C. O. L. CARDELL.

TRIMMING MECHANISM FOR PAPER FOLDING MACHINES.

APPLICATION FILED NOV. 24, 1911.

1,068,104.

Patented July 22, 1913.

3 SHEETS—SHEET 1.

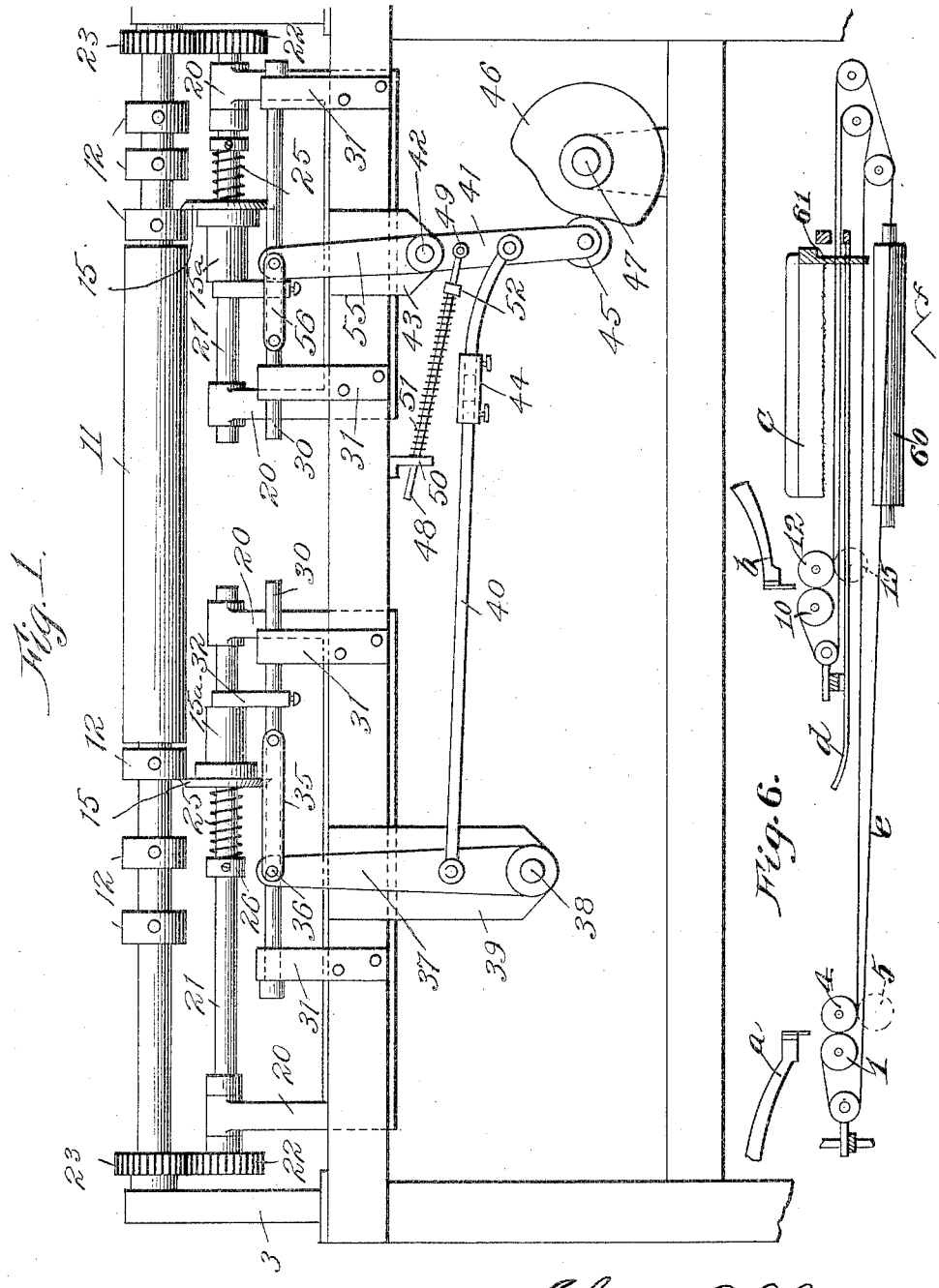


Fig. 1.

Fig. 6.

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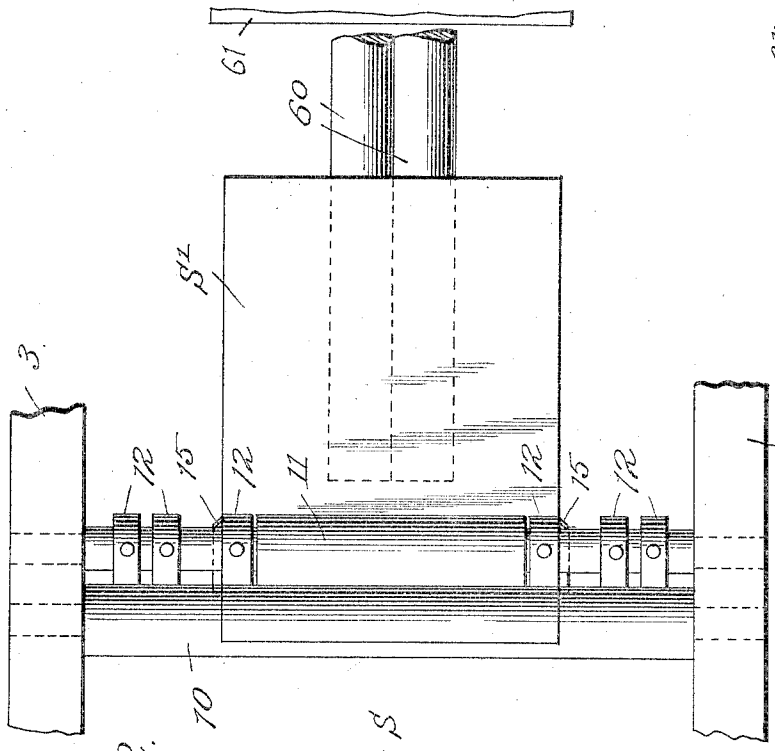


Fig. 2.

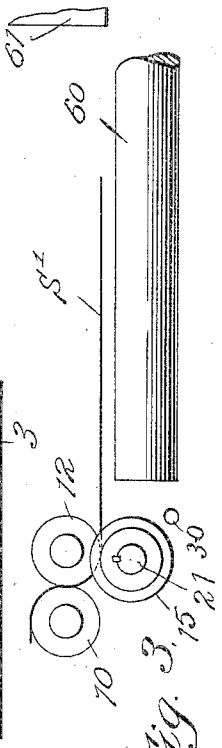
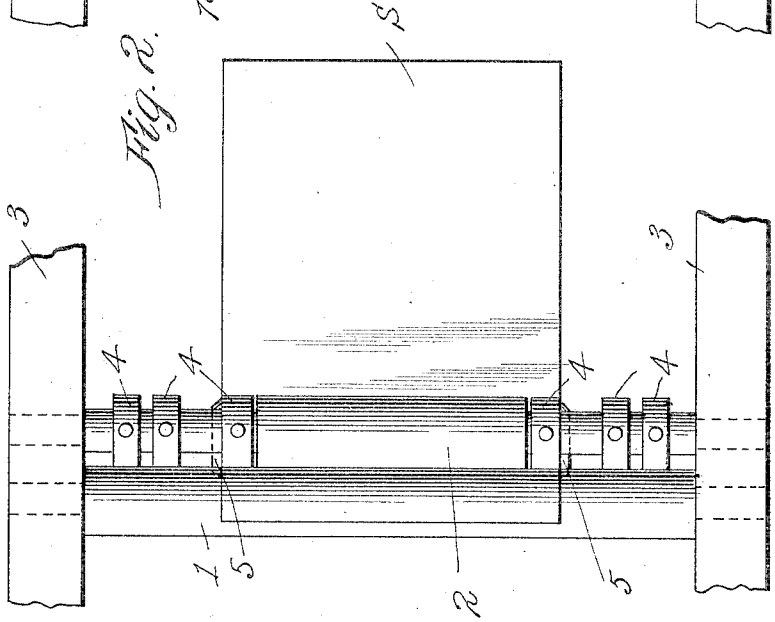
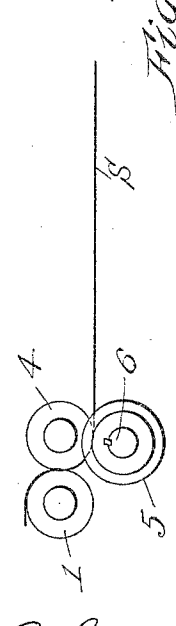


Fig. 3.





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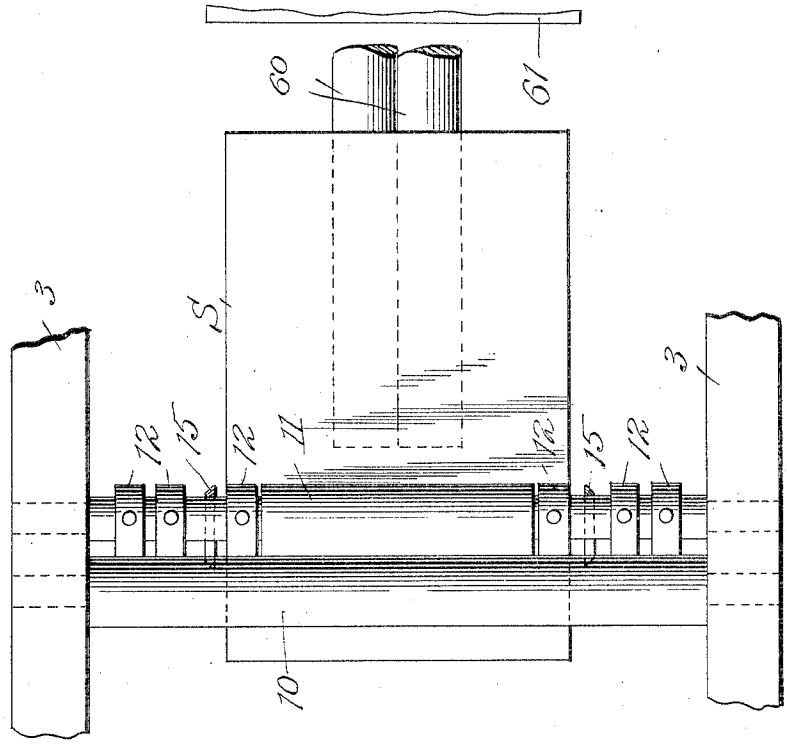


Fig. 4.

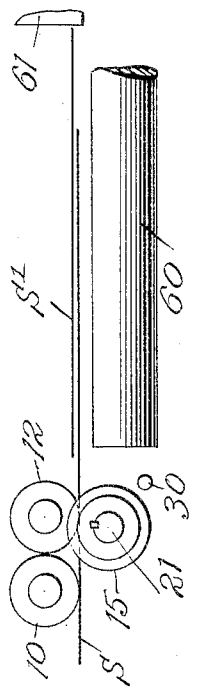
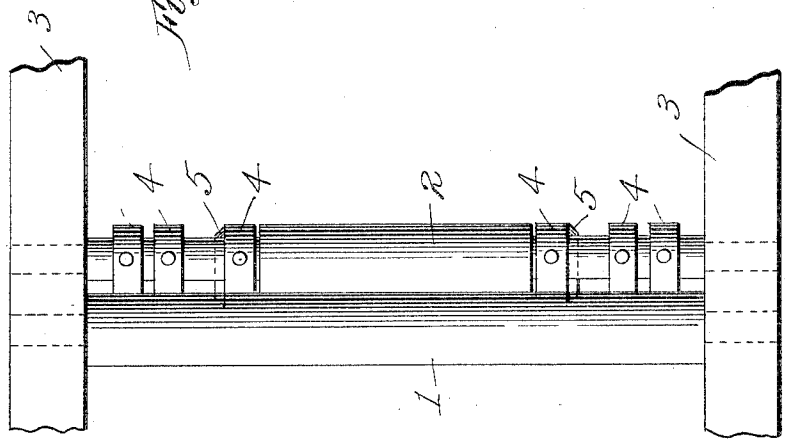
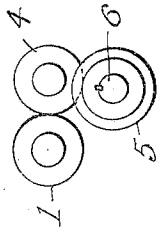


Fig. 5.





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UNITED STATES PATENT OFFICE.

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TRIMMING MECHANISM FOR PAPER-FOLDING MACHINES.

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To all whom it may concern:

Be it known that I, CHARLES O. L. CARDELL, a citizen of the United States, and a resident of Pearl River, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Trimming Mechanism for Paper-Folding Machines, of which the following is a full and clear specification.

In the type of paper folding machines designed for producing single 32 page or double 16 page signatures, it is common practice to pass the folded sheet sections from the two sets of second fold rollers to position above the final or the third fold rollers to be either simultaneously folded with one sheet section inserted in the other, to form 32 page signatures, or separately folded to form 16 page signatures. These two sheet sections are usually trimmed at both edges as they pass through the two sets of second fold rollers and for the purpose of producing folded signatures with the pages of uniform size when forming 32 page signatures, the sheet section forming the insert of the signature is usually trimmed slightly more than the outside sheet section.

Whether 32 page or 16 page signatures are formed, or the inside sheet section is trimmed to the same size or to a smaller size than the outside sheet section in forming 32 page signatures, it is desirable in presenting the two sheet sections above the third fold rollers (either assembled or singly) that the sheet section be passed from one set of second fold rollers between the trimming devices of the other set of second fold rollers immediately after the completion of the trimming of the sheet section passing from said second set of second fold rollers.

The object of my present invention is to produce a simple and effective mechanism for accomplishing this result. To this end I have provided the first set of second fold rollers with trimming devices which operate in a fixed position and trimming devices for the second set of second fold rollers which are separated or spread apart at the completion of each trimming operation so as to permit the free passage between them of the sheet section passing from the first set of second fold rollers. The only change necessary in the machine to produce the different kinds of signatures is the timing of the third fold blade, said blade operating one to one with the second fold blades when inserting to produce single 32 page signatures, and two to one when producing double 16 page signatures. When the machine is set to produce 32 page signatures, the outside sheet section is led in the usual manner to a position beneath the insert sheet section, which is supported upon the usual separator rods, both sections being positioned against the final fold gage in readiness to be folded together through the final fold rollers.

The trimming devices of the second set of second fold rollers comprise trimming disks or cutters splined upon their rotary shafts which are driven in the usual manner and held by springs in engagement with the collars upon the shaft of one of the second fold rollers. Connected cam operated controlling devices engage said trimming disks and cause them to move outwardly upon their shafts away from their collars immediately after each insert sheet section has been trimmed, so that the outside sheet section can pass between said trimming disks.

In order that my invention may be fully understood I will first describe the same with reference to the accompanying drawings and afterward point out the novelty more particularly in the annexed claims.

In said drawings Figure 1 is a side elevation of a part of a paper folding machine showing the second set of second fold rollers and the coöperating trimming devices embodying my invention. Fig. 2 is a detail plan view of the two sets of second fold rollers showing the relation of the insert and outside sheet sections passing through them. Fig. 3 is a diagrammatic end elevation of the devices shown in Fig. 2. Fig. 4 is a view similar to Fig. 2, showing an advanced position of the two sheet sections with the trimming disks of the second set of second fold rollers separated to permit the passage of the outside sheet section from the first set of second fold rollers. Fig. 5 is a view similar to Fig. 3, showing the parts in the position illustrated in Fig. 4. Fig. 6 is a sectional end elevation showing in detail the tape arrangement for conveying sheet sections from the two sets of second fold rollers to the final fold rollers.

In illustrating my invention I have shown only sufficient of a paper folding machine of the well known type to properly represent my improvements. It is well known in the art that in this type of paper folding machines, the sheet is first fed into position above the first fold rollers through which the sheet is folded and cut into two sections which are individually positioned above two sets of second fold rollers. These second fold rollers are shown in the accompanying drawings. To produce accurately finished signatures it is desirable that these second fold rollers be provided with trimming devices for accurately trimming both edges of the sheet sections as they receive their second fold in passing through said rollers.

The first set of second fold rollers is indicated at 1 and 2, journaled as usual in the machine frame 3. The folding roller 2 is provided as usual with reduced ends upon which are adjustably secured the trimming collars 4 with which coöperate the usual trimming disks 5, mounted upon positively driven shafts 6 supported below the folding roller 2 and operated in the manner well understood, but not specifically shown in the drawings. It will be understood that the first sheet section from the first fold rollers is folded through the second fold rollers 1 and 2 and trimmed in the usual manner.

The second set of second fold rollers is shown at 10 and 11 journaled in the machine frame 3 as usual. The roller 10 has the reduced ends supporting the adjustable trimmer collars 12 in the usual manner. Cooperating with the trimming collars 12 are the trimming disks 15 which are mounted and operated in the manner which will now be described.

Journaled in the brackets 20 beneath the second fold rollers 10 and 11 are the trimmer shafts 21 upon which the trimming disks 15 are splined. These trimmer shafts 21 carry gears 22 meshing with gears 23 at the opposite ends of the shaft of folding roller 11. Each trimming disk 15 is engaged by an expansion spring 25, surrounding shaft 21 and held in position by an adjustable collar 26 secured upon the shaft. By these means each trimming disk 15 is yieldingly held in operative engagement with a trimming collar 12.

Supported beneath each shaft 21 is a reciprocatory rod 30 mounted in brackets 31. Each of these rods 30 carries a yoke arm 32 which extends transversely of a shaft 21 and engages the hub 15^a of one of the trimmers 15. The rod 30 at the left of Fig. 1 has pivotally connected with it the link 35 pivoted at 36 to an upright rock arm 37 journaled at 38 in the depending bracket 39. This rock arm 37 is connected through a long link 40 with a rock arm 41 mounted upon a rock shaft 42 journaled in bearing bracket 43. Connecting rod 40 may be adjusted in length by means of a coupling shown at 44. The rock arm 41 carries in its lower end an anti-friction roller 45 operating upon the periphery of a cam 46 carried by the shaft 47 journaled in any convenient position upon the machine and operated by gearing from any suitable operating part. A spring actuated rod 48 is pivoted to the rock arm 41 at 49 and extends therefrom through a guide bracket 50. An expansion spring 51 is mounted upon the rod 48 and confined between said bracket 50 and an adjustable collar 52 upon the rod 48. This spring actuated rod 48 holds the rock arm 41 in operative relation to cam 46.

The rock shaft 42 carries an upwardly presented rock arm 55 whose upper end is connected by link 56 with the rod 30 at the right hand side of Fig. 1.

From the structure described with reference to Fig. 1, it will be observed that while the anti-friction roller 45 is in engagement with the low part of cam 46, the trimming disks 15 will be in operative engagement with trimming collars 12. In this position of the parts, a sheet section is passed through the second set of fold rollers 10 and 11 and is trimmed at its opposite edges by the trimming devices. When the high part of cam 46 engages anti-friction roller 45, it will be observed that rock arms 37 and 55 will move rods 30 for shifting trimmers 15 outwardly or away from each other upon their shafts 21, thus separating or spreading apart the trimming disks to permit a free passage between them of a sheet section from the first set of second fold rollers.

It will be understood that in the type of folding machine to which my invention relates, suitable conveying tapes and guides are arranged for passing sheet sections from the first and second sets of second fold rollers to the gage which arrests and positions them one above the other at the final or third fold rollers. In Figs. 2, 3, 4, 5 and 6, the two sets of second fold rollers with trimming devices and the final or third fold rollers and gage are represented. The final fold rollers are shown at 60 and the final fold gage at 61.

The usual separator rods *d*, Fig. 6, are arranged above the third or final fold rollers 60 to support the insert sheet sections received from second fold rollers 10, 11, above the outside sheet sections which pass from the second fold rollers 1, 2. In Fig. 6 *a* and *b*, are the folding blades of the two sets of second fold rollers, *c* is the folding blade of the third or final fold rollers, and *f* is the packing box. The conveyer tapes are represented at *e* in a common and well known arrangement. In this arrangement single continuous tapes pass from second fold rollers 1, 2, to points beyond final fold

gage 61 around suitable guide rollers, then return beneath second fold rollers 10, 11 to other guide rollers, then down between rollers 10, 11 and over to points beyond gage 61 around other guide rollers from which they return to guide rollers adjacent to second fold rollers 1, 2. With this arrangement a single set of endless tapes provides parallel carrying portions (respectively above and below separator rods *d*) from the two sets of second fold rollers to the final fold gage.

In Figs. 2 and 3 of the drawings I have represented a sheet section S passing through the first set of second fold rollers 1 and 2 and being trimmed by the trimming devices 4 and 5. In these figures I also show a second sheet section S′ passing through the second set of second fold rollers 10 and 11, and being trimmed by the trimming devices 12, 15. This second sheet section is just moving into position above the final fold rollers 60. In Figs. 4 and 5 of the drawings I show a further stage in the operation in which sheet section S′ is in position against the final fold gage 61, and sheet section S is passing beneath the sheet section S′ toward the gage 61. The trimming disks 15 are shown separated or spread apart so as to allow the free passage of sheet section S between them. When the two sheet sections S and S′ are properly positioned above the final folding rollers 60, they are folded together through said rollers and dropped into the packing box in the usual manner.

It will be observed that the operating cam 46 throws the trimming disks 15 apart once in every revolution so as to permit the passage of each sheet section S as it arrives beneath the second set of second fold rollers. With the described mechanism it will be clear that the sheet section which is folded through the second set of second fold rollers, may be trimmed to the same width as the sheet section which passes through the first set of second fold rollers, or it may be trimmed slightly narrower for the purpose above explained, the separation of the trimming disks 15 accommodating the sheet section S in either case.

If desired, the timing of final folding blade *c* can be changed to operate one to one with the second fold mechanisms so as to act upon the signatures independently and deliver sixteen page signatures, in which case the twice folded signatures from the farthest distant second fold rollers 1, 2 will pass between the separated trimming disks beneath second fold rolls 10, 11 in the same manner as above described with reference to inserting.

What I claim is:

1. In a folding machine, the combination of two sets of folding rollers, with two sets of sheet trimmers coöperating therewith, and means for automatically moving one set of said sheet trimmers into and out of operative position.

2. In a folding machine, the combination of suitable folding rollers, with sheet trimmers operating adjacent to the opposite ends of said rollers, means for periodically moving said trimmers relatively to increase the space between them, and means for feeding sheets or signatures beneath said rollers and between said trimmers.

3. In a folding machine, the combination of two sets of folding rollers, with sheet trimmers operating adjacent to the opposite ends of one set of said folding rollers, means for periodically and automatically moving said trimmers into separated inoperative position, and means for conveying sheets or signatures from one set of said folding rollers past the other set of folding rollers and between said trimmers.

4. In a folding machine, the combination of two pairs of folding rollers, sheet trimming collars mounted upon one of each pair of said rollers, sheet trimming disks coöperating with said trimming collars, and means for periodically and automatically moving the trimming disks of one pair of rollers into and out of operative position.

5. In a paper folding machine, the combination of a pair of folding rollers, sheet trimming collars mounted upon one of said rollers, sheet trimming disks coöperating with and movable toward and away from said collars parallel with the longitudinal axis of said folding rollers, springs yieldingly holding said trimming disks in operative relation to said collars, and means for simultaneously moving said disks outwardly away from said collars.

6. In a paper folding machine, the combination of two pairs of folding rollers, sheet trimming collars mounted upon one of each pair of said rollers, a pair of sheet trimming disks coöperating with the collars of each pair of said folding rollers, one pair of said trimming disks being movable toward and away from said collars parallel with the longitudinal axis of said folding rollers, springs yieldingly holding said movable trimming disks in operative relation to said collars, and means for simultaneously moving said movable disks outwardly away from said collars.

7. In a folding machine, the combination of the folding rollers, and the trimming collars carried by one of said rollers, with the trimming disks mounted beneath said rollers and coöperating with said collars, shafts upon which the said trimming disks are movably mounted, springs holding said disks in operative relation to said collars, oppositely moving devices engaging said disks for moving them outwardly upon their shafts, coupled rock arms connected with

said oppositely moving devices for simultaneously operating them, and a cam for actuating said coupled rock arms.

8. In a folding machine, the combination of the folding rollers, and the trimming collars carried by one of said rollers, with the trimming disks mounted beneath said rollers and coöperating with said collars, shafts upon which the said trimming disks are movably mounted, springs holding said disks in operative relation to said collars, oppositely moving rods engaging said disks for moving them outwardly upon their shafts, coupled rock arms connected with said rods for simultaneously operating them, and a cam for actuating said coupled rock arms.

9. In a paper folding machine, the combination of two sets of second fold rollers, fixed trimming devices coöperating with one set of said folding rollers, automatically adjustable trimming devices coöperating with the other set of said folding rollers, and means for periodically moving said adjustable trimming devices away from each other for the purpose set forth.

10. In a folding machine, the combination with means for folding together the insert and outer sheet of a signature, and means for feeding the two sheets thereto; of automatic means for selectively trimming the insert and permitting the outer sheet to pass untrimmed to said folding means.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."