TO all whom it may concern:

Be it known that I, Howard M. Barber, a citizen of the United States, and resident of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Sheet Cutting, Stitching, and Folding Machines, of which the following is a specification.

My object of this invention is to provide means whereby a collection of sheets is stitched while at rest and is then removed from the stitcher mechanism at a speed less than its feeding-in speed, the relative movement of the successive collections being such that the stitched collection is removed at a speed sufficient to cause it to clear the next collection as it is fed into the stitcher mechanism, such arrangement permitting the stoppage of the collections on the stitcher table a sufficient length of time to allow them to be accurately stitched.

A practical embodiment of the invention is represented in the accompanying drawings, in which that part of a sheet cutting, stitching and folding machine is illustrated which includes my invention.

Figure 1 is a vertical central section taken from front to rear through the machine.

Fig. 2 is a detail vertical section taken from front to rear just inside the near side frame.

Fig. 3 is a similar section taken just inside the far side frame.

Fig. 4 is a detail section showing the driving connection between certain of the parts, and

Fig. 5 is a detail section taken just outside the near side frame, showing the driving connection between certain other of the driving parts.

The stitcher table is denoted by 1, the stitcher mechanism by 2, and its driving shaft by 3, which stitcher mechanism may be of any well known or approved construction adapted to stitch a collection of sheets while the movement of the collection is arrested.

The collection transfer cylinder 4 is mounted on a shaft 5, and its set of grippers 6 is arranged to receive a sheet from an extra source of sheet supply, such as a cover sheet, from the table 7 and associate it with a collected group of sheets received from one of the sets of grippers 8, 9, 10 of the collecting cylinder 11 on the shaft 12.

The collection of sheets is delivered from the transfer cylinder 4, between two endless tape carriers 13, 14, which endless carriers feed the collections on to the stitcher table 1, into engagement with a movable sheet stop 15. A main web is fed by the pair of rolls, 16, 17, through the pair of coacting rotary cutters 18, 19, and through the coating guide rollers 20, 21, to the collecting cylinder 11 and transfer cylinder 4.

In the arrangement shown herein, the first three sheets of each group are collected on the cylinder 11, and those sheets, together with the fourth sheet, are seized by the grippers 6 of the cylinder 4, which grippers have previously taken a sheet from the table 7. It is evident that one web or a plurality of superimposed webs may be fed into the machine as desired, and it is also obvious that a collection of any desired number of sheets may be obtained as desired.

The sheet stop 15 is mounted on a rock shaft 32, to which is fixed a rock lever 23, having a stud or roller 24 under the control of a rotary cam 25, rotating with the male folding cylinder 26 mounted on a shaft 27. This male folding cylinder 26 is provided with a folding blade 28, and a pair of tumbler actuated grippers 29. The female folding cylinder 30 on the shaft 31, carries a pair of folding jaws 32 arranged to coat with the folding blade 28 on the male folding cylinder 26. Any suitable delivery mechanism may be employed for delivering the stitched and folded collections from the female folding cylinder 30, which delivery mechanism in the present instance comprises the endless tape carriers 33, 34, the dropper delivery 35 and the endless delivery carrier 36.

Spring-pressed rollers 37 are arranged in position to hold the sheet from the extra source of sheet supply in register on the cylinder 4, while the grippers 6 are opened for receiving the collected group of main web sheets. Spring-pressed rollers 38 are also provided for holding the group of main web sheets in register on the cylinder 11, when the grippers 8, 9 and 10 are open to
receive the successive sheets of each collection and to transfer the sheets to the grippers 6 on the cylinder 4. A sheet stop 39 for the extra sheets is mounted on a rock shaft 40 to which is fixed a rock lever 41 having a stud or roller 42 under the control of a rotary cam 43 rotated with the cylinder 4.

Means 44 are provided for cutting the sheets on the extra sheet feed table 7 in two, which means is operated in any well-known or approved manner, the front half of the sheet being associated with one collection of main web sheets and the back half with the next succeeding collection of main web sheets. The web feed rolls 16, 17 are connected to the shaft 45 of the rotary cutter 19, through the gears 46, 47, 48, 49, and the guide rollers 20, 21, are driven from the gear 49 through the gears 50, 51, 52. The shaft 12 of the cylinder 11 is connected to the shaft 45 of the rotary cutter 19, through the gears 53, 54. The gear 55 on the shaft 5 of the cylinder 4 meshes with the gear 54.

The spring-pressed rollers 38 are driven from the gear 55 through the gear 56 and the spring-pressed rollers 38 are driven from the gear 54 through the gear 57. The shaft 3 of the stitcher mechanism is driven through a gear 58 which meshes with the gear 55. The shaft 27 of the male folding cylinder 26 is connected to the shaft 3 of the stitcher mechanism through the gears 59, 60. A gear 61 on the shaft 27 meshes with a gear 62 on the shaft 51 of the female folding cylinder 30. The delivery tape carriers of the dropper mechanism are driven through the gears 63, 64, 65, 66, 67, 68, 69. The endless delivery is driven from the shaft 51, through the bevel gears 70, 71, shaft 72, worm 73, gears 74, 75, 76.

The relative speeds of the driving mechanism hereinabove referred to are such that the stitched collections of sheets are withdrawn from the stitcher mechanism at a speed less than their feeding-in speed, ample time being given for the stitching of a collection while at rest in the stitcher mechanism and for the removal of the stitched collection without interfering with the operation coming next succeeding unstacked collection.

The cam mechanism for controlling the floating of the tucking blade and folding jaws in parallelism during the folding of the stitched collection off from the male cylinder on to the female cylinder will not be specifically described herein, as it is of well-known and approved construction and forms no part of the present invention.

The objects of having the sheets removed at a speed slower than their feeding-in speed are: first, to materially lessen the strain on the moving parts because of this slower speed; second, a greater accuracy can be obtained by the slower speed of the moving parts; third, a lesser strain; fourth, a smoother operation of the parts; and fifth, the advantageous feature of dropping the product on to the delivery belts at a slower speed.

The slower the stitched sheets are removed from the table, the less the liability of the grippers to slip on the product and the more accurate the register.

By the term "cylinder" as used in the description, I contemplate any equivalent means for passing the sheets and signatures through the prescribed paths and by the term "grippers" I wish to include any equivalent devices suitable for the purpose of leading the sheets or signatures through said prescribed paths.

It is evident that various changes may be resorted to in the construction, form and arrangement of the various parts without departing from the spirit and scope of my invention, and hence I do not wish to limit myself strictly to the form herein shown and described, but

What I claim is:

1. A stitcher mechanism, means for collecting a plurality of sheets, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation and means for removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed.

2. A stitcher mechanism, means for collecting a plurality of sheets, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation, means for removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed, and means for folding and delivering said stitched collection.

3. A stitcher mechanism, means for collecting a plurality of sheets, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation and rotary means including grippers for positively removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed.

4. A stitcher mechanism, means for collecting a plurality of sheets, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation, rotary means including grippers for positively removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed, and means for folding and delivering said stitched collection.

5. A stitcher mechanism, means for col-
lecting a plurality of sheets from different sources, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation and means for removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed.

6. A stitcher mechanism, means for collecting a plurality of sheets from different sources, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation, means for removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed, and means for folding and delivering said stitched collection.

7. A stitcher mechanism, means for collecting a plurality of sheets from different sources, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation and rotary means including grippers for positively removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed.

8. A stitcher mechanism, means for collecting a plurality of sheets from different sources, means for feeding said collection to the stitcher mechanism at a certain speed, means for arresting the movement of the collection during the stitching operation, rotary means including grippers for positively removing the stitched collection from the stitcher mechanism at a speed less than its feeding in speed, and means for folding and delivering said stitched collection.

9. Means for cutting sheets from a web, a stitcher mechanism, means for feeding a group of sheets, means for feeding it to the stitcher mechanism at a certain speed, means for arresting the movement of the group of sheets during the stitching operation and means for removing the stitched group of sheets from the stitcher mechanism at a speed less than its feeding in speed.

10. Means for cutting sheets from a web, a stitcher mechanism, means for collecting a group of sheets, means for feeding it to the stitcher mechanism at a certain speed, means for arresting the movement of the group of sheets during the stitching operation, means for removing the stitched group of sheets from the stitcher mechanism at a speed less than its feeding in speed, and means for folding and delivering said stitched group of sheets.

11. Means for cutting sheets from a web, an extra source of sheet supply, a stitcher mechanism, means for collecting sheets cut from the web with sheets from the extra source of sheet supply, means for feeding said collections successively to the stitcher mechanism at a certain speed, means for arresting the movement of the collections during the stitching operations and means for removing the stitched collections from the stitcher mechanism at a speed less than their feeding in speeds.

12. Means for cutting sheets from a web, an extra source of sheet supply, a stitcher mechanism, means for collecting sheets cut from the web with sheets from the extra source of sheet supply, means for feeding said collections successively to the stitcher mechanism at a certain speed, means for arresting the movement of the collections during the stitching operations, means for removing the stitched collections from the stitcher mechanism at a speed less than their feeding in speeds and means for folding and delivering said stitched collections.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this tenth day of February 1915.

HOWARD M. BARBER.

Witnesses:
E. GEORGE BARRY,
C. L. SUNDGREN.

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