

Sept. 22, 1931.

C. L. BURDICK

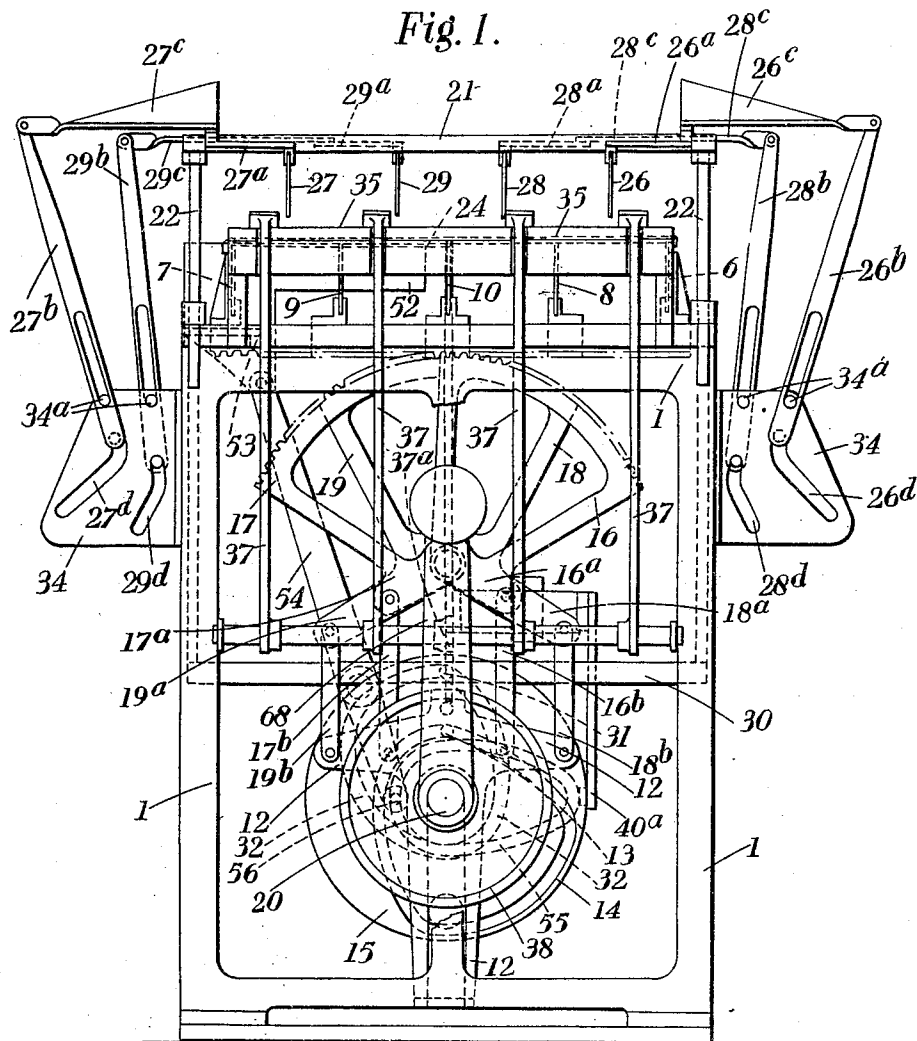
1,824,073

PAPER FOLDING MACHINE

Filed Dec. 11, 1929

3 Sheets-Sheet 1

Fig. 1.



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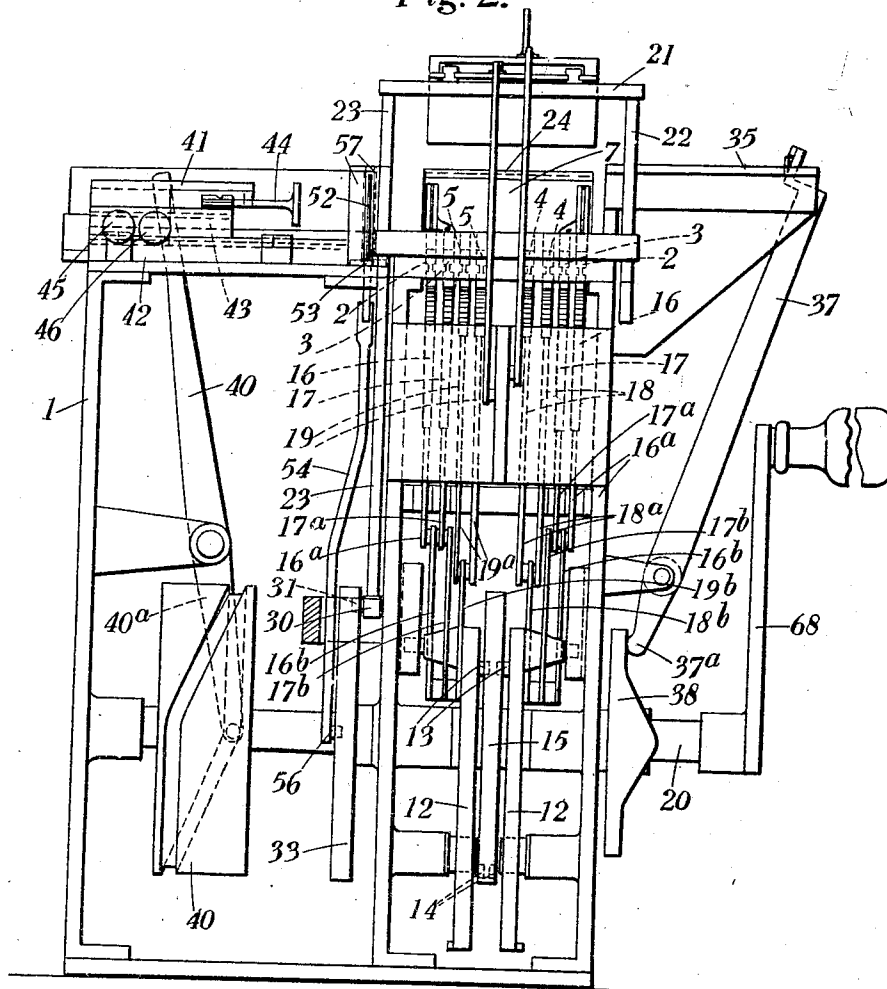
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3 Sheets-Sheet 2

Fig. 2.



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3 Sheets-Sheet 3

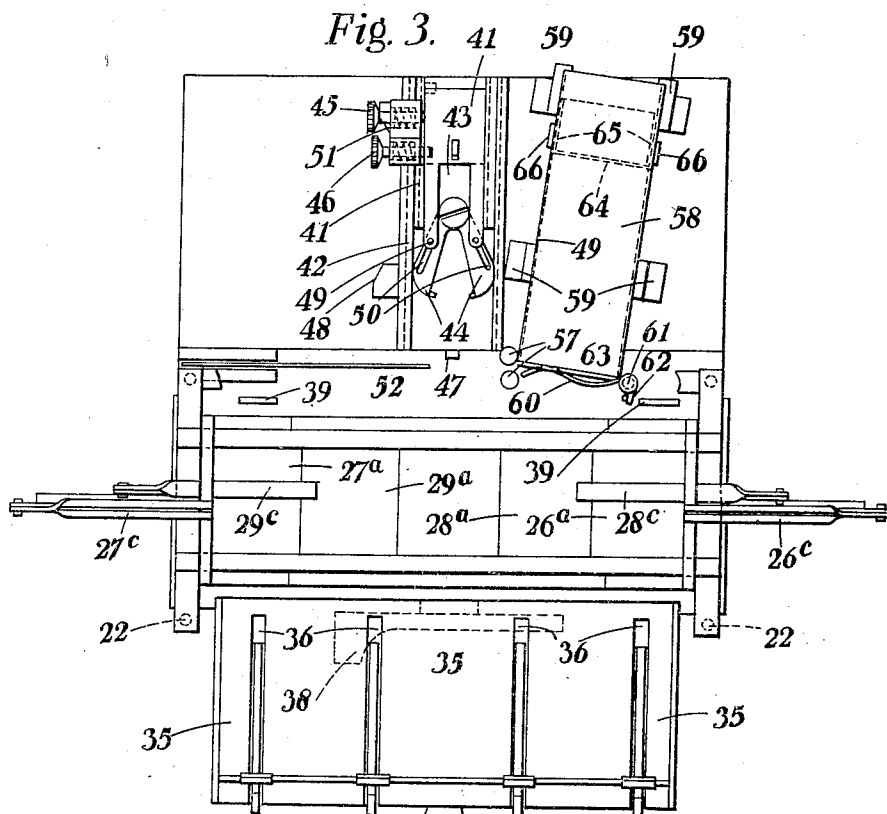
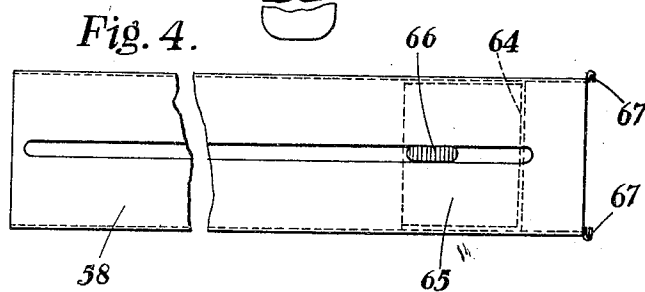
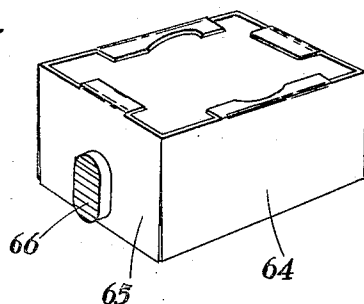


Fig. 5.



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UNITED STATES PATENT OFFICE

CHARLES LAURENCE BURDICK, OF LONDON, ENGLAND

PAPER FOLDING MACHINE

Application filed December 11, 1929, Serial No. 413,352, and in Great Britain December 21, 1928.

My invention relates to machines for folding sheets of paper, and more especially to folding currency notes, but may be used for folding circulars, invoices, statements of account, and generally where manual labour is employed for folding sheets of paper.

An object of the invention is to provide means for securing the folded sheets, such as currency notes, in a container or box from which they may be delivered by suitable mechanism in paying wages, giving change from money received and the like, the filled container being removed from the present machine and used as a delivery reservoir for the wage-paying or like machine.

Another object is to provide improved folding mechanism and further objects are generally to provide an improved machine for folding and delivering paper sheets and to co-ordinate and facilitate the various necessary operations as hereinafter described and claimed.

The invention is illustrated in its preferred form by the accompanying drawings, whereof:—

Figure 1 is a side elevation,

Figure 2 an end elevation,

Figure 3 a plan,

Figure 4 is an elevation of the folded sheet receiving box to a larger scale, and

Figure 5 is a view of a spring-pressed plunger or movable bottom used therein to a further enlarged scale.

As illustrated, the frame work or table 1 of the machine carries slideways for sliding bars 2, 2, 3, 3, 4, 4 and 5, 5 formed upon their undersides with rack teeth 2'. These bars carry vertical upstanding blades marked respectively 6, 7, 8 and 9, and are engaged respectively by pairs of toothed segments 16, 17, 18, and 19.

It will be observed that the outer blades 6 and 7 have to move about twice the distance that the inner blades 8 and 9 have to move to bring them all together against the fixed central blade 10. Accordingly the segments 16 and 17 subtend proportionately greater angles and have greater movement about the axis 11. Each segment is formed with a lever arm (16a, 17a, 18a, 19a) of

which the two former pairs are short and the two latter pairs long and are connected by links 16b, 17b, 18b, 19b to a vertically movable T-shaped slotted member 12 engaging by pins 13, 13 in the paths 14 of cam 15 mounted on the main shaft 20, whereby racking together of the blades towards the central blade 10 may be accomplished at the appropriate time in the cycle of operations.

Secured by its ends to the two outermost blades 6 and 7 is an apron or web 24, which may be made of any strong flexible material; this apron may be clamped to the outer blades so as to be easily removable, and is made of a suitable length to be fully extended when the outermost blades are at their farthest distance apart.

Mounted in the framework 1 is a carrier comprising a bracket 21 in a horizontal position above the extended apron and carried by guide rods 22, 22 and operating rods 23, 23. The carrier is capable of moving vertically with the rods 22 and 23. Suspended from the bracket are four movable vertical blades 26, 27, 28 and 29 similar to the ones below the apron.

These blades are suspended from horizontal bars 26a, 27a, 28a and 29a, which are free to move in guides in the bracket, and so arranged that the suspended blades are free to move near together in parallel.

These suspended blades are so positioned normally that when the carrier is lowered the two outer blades 26 and 27 will come into contact with the apron 24 midway between the outermost vertical lower blades at each end of the machine while the two inner suspended blades 28 and 29 will fall midway between the two inner vertical blades and the central rigid blade 10 on either side.

The movement of these blades may be accomplished as shown by means of the lowering of the carrier, the operating rods 23, 23 thereof being connected to a cross beam 30 which engages by means of a pin 31 in the path 32 of cam 33. The fixed brackets 34 are provided with pins 34a and cam slots 26d, 27d, 28d, 29d whereby the corresponding suspended blades are simultaneously racked together between the upstanding blades as

they are lowered. This is accomplished through the medium of the slots and pins in the links 26*b*, 27*b*, 28*b*, 29*b* which are pivoted to the rigid extensions 26*c*, 27*c*, 28*c*, 29*c* of the blade-carrying slides.

It will be seen that if a sheet of paper be laid upon the apron 24 the racking together of the blades 6, 7, 8, 9 and 10 and the simultaneous lowering and racking together of the intermediate blades 26, 27, 28 and 29 will fold it concertina fashion.

At one side of the table or framework 1, I provide a feeding platform 35 for the sheets. This is at one side and runs parallel with the apron but slightly elevated.

It may be provided at one or both ends with adjustable guides of normal construction and not shown. Grooves 36 are cut in the platform at right angles to its length and through these grooves fingers 37 operated by a cam 38 on the driving shaft 20 push the sheets of paper on to the apron.

At the side of the apron opposite the feeding platform are stops 39 which prevent the sheet from being carried too far, but permit the edge of the sheet to extend a short distance beyond the apron 24 to permit a gripper to get hold of the sheet to remove it from the folded blades.

The gripper is operated by a cam 40 on the driving shaft 20 through lever 40*a*, and consists of a casing 41 mounted to slide in guides 42 centrally towards and away from the ends of the folding blades.

Within the casing is a bar 43 preferably rectangular in section and carrying at one end two hinged spring actuated gripper jaws 44, 44.

The casing carries two spring-pressed plungers 45 and 46 adapted to lock the casing and the bar together and with the bar is advanced near to the end of the folded paper, when the bar is arrested by a stop 47 which meets the bar, but is suitably cleared by a slot in the casing.

Simultaneously the plunger 46 is raised by meeting the fixed cam surface 48 and the casing is thus enabled to advance while the bar remains still and so to close the jaws by the action of pins 49 in cam slots 50. The jaws grip the folded paper and plunger 45 engages the slot in the bar from which plunger 46 had just been raised. On the return stroke casing and bar go back together with the folded paper, withdrawing the latter from the folding plates, and the jaws are opened when the bar reaches its back stop and plunger 45 is simultaneously raised by the fixed cam surface 51 enabling the casing to proceed on its back stroke until the jaws are opened and plunger 46 once more engaged. The actual release does not, however, take place until another element functions which pressing against the side of the folded sheet at or near the middle presses

the sheet between two roller posts completing a fold at right angles to the accordion fold.

This final fold is accomplished by mounting in suitable frame work a knife 52 or thin piece of metal carried by a slider 53 which, being advanced by lever 54 operated by cam path 55 on cam 33 engaging lever pins 56 picks up the paper at the moment when it is released by the gripper and forcing it past the roller posts 57, 57, thrusts it into the end of a box or container positioned to receive it.

The container 58 is placed in a horizontal position on the table or framework and is held in place by supports 59, 59 so that the open end will be in position to receive the folded paper after it passes the rollers. A spring actuated gate comprising the curved blade 60, spring pressed about its pivot 61 to bring lug 62 against stop 63, is positioned at the end of the container and is so shaped that one part will fall within the opening of the container. It is so shaped that the thrust of the folded paper will press the gate back and permit of the entrance of the folded paper at the open end of the container; when the knife is withdrawn the paper will be thrust farther into the container by the action of the spring gate.

The end of the container opposite to the filling end is cut away so as to allow a spring plunger 64 to enter and by a constant spring pressure of its free and slightly opened sides 65, 65 keep the folded sheets in place during the operation of filling.

In some circumstances it may not be desirable to fill the entire container; to meet this contingency the plunger forms a sliding end piece which can be set at any position in the length of the container by means of the lugs 66 which project through a slot in the side of the container. A cover slide may also be secured to the filling end of the container by pushing it into guides 67, 67 to keep the folded sheets in place when handling the filled container.

While the machine as described would be fed by hand it will be understood that an automatic feed such as is used in printing machines could be arranged to place the sheets on the feeding table.

The operations are preferably carried out by means of a series of cams on the driving shaft as described, but this may be varied as found convenient.

The driving shaft may be rotated by electric motor or any convenient form of power as by hand crank 68 or by foot.

The construction described may be varied as required within the scope of the invention.

I claim:—

1. A machine having mechanism making a number of parallel folds in papers, spaced abutment means, a box removably attached

to the machine, and a member feeding the folded papers successively between said spaced abutment means and into said box, said member simultaneously with its feeding movement making a transverse fold in the paper being fed.

2. A machine having paper-folding mechanism, a box removably attached to the machine, means to deliver papers folded by the said mechanism successively into the box and means to pack the papers in the box together with means facilitating the closing of said box to retain the folded papers therein for removal from the machine.

3. A machine having mechanism making a number of parallel folds in papers, spaced abutments means, a box removably attached to the machine, a member passing the folded papers successively between said spaced abutment means and into said box, simultaneously making a transverse fold, together with a spring gate to ensure entry of successive papers in successive order into the said box and to pack the said folded papers together in said box.

4. A machine having paper-folding mechanism, a box removably attached to the machine, means to deliver papers folded by the said mechanism successively into the box and a spring gate attached to said machine at the mouth of said box for packing the papers in the box, means being provided to position the box relatively to the said spring gate.

5. A removable and replaceable delivery receptacle for folded papers delivered from a paper-folding mechanism comprising a rectangular tubular container and a spring-pressed sliding end to said container.

6. A removable and replaceable delivery receptacle for folded papers delivered from a paper-folding mechanism comprising a rectangular tubular container, an end to said container and spring means to exert a frictional pressure between said end and said container.

7. A removable and replaceable delivery receptacle for folded papers delivered from a paper-folding mechanism comprising a rectangular tubular container, a sliding end in said container, spring means tending to maintain said end frictionally in adjusted position in said container, a lug projecting through said container and adapted on pressure to overcome said spring means.

8. In a machine of the kind set forth, folding mechanism comprising an apron carried upon travelling supporting blades in conjunction with blades simultaneously travelling and advancing to engage a paper on the apron and fold it into a number of parallel folds concertina fashion.

9. The combination of claim 8 together with mechanism to grip the edge of the folded paper and withdraw it sideways.

10. The combination of claim 8, all the blades remaining parallel throughout.

11. In a machine of the kind set forth, folding mechanism comprising travelling blades, an apron carried on said blades and adapted to support a paper, intermediate travelling blades facing said apron, means to advance said blades towards one another, means to move all of said blades into close parallel relationship, and means to withdraw the paper laterally from the blades when in their said relationship.

12. In a machine of the kind set forth, folding mechanism comprising travelling blades, an apron carried on said blades and adapted to support a paper, intermediate travelling blades facing said apron, means to advance said blades towards one another, means to move all of said blades into close parallel relationship, and means to withdraw the paper laterally from the blades when in their said relationship, together with a member engaging the withdrawn folded paper and adapted simultaneously to move it clear of said blades and to assist in imparting a final fold.

13. In a machine of the kind set forth, folding mechanism comprising travelling blades, an apron carried on said blades and adapted to support a paper, intermediate travelling blades facing said apron, means to advance said blades towards one another, means to move all of said blades into close parallel relationship, and means to withdraw the paper laterally from the blades when in their said relationship, together with a receptacle and a member adapted to engage the withdrawn folded sheet and simultaneously to assist in imparting a transverse fold and to push the folded sheet into said receptacle.

In testimony whereof I affix my signature.
CHARLES LAURENCE BURDICK.

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