower speed than the first conveyer.

Riding on the cables 36 or in very close proximity thereto, at a point substantially over the first set of idlers 42, is a comparatively heavy cylinder 44 having a knurled surface (not shown) which is driven by a belt 45 from a pulley 46 on shaft 38 carrying pulley 39. The shaft 47 of cylinder 44 is, in turn, mounted in bearings 48 which are pivotally mounted by means of the rods 49 on the shaft 50 of pulley 16 so that it may rise as the folded material is carried between it and the second conveyer. The extent to which it may drop toward the second conveyer is limited by the stop 51 (see Figs. 1, 2, 3, 4 and 5).

From the foregoing, it will be apparent that the first conveyer carries the folded material at a comparatively high rate of speed when it drops thereon from the folding rollers and delivers it to the second conveyer which is moving at somewhat slower speed so that the folded

specimens on the second conveyer are disposed in somewhat overlapped relation as they approach the cylinder 44.

In order to eliminate the necessity of counting the number of specimens which are folded and deposited on the second conveyer, I have provided a device for automatically counting them as they are delivered from the folding rollers, and have combined this counting mechanism with means for momentarily stopping the movement of the folded material on the second conveyer so that they will be arranged thereon in spaced groups each containing a predetermined number.

Referring now more particularly to Figs. 7, 8 and 9 in connection with Fig. 5, I have provided a switch 52 positioned below the folding rollers and having an actuating arm 53 which will intercept each specimen of folded material 25 as it is discharged from the folding rollers and be moved thereby. Rotatably mounted on the frame 1 is a ratchet wheel 54 having a specified number of teeth and which is provided with a spring pawl 55 to prevent free rotation thereof, and a second pawl 56 which is actuated by the solenoid 57 to move the ratchet wheel one tooth each time the switch 52 is closed. The pawl 56 is normally held in the position shown in Figs. 8 and 9 by the spring 58. Pivotaly mounted on the frame is the lever 59 which carries a mercury switch 60 and is normally held in contact with the stop pin 61 by means of the spring 62. The ratchet wheel 54 is provided with a projecting pin 63 which is positioned to contact the lever 59 upon each revolution of the wheel 54 and cause it to move counterclockwise about its pivotal connection to the frame. This causes the mercury to flow to the left in the tube and electrically connect the conductors 64 and 65 which causes the solenoid 66 to be energized from the main power lines 67 and 68.

Referring now more particularly to Fig. 5, there is pivotally mounted above the second conveyer on a shaft 69 just in advance of the cylinder 44, three fingers 70 which are normally positioned above the spaces between the cables 36 of the second conveyer but which may be swung downwardly into contact with folded material supported on the cables and stop its movement forward on the conveyer for a short interval. A crank 71 is provided on one end of the shaft 69 and is pivotally connected to the lever 72 by means of the link 73. The lever 72 is pivoted to the frame at 74 and the armature 75 of the solenoid 66 is pivotally connected to the lever 72 at a point 76 intermediate the pivotal connection 74 and the link 73. The fingers 70 are normally held above the folded material on the conveyer by means of the counterweight 77 on the lever 72.

In operation, when the fingers 70 are depressed into contact with the folded material on the conveyer, the forward movement of the material to the left of the fingers, as shown in Fig. 2, is temporarily restrained while the material to the right of the fingers, as shown in said figure, is carried forward by the conveyer and the cylinder 44 moving in contact therewith. Thus, the folded material after it has passed beneath the cylinder 44 will be separated into groups 78 each containing the same predetermined number of folded specimens, depending on the number of teeth in the ratchet wheel 54.

While I have described my invention in its preferred embodiment, it is to be understood that the words which I have used are words of description rather than of limitation and that changes, within the purview of the appended claims, may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. In a machine for folding paper, magazines, newspapers and like materials, the combination with a pair of rollers having their axes in a common, substantially horizontal plane, of resilient means normally urging said rollers into tangential contact with each other; means for

driving said rollers in opposite directions to fold material passed therebetween; means actuated by each piece of folded material discharged from said rollers for counting the pieces folded; a first belt conveyer having a portion thereof positioned to receive the pieces of folded material discharged from said rollers and carry them away; a second belt conveyer having a portion thereof positioned to receive the folded material discharged from said first conveyer; and means controlled by said counting means each time a predetermined number of pieces has been counted thereby for separating the folded material on said second conveyer into spaced groups each containing the same number of folded pieces.

2. A machine for folding paper, magazines, newspapers and like materials, and comprising a pair of rubber surfaced, parallel-disposed rollers having their axes in a common, substantially horizontal plane; the first of said rollers being mounted in fixed bearings and the second in bearings slidably mounted to move it into tangential contact with and away from said first roller; resilient means normally urging said second roller into contact with said first roller; means for supporting a plurality of superposed pieces of the material to be folded above said rollers but in close proximity thereto with the lines along which said material is to be folded disposed substantially in a vertical plane between said rollers and tangent to said first roller; whereby downward pressure on said material in said plane will force the lowermost pieces consecutively into engagement with said rollers to be folded thereby; a first conveyer positioned to receive the folded material discharged from said rollers and carry it away; a second conveyer positioned to receive the material discharged from said second conveyer; means for driving said rollers in opposite directions, said first conveyer at substantial speed, and said second conveyer at slower speed than said first conveyer; means for counting the pieces folded; a normally open switch disposed beneath and in close proximity to said rollers positioned to be momentarily closed by contact therewith of each piece of folded material as it is discharged from said rollers for actuating said counting means; and means, controlled by said counting means when a predetermined number of said pieces has been counted, and cooperating with said second conveyer, for stopping the movement of those pieces advancing on said second conveyer towards said stopping means while allowing those pieces which have passed said stopping means to continue to advance.

3. A machine for folding paper, magazines, newspapers and like materials, and comprising a pair of rubber surfaced, parallel-disposed rollers having their axes in a common, substantially horizontal plane; the first of said rollers being mounted in fixed bearings and the second in bearings slidably mounted to move it into tangential contact with and away from said first roller; resilient means normally urging said second roller into contact with said first roller; means for supporting a plurality of superposed pieces of the material to be folded above said rollers but in close proximity thereto with the lines along which said material is to be folded disposed substantially in a vertical plane between said rollers and tangent to said first rollers; whereby downward pressure on said material in said plane will force the lowermost pieces consecutively into engagement with said rollers to be folded thereby; a first conveyer positioned to receive the folded material discharged from said rollers and carry it away; a second conveyer positioned to receive the material discharged from said second conveyer; means for driving said rollers in opposite directions, said first conveyer at substantial speed, and said second conveyer at slower speed than said first conveyer; means for counting the pieces folded; a normally open switch disposed beneath and in close proximity to said rollers positioned to be momentarily closed by contact therewith of each piece of folded material as it is dis-

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charged from said rollers for actuating said counting means; a comparatively heavy cylinder rotatively mounted to ride substantially in contact with said second conveyer and driven by said driving means; said roller having a surface adapted frictionally to engage the folded pieces on said second conveyers; and means controlled by said counting means and actuated each time a predetermined number of pieces has been counted for momentarily stopping the movement of the folded pieces on said second conveyer in a zone in advance of

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said heavy roller, whereby to separate said pieces into groups each containing the same number of pieces.

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