Sept. 6, 1932. H. H. RAWSON 1,875,655

PAPER FOLDING MACHINE

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Fig. 3

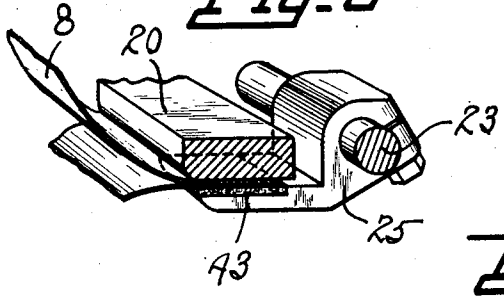
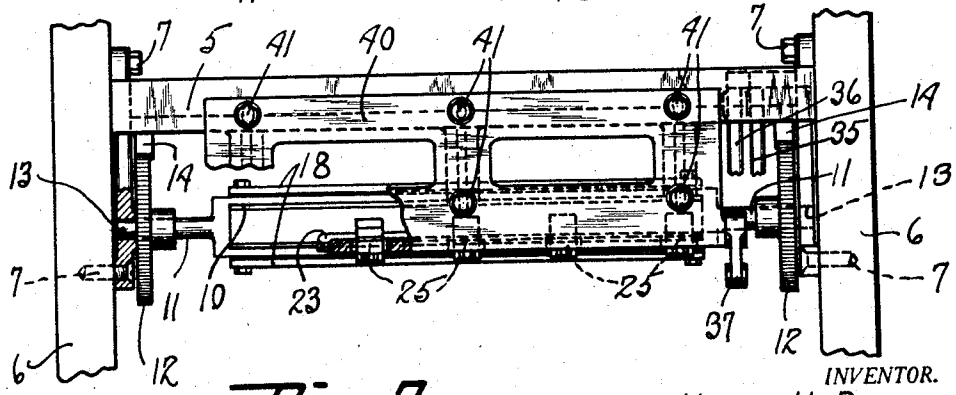


Fig. 1

Fig. 2



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Fig. 4

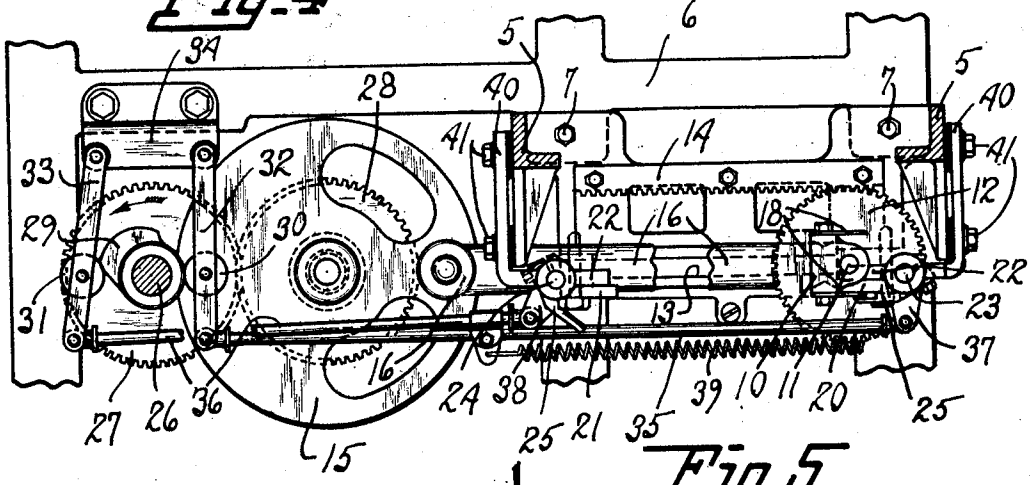


Fig. 5

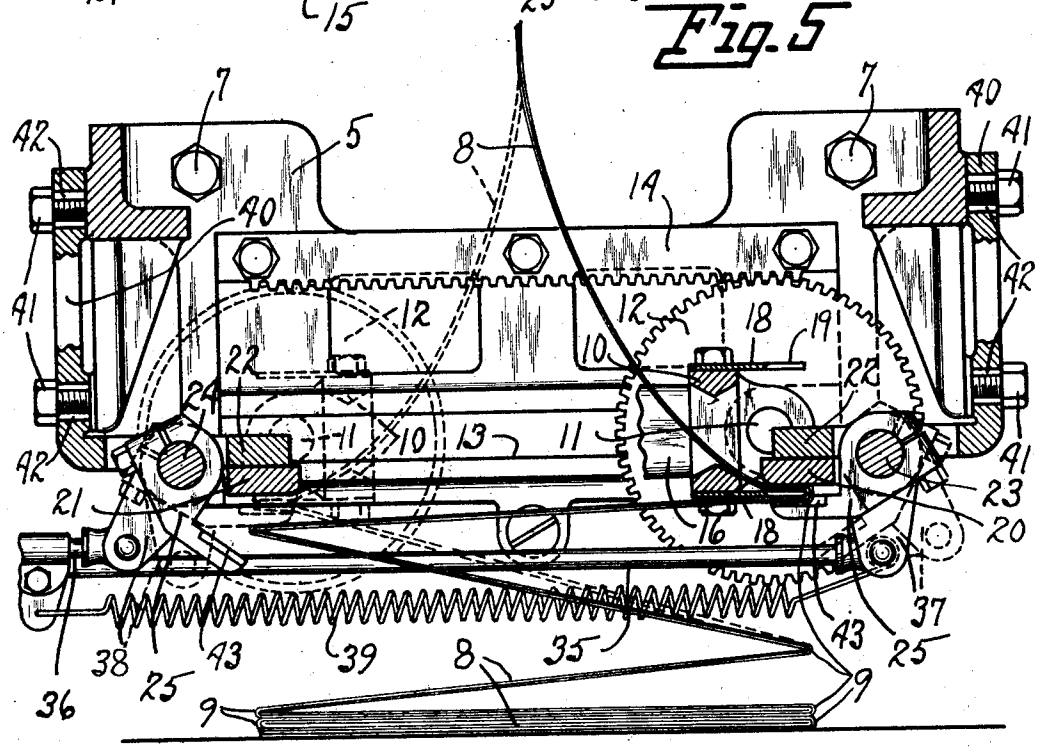
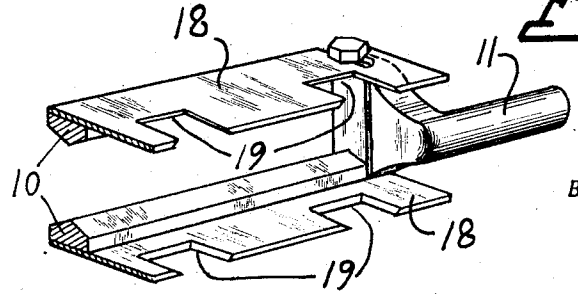


Fig. 6



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UNITED STATES PATENT OFFICE

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PAPER FOLDING MACHINE

Application filed August 17, 1931. Serial No. 557,448.

My invention relates to paper folding machines and the principal objects of the invention are to provide machine embodying reciprocative folding elements operating in conjunction with intermittent holding or grasping elements whereby paper is rapidly folded over and is prevented from displacement at all times during the folding operation. Further objects of the invention are to provide a machine of comparatively simple construction, that is direct and positive in operation, which embodies certain adjusting features, and which is comparatively inexpensive to manufacture and operate.

With the above and other objects in view which will appear as the description proceeds, the invention consists of the novel construction, adaptation, combination and arrangement of parts hereinafter described and claimed. These objects are accomplished by devices illustrated in the accompanying drawings; wherein:

Figure 1 is a plan view of the machine with parts broken away or omitted for the reason that both sides of the machine are identically the same in construction;

Fig. 2 is a view in end elevation of the machine;

Fig. 3 is a detail view in perspective showing one of the paper gripping fingers;

Fig. 4 is a view in vertical section of the machine taken substantially on a broken line 4, 4 of Fig. 1;

Fig. 5 is an enlarged view in vertical section showing the folding elements of the machine in operation; and

Fig. 6 is a fragmentary detail view in perspective showing a portion of one of the rectangular folding members.

Referring to the drawings throughout which like reference numerals designate like parts, the machine comprises a rectangular frame 5 which is secured to a printing press frame 6 by means of bolts 7 or the like. Although not shown in the drawings, it will be understood that the paper 8 is supported in the form of a large roll at the further end of the printing press and is fed therefrom through a perforating machine disposed immediately above the folding machine and which perforating machine is so constructed and timed that the paper is perforated transversely at equally spaced lengths and at points in exact conformity with the lines along which the paper is folded, as at 9 in Fig. 5.

The paper 8 is first fed into the folding machine through a rectangular folding member 10. Said member has a stub shaft 11 fixed to each end thereof and said stub shafts are centrally secured through large gear wheels 12. The outer projecting ends of said stub shafts are slidably mounted in guide slots 13 formed in the frame 5. Rack bars 14 are secured to said frame and their teeth are in mesh with said large gear wheels.

The folding machine receives its power from the printing press mechanism by any suitable connecting means (not shown) and whereby rotary movement is imparted to drive wheels 15 mounted on the press frame 6. Said drive wheels each have an arm 16 pivotally and eccentrically connected thereto and whose other ends are connected to the stub shafts 11 of the folding members 10, as at 17, one of which arms is most clearly shown in Fig. 1 of the drawings. Said drive wheels are of such dimensions that one revolution thereof draws the folding member, by means of its connecting stub shafts and arms, the full length of the guide slots 13. In so doing the gears 12, by reason of their engagement with the rack bars 14, are caused to turn one-half revolution, and said folding member being fixed to said gears is likewise caused to turn one-half revolution.

The folding member 10 has a flange plate 18 fixed to both its upper and lower faces and said plates are provided with spaced apart notches 19. Bars 20 and 21 are secured transversely of the folding machine frame 5 at either end thereof respectively and in cooperative relation with the folding member. Said bars are secured to transverse supports 22 extending from one side of the frame to the other. Finger supporting shafts 23 and 24 have their ends respectively journaled in bearings adjacent the ends of said bars and a plurality of fingers 25 are fixed to said shafts in engageable relation with said bars and are

spaced apart to register with the notches 19 of the folding member flange plates 18.

The finger supporting shafts 23 and 24 are operated from a cam shaft 26 extending across the machine and having a gear 27 fixed to each end portion thereof and in mesh with gears 28 fixed to the drive wheels 15. Cams 29 are secured to said shaft adjacent the gears 27. Referring to Fig. 4, said cams are arranged to engage diametrically opposite rollers 30 and 31 that are respectively carried by arms 32 and 33 pivotally connected to brackets 34 secured to the press frame 6. A lever rod 35 is connected to the arms 32 and a corresponding lever rod 36 is connected to the arms 33. The remote ends of said lever rods are respectively connected to crank arms 37 and 38 which arms are respectively fixed to the finger supporting shafts 23 and 24. It will thus be apparent that said finger shafts are caused to turn alternatively and in opposite directions, or in other words the fingers 25 on the shaft 23 are caused to engage the bar 20 while at the same time the fingers 25 on the shaft 24 are retained in disengagment from the bar 21.

In the operation of my folding machine, the paper 8 is first passed through the opening in the rectangular folding member 10 and around the outer end of the lower flange plate 18 and is placed in the grasp of the fingers 25 on the shaft 23. Said fingers clamp the paper against the bar 20 between the notches 19 of the flange plate 18. Referring to Fig. 5, one-half revolution of the power drive wheels 15, shown in Fig. 4, moves the gears 12 from the full line position to the dotted position. In so moving said gears turn one-half revolution and carry the rectangular folding member around one-half turn. Said folding member will thus carry the paper horizontally the length of the machine causing it to bend at its next perforated line 9 and delivering the paper in a position whereby it is grasped by the fingers 25 on the shaft 24, and whereupon the fingers 25 on the shaft 23 release their hold on the paper.

On the next half revolution of the drive wheels 15 the gears 12 and the folding member 10 are caused to turn one-half revolution in the opposite direction in the slidable movement of the stub shafts 11 upon carrying said gears and folding member back to its original full line position shown in Fig. 5. The paper is thus delivered back under the bar 20 and is then again grasped by the fingers 25 on the shaft 23 whereby it is again folded and along its next perforated line 9. It will thus be seen that this back and forth movement of the rectangular folding member will continue to fold the paper along its perforated lines as long as the machine is in operation.

For the purpose of retaining the rollers 30 and 31 in constant engageable relation with the cams 29, springs 39 have their respective ends secured under tension to the lever rods 35 and 36 as will be understood. The finger supporting shafts 23 and 24 have their ends journaled in brackets 40 that are secured to the outer ends of the frame 5 by means of bolts 41 passing through slots 42 in said brackets. Said shafts may therefore be raised or lowered by manipulation of said bolts and the fingers 25 are thus caused to be brought into snug or loose engagement with the paper 8 as desired. Referring to Fig. 3, a leather insert 43 is provided for the fingers 25 for the purpose of preventing the paper from being pulled from the grasp of said fingers while the folding member 10 is in the act of placing the paper on the opposite sides of the machine.

In the foregoing description the folding mechanism has been described throughout as dual in character and it will be understood that in Figs. 1 and 2 of the drawings the folding elements on the left have been omitted for the sake of clearness and simplicity. Having thus described my invention, it being understood that minor changes in its construction and arrangement may be resorted to without departing from the scope and spirit of the invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. The combination with a printing press frame of a paper folding machine arranged to be driven by the mechanism of the printing press, said folding machine comprising a frame secured to the printing press frame, a rectangular folding member having an opening therethrough, gears fixed to the ends of the folding member, the projecting ends of said folding member slidably disposed in guide slots formed in the folding machine frame, rack bars secured to said frame and meshing with said gears, drive wheels mounted on the press frame, an arm eccentrically connected to each of said drive wheels and to the ends of the folding member whereby said member is caused to reciprocatively move the length of the guide slots and to make a half turn in alternatively opposite directions at each reciprocative movement thereof, a flange plate secured to the upper and lower faces of the folding member and having spaced apart notches in their outer edge portions, a bar secured transversely of the folding machine frame adjacent the ends of the guide slots, finger supporting shafts mounted adjacent said bars and parallel therewith, adjusting means for said shafts, a plurality of fingers fixed to said shafts in spaced relation to register with the notches in the folding member flange plates, frictional inserts for said fingers, and means whereby said finger supporting shafts are caused to alternatively turn and whereby the fingers at each end of the machine are caused to move into engagement with the particular transverse bar that is adjacent the folding member in its reciprocative movements.

2. A folding machine having in combination a frame, a rectangular folding member having an opening therethrough, a gear fixed to each end portion of the folding member, said folding member mounted for reciprocative movement in guide slots, rack bars for the frame meshing with the gears whereby the folding member is adapted to turn a half revolution at each reciprocative movement, a flange plate secured to the upper and lower faces of the folding member and having spaced apart notches therein, a bar secured transversely of the frame adjacent the ends of the guide slots, a finger supporting shaft mounted adjacent and parallel with each of said bars, fingers fixed to said shafts in spaced relation to register with the notches in the folding member plates, the fingers on one of said shafts adapted to engage their adjacent bar upon the approach of the folding member in its reciprocative movement, and the fingers on the other shaft adapted to disengage themselves from their adjacent bar upon receding movement of the folding member.

3. A paper folding machine having in combination a frame, a rectangular folding member having an opening therethrough, rack bar and gear means whereby said folding member is adapted for both rotary and reciprocatory movement, a bar disposed transversely of the frame at either end of the path of movement of the folding member, a shaft having fingers fixed thereon disposed adjacent each of said bars, and said shafts adapted to revolubly bring their fingers into engagement with their adjacent bars upon the approach of the folding member in its reciprocatory movement.

4. In a paper folding machine the combination of a rectangular folding member adapted for both rotary and reciprocatory movement, of a finger carrying shaft disposed at either limit of movement of the folding member and a bar for engagement by the fingers adjacent each shaft, and said shafts adapted to move their fingers into engagement with the bars upon the approach of the folding member in its reciprocating movement.

In testimony whereof I affix my signature.

HARRY H. RAWSON.