H. E. PELTON.

MACHINE FOR FOLDING SHEET MATERIAL.

APPLICATION FILED FEB. 9, 1920.

1,376,969.

Patented May 3, 1921.

4 SHEETS—SHEET 1.

Fig. 1.

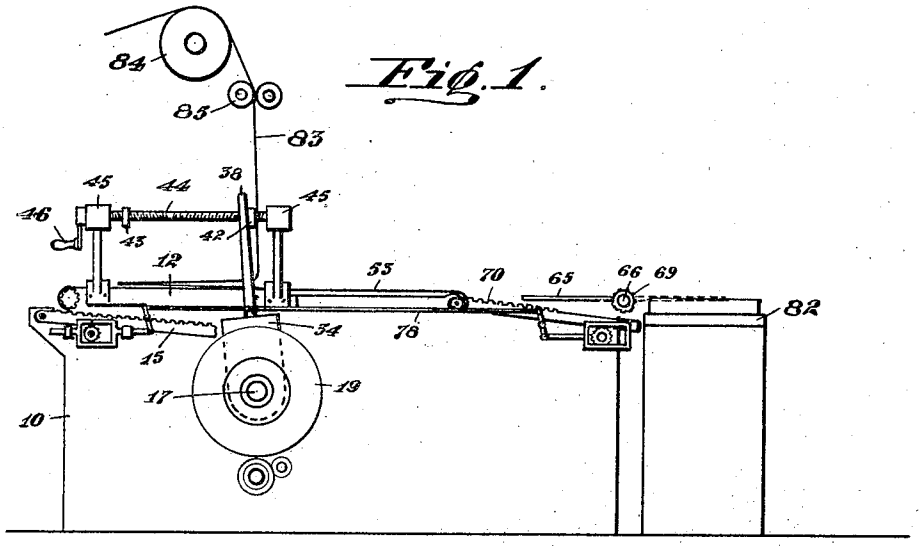
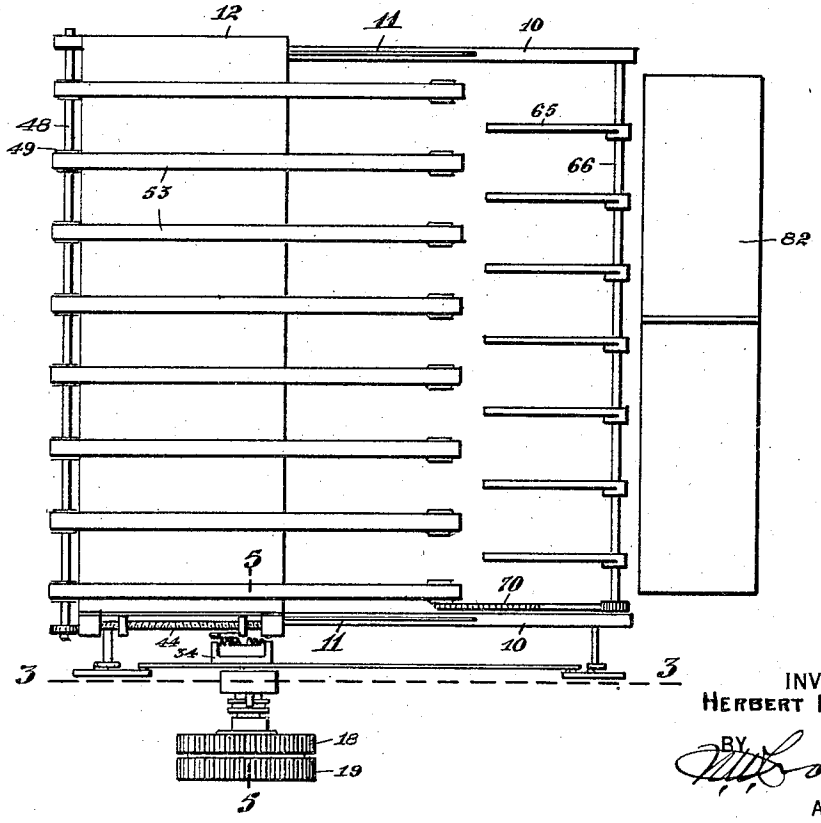


Fig. 2.



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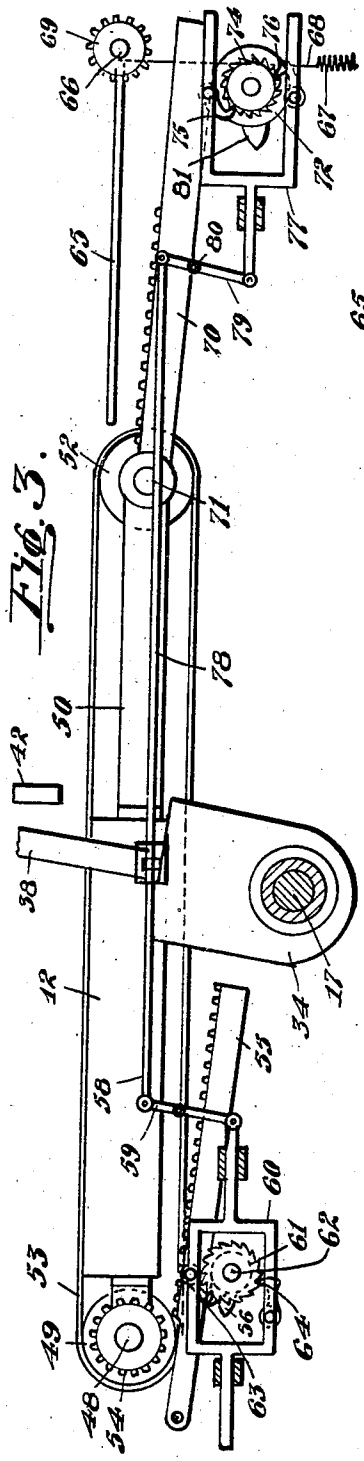


Fig. 3.

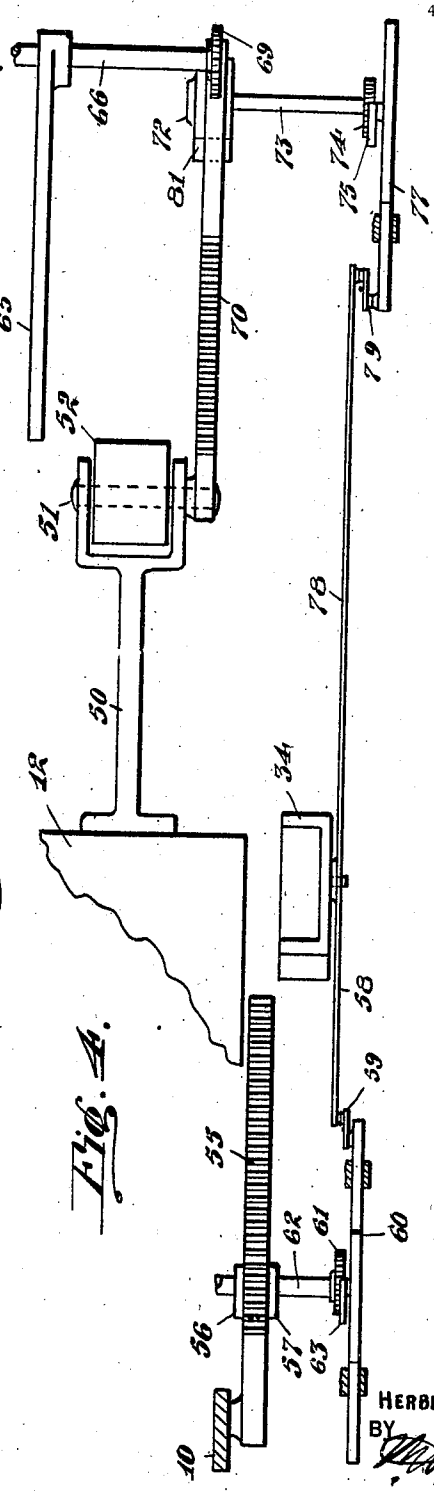


Fig. 4.

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4 SHEETS—SHEET 3.

Fig. 5.

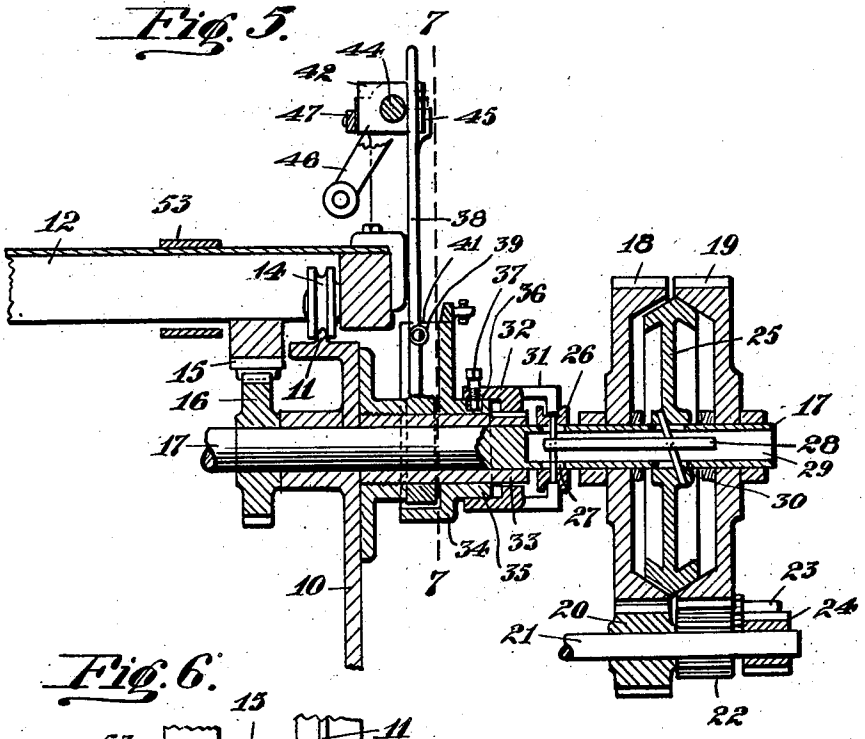
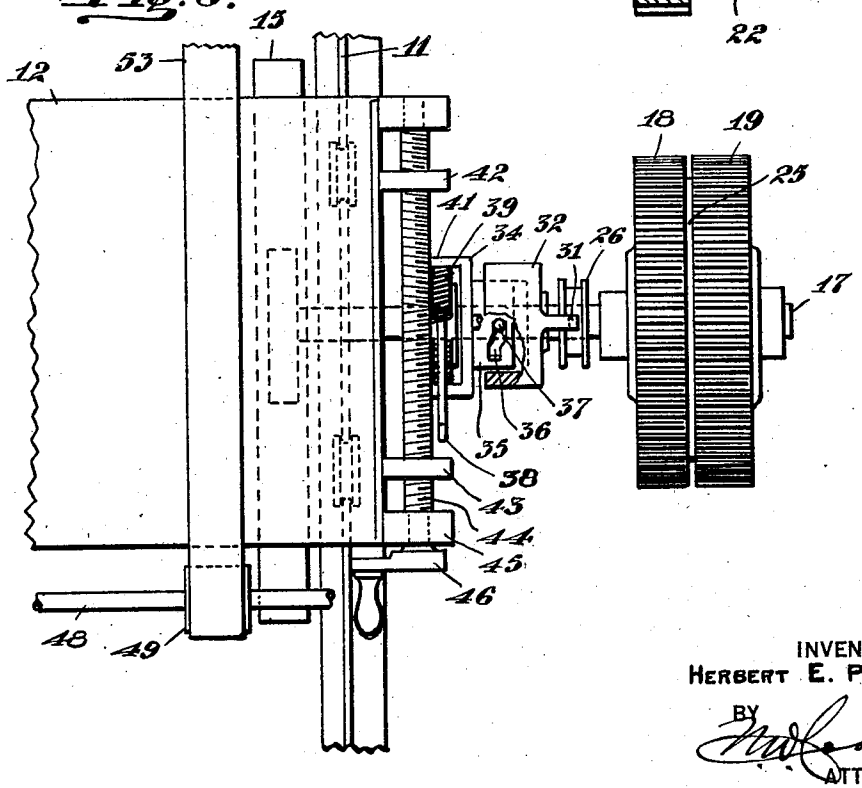


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

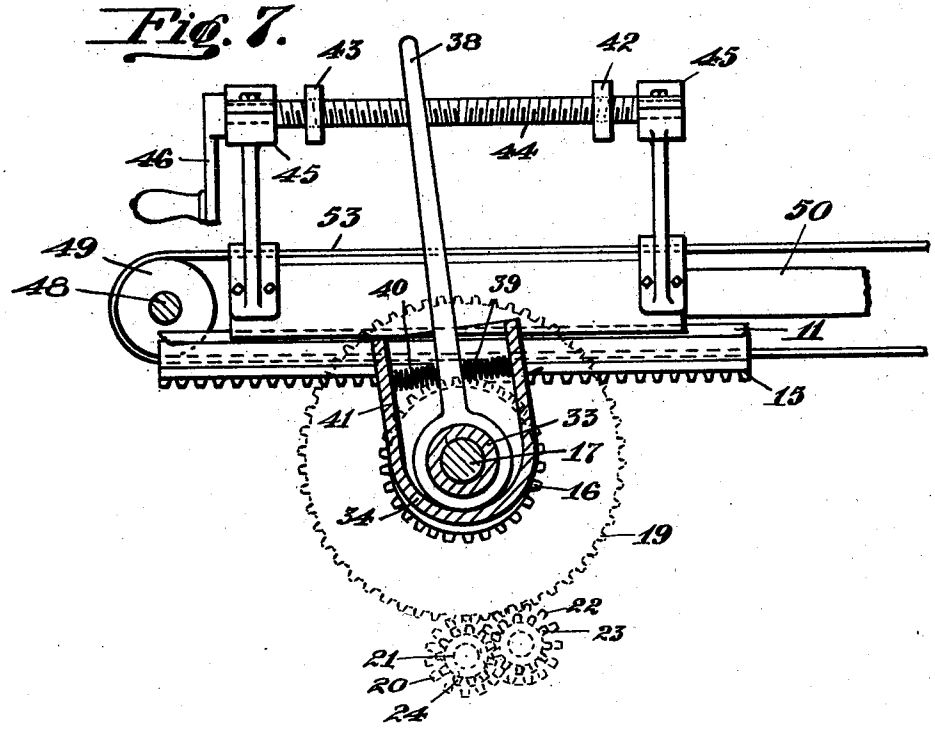
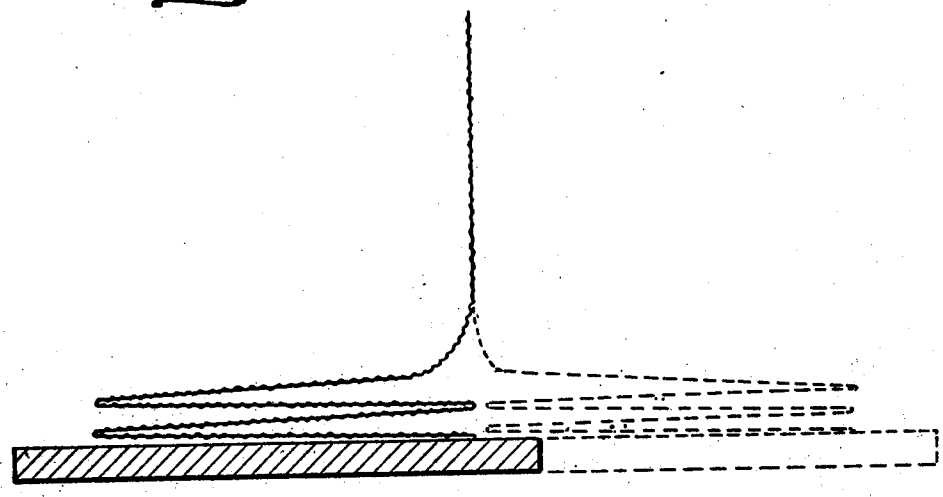


Fig. 8.



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UNITED STATES PATENT OFFICE.

HERBERT E. PELTON, OF LOS ANGELES, CALIFORNIA.

MACHINE FOR FOLDING SHEET MATERIAL.

1,376,969. Specification of Letters Patent. Patented May 3, 1921.

Application filed February 9, 1920. Serial No. 357,153.

To all whom it may concern:

Be it known that I, HERBERT E. PELTON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Machines for Folding Sheet Material, of which the following is a specification.

This invention relates to a machine for folding bed sheets, counterpanes, table cloths and other sheet articles, and particularly pertains to a mechanism adapted to act on the articles delivered from a mangle in laundry operations to fold same.

It is the object of this invention to provide a means for folding a sheet article into a series of successive zigzag folds of predetermined widths, which is adapted to receive the articles as delivered from a mangle or the like, and a further object is to provide a mechanism for folding sheet articles in the fashion specified embodying a reciprocable table to which the article may be fed dependently in such manner as to arrange the article in superposed continuous folds.

Another object is to provide an effective mechanism for actuating the reciprocable table and to provide a construction whereby the length of the stroke of the table may be adjusted to vary the length of the fold as occasion may require.

A further object is to provide means whereby the folded article may be removed from the reciprocating table while the latter is in motion so that the folding mechanism may be of continuous operation and thereby obviate the necessity of delay in feeding the articles to the mangle so as to increase the output of the latter.

Other objects will appear hereinafter.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view of the machine as seen in end elevation;

Fig. 2 is plan view of same;

Fig. 3 is an enlarged detail view in section and elevation, with portions removed, as seen on the line 3—3 of Fig. 2, illustrating the timing and control mechanism;

Fig. 4 is a plan view of the timing and control mechanism shown in Fig. 3;

Fig. 5 is an enlarged detail view in section and elevation as seen on the line 5—5 of Fig. 2 with portions removed;

Fig. 6 is a plan view of the mechanism shown in Fig. 5;

Fig. 7 is a view in section and elevation as seen on the line 7—7 of Fig. 5;

Fig. 8 is a diagram illustrating the manner of folding sheet material into a series of successive zigzag folds by means of this invention.

More specifically, 10 indicates the frame of the machine which may be of any suitable construction and which frame carries a pair of parallel horizontally extending tracks 11 on which a horizontally extending carriage 12 is mounted for reciprocal movement; the carriage being here shown as comprising a rectangular frame or table fitted with grooved rollers 14 arranged to travel on the tracks 11. Mounted on the under side of the carriage and extending transversely thereof, parallel with the tracks 11 and adjacent to the latter, is a pair of inverted toothed racks 15 engaged by pinions 16 on an auxiliary drive shaft 17, which shaft is designed to be alternately rotated in opposite directions to effect reciprocation of the carriage. The shaft driving mechanism embodies a pair of toothed wheels 18 and 19 loosely mounted on the shaft 17; the toothed wheel 18 meshing with a pinion 20 on a main drive shaft 21 and the toothed wheel 19 meshing with a compound pinion 22 having a tooth portion 23 meshing with a pinion 24 on the shaft 21. The compound pinion serves to rotate the toothed wheel 19 in a direction opposite that of the toothed wheel 18 on rotation of the shaft 21, which shaft is designed to be driven at a uniform speed in one direction from some suitable rotating part of a mangle.

Splined on the shaft 17 to rotate therewith is a double faced friction clutch 25 adapted to be moved alternately in and out of engagement with the friction clutch faces on the toothed wheels 18 and 19 to effect rotation of the auxiliary drive shaft through the clutch member. Means are provided for automatically shifting the clutch member 25 controlled by movement of the carriage 12 whereby as the carriage traverses a desired distance in one direction the clutch member will be operated to reverse the rotation of

the auxiliary drive shaft to effect reverse movement of the carriage. This mechanism embodies a sleeve 26 slidable on the shaft 17 connecting through a slot 27 in the shaft 17 to a rod 28 extending along a longitudinal bore 29 in the shaft 17 and connecting through slots 30 in the shaft 17 to the hub of the clutch member 25. The grooved sleeve 26 is engaged by fingers 31 on a sleeve 32 splined on a collar 33 affixed to the frame 10 and encircling the shaft 17. The sleeve 32 is thus mounted for reciprocal movement in the direction of the length of the shaft 17 and is secured against rotation.

Mounted to oscillate on the collar 33 is a member 34 having a hub 35 projecting into the sleeve 32 and which hub is formed with a peripheral cam groove 36 into which a pin 37 on the sleeve 32 projects and which cam groove is of such shape as to operate through the pin 37 to advance or retract the sleeve 32 on oscillation of the member 34. A lever 38 pivoted on the collar 33 extends upwardly adjacent to the member 34 and is connected to the latter by oppositely extending helical springs 39 and 40, which springs bear between the opposite sides of the lever 38 and side flanges 41 on the member 34; the springs 39 and 40 normally positioning the lever 38 centrally between the flanges 41 and serving, on shifting the lever to one side or the other of its central position, to effect a quick movement of the member 34, when the pull exerted upon a spring by movement of the lever is sufficient to overcome the resistance offered to movement of the member 34 occasioned by the various connections thereto tending to oppose its movement. The member 34 with its side flanges 41 constitutes a reversing yoke and will be hereinafter thus designated.

The lever 38 is designed to be shifted automatically by movement of the carriage 12 and for this purpose the carriage is fitted with a pair of spaced stops 42 and 43 positioned on opposite sides of the lever 38 and adapted to engage the latter as the carriage advances to move the lever from one side to the other according to the direction of movement of the carriage to effect shifting of the clutch 25 through the connections thereto and thereby cause reverse movement of the carriage.

As a means for varying the length of movement of the carriage in either direction, the stops 42 and 43 are adjustable and for this purpose are threaded upon a shaft 44 formed with right and left hand threads and which shaft is carried in suitable bearings 45 supported on the carriage and is fitted with a hand crank 46 by which the shaft 44 may be rotated to cause the stops 42 and 43 to be advanced or retracted relative to each other; a bar 47 extending parallel with the shaft 44 slidably abutting against the stops 42 and 43 to hold the latter against rotation and thereby cause them to move on the shaft when the latter is turned in either direction. A quick adjustment can thus be effected to vary the length of stroke of the carriage, thereby adapting the machine to fold the sheet material in zizzag folds of any desired lengths, as will later appear.

Mounted on the rear edge of the carriage is a shaft 48 carrying a series of pulleys 49, and extending forwardly from the front edge of the carriage is a series of brackets 50 carrying stud shafts 51 on which pulleys 52 are mounted; the pulleys 49 and 52 being alined with each other forming pairs of pulleys on the opposite sides of the carriage and carried by the latter with the forward pulleys spaced from the carriage a distance substantially corresponding to the length of the maximum stroke of the latter. A belt 53 passes around each pair of the pulleys with the upper leaf thereof extending over and bearing upon the upper face of the carriage. A series of belts are thus provided and spaced a short distance apart throughout the length of the carriage, on which belts the article to be folded is deposited as the carriage reciprocates. Normally the belts are stationary throughout any suitable number of reciprocations of the carriage and are designed to be advanced a distance substantially corresponding to the width of the carriage as the latter moves forward, for example, on each fourth reciprocation; the upper leaf of the belt being designed to move toward the forward pulleys 52 so as to carry the article deposited thereon onto the portions of the belts extending over the brackets 50 to a position clear of the body of the carriage and in front thereof.

As a means for effecting intermittent movement of the belts, a spur pinion 54 is mounted on the shaft 48, and pivoted on the frame beneath the pinion 54 is a rack bar 55 adapted to be moved in and out of engagement with the pinion and to be held in engagement with the latter an interval during the forward stroke of the carriage so that the pinion, in riding over the rack, will rotate the shaft 48 in such direction as to advance the upper portion of the belts, as before described; the rack bar being normally positioned out of engagement with the pinion 54 during a certain number of the strokes of the carriage and engaging with the pinion on certain forward strokes of the latter.

Vertical swinging movement of the rack bar is intermittently effected by means of a cam 56, arranged beneath the bar in contact therewith, having a projection 57 adapted to engage and elevate the bar during a portion of a revolution of the cam. Rota-

tion of the cam is effected step by step fashion with each movement controlled by some element of the machine having a determined movement in relation to the reciprocation of the carriage, irrespective of variations in the lengths of the stroke of the latter, so that the cam will move one step at the termination of each stroke of the carriage, regardless of the length of the stroke. This element is here shown as comprising the oscillatory reversing yoke 34, movement of which is controlled through the lever 38, which in turn is operated by the adjustable stops 42 and 43 on the carriage to cause the yoke to swing at the end of each stroke of the carriage to reverse movement of the latter through the gear and clutch connections before described. The connections between the yoke and the cam, by which the latter is advanced a step on each oscillation of the yoke, is here shown as comprising a connecting rod 58 on the yoke, a lever 59 pivoted on the frame attached at its upper end to the connecting rod, a slide frame 60 connected to the lower end of the lever for reciprocal movement, a ratchet wheel 61 on a shaft 62 on which the cam 56 is mounted, and oppositely operating pawls 63 and 64 carried by the slide frame and engaging the ratchet wheel 61 in such manner that as the slide frame is advanced or retracted, by reason of its connection with the oscillating yoke, the ratchet wheel will be intermittently advanced in one direction to effect the desired rotation of the cam.

Means are provided for automatically delivering the folded sheet article from the projecting belts on the carriage when the latter are in an advanced position, which means are here shown as embodying a series of fingers 65 fixed on a rock shaft 66 and which fingers normally extend horizontally between adjacent belts 53 on a plane below the upper leaves of the latter; the shaft 66 being actuated on by a spring 67 connecting with a cord 68 wound on a drum on the shaft 66 in such manner as to hold the shaft and the fingers thereon in a retracted position against a suitable stop. This shaft is designed to be operated to elevate the fingers 65 into engagement with the folded article disposed thereover on advanced movement of the carriage immediately on the retrograde movement of the carriage following the advanced movement during which the folded article was disposed forwardly of the carriage. The mechanism for effecting this movement of the rock shaft embodies a spur pinion 69 mounted on the shaft, adapted to be engaged by a rack bar 70 pivoted at 71 on an end bracket 50 and the outer end of which rack bar normally seats on a cam disk 72 mounted on a cam shaft 73 carrying a ratchet 74 engaged by pawls 75 and 76 carried on a reciprocal frame 77. A connecting rod 78 leads from the reversing yoke 34 opposite the rod 58 and connects with a lever 79 pivoted at 80 and the lower end of which lever connects with the slide frame 77 in such manner that the oscillations of the yoke will operate through the slide frame and the pawls thereon to rotate the ratchet wheel 74 and the cam 72 step by step fashion and thereby cause a projection 81 on the cam 72 to engage the rack bar and move the latter upwardly into mesh with the pinion 69 at a time when the carriage is in its advanced position and returning on its retrograde stroke, so that the rack bar will act on the pinion to rotate the latter and the shaft connected thereto substantially a half revolution, which operation causes the fingers 65 to pick up the article suspended on the belt and to deliver it to a table 82, from whence it may be removed in any desired manner.

In the operation of the invention, the sheet 83 to be folded is delivered from the discharge roll 84 of a mangle, as shown in Fig. 1, being preferably passed between a pair of feed rollers 85 arranged directly over the reciprocable carriage. On setting the carriage in motion, the sheet article is deposited thereon, as shown in Fig. 8, and caused by the movement of the carriage back and forth to be laid in a series of continuous zigzag folds, the lengths of which folds are adjusted by positioning of the stops 42 and 43, as before described, to regulate the length of stroke of the carriage. Movement of the carriage is controlled as before specified and the folded article is discharged therefrom as stated. The movement of reciprocations of the carriage, before effecting discharge of the folded article, is governed by the number of impulses necessary to rotate the cam a complete revolution, which in turn is dependent upon the length of action on the ratchet wheel and the throw of the yoke. If it is desired to vary the number of such impulses, the connections of the rods 58 and 78 to the yoke may be varied relative to the pivotal mounting of the yoke so as to effect the desired length of stroke by connecting the rods 57 and 58 to the yoke nearer the shaft 17 or farther away from said shaft, to vary the length of movement of said rods and thereby increase or decrease the number of impulses necessary to rotate the cams 56 and 81.

While the invention has been specifically shown and described, I do not desire to limit myself to the exact details of construction shown but may employ such modifications in the details of construction and arrangement of various parts as come within the scope of the appended claims without departing from the spirit thereof.

I claim:

1. In a machine for folding sheet ma-

terial, a carrige on which the article to be folded may be fed from a point thereabove, means for reciprocating said carriage, and means for advancing the folded article to one side of the carriage at the termination of a predetermined number of reciprocations thereof, said last named means being automatically controlled by movement of the carriage.

2. In a machine for folding sheet material, a carriage on which the article to be folded may be fed from a point thereabove, means for reciprocating said carriage, means for advancing the folded article to one side of the carriage at the termination of a predetermined number of reciprocations thereof, and means for automatically removing the folded article from the carriage.

3. In a machine for folding sheet material, a carriage arranged to receive a downwardly fed sheet, an auxiliary shaft, means for moving said carriage on rotation of said shaft, and means controlled by movement of said carriage for effecting alternate rotation of said shaft to impart reciprocal movement to said carriage.

4. In a machine for folding sheet material, a carriage arranged to receive a downwardly fed sheet, an auxiliary shaft, means for moving said carriage on rotation of said shaft, means controlled by movement of said carriage for effecting alternate rotation of said shaft to impart reciprocal movement to said carriage, and means for regulating the length of stroke of said carriage.

5. In a machine for folding sheet material, a carriage arranged to receive a downwardly fed sheet, an auxiliary shaft, means for moving said carriage on rotation of said shaft, means controlled by movement of said carriage for effecting alternate rotation of said shaft to impart reciprocal movement to said carriage, a series of belts extending transversely of said carriage and projecting forwardly thereof, and means for rotating said belts intermittently to advance the sheet folded thereon.

6. In a machine for folding sheet material, a carriage arranged to receive a downwardly fed sheet, an auxiliary shaft, means for moving said carriage on rotation of said shaft, means controlled by movement of said carriage for effecting alternate rotation of said shaft to impart reciprocal movement to said carriage, a series of belts extending transversely of said carriage and projecting forwardly thereof, and means for rotating said belts intermittently to advance the sheet folded thereon, said last named means controlled by the shaft reversing means.

7. In a machine for folding sheet material, a carriage arranged to receive a downwardly fed sheet, an auxiliary shaft, means for moving said carriage on rotation of said shaft, means controlled by movement of said carriage for effecting alternate rotation of said shaft to impart reciprocal movement to said carriage, a series of belts extending transversely of said carriage and projecting forwardly thereof, means for rotating said belts intermittently to advance the sheet folded thereon, and means for removing the folded sheet from said belts.

8. In a machine for folding sheet material, a carriage on which the article to be folded may be fed from a point thereabove, means for reciprocating said carriage, pulleys mounted on said carriage, belts traveling over said pulleys and over said carriage, means for operating said pulleys and belts to draw the folded material to one side of said carriage, and means over which the folded material is thus drawn for picking up the folded material from said belts and delivering it from the machine.

HERBERT E. PELTON.