MACHINE FOR FOLDING FABRIC.

This invention relates to an improved machine for folding sheets of fabric and in particular regular pre-determined sized sheets and the machine that is illustrated and described is of the most commonly used type for folding handkerchiefs, napkins and the like in mills where they are made or in the laundries where large quantities of fabric sheets are folded such as in hospitals and hotels.

While such articles as handkerchiefs, napkins and the like can be made in various dimensions, they are usually made square and the machine that is described herein is applicable to such articles and as they are customarily folded twice, once across and then once across the other way, the machine illustrates the disposition of parts that will do this kind of folding.

The handkerchiefs or similar articles are fairly stiff as they come from the laundry or from the last manufacturing step in a factory and are laid on the table of the machine. The machine picks up the handkerchief, folds it, and if desired it can be pressed or ironed so that it will remain folded and flat, and the invention contemplates here usual use of such flattening or ironing means as part of the folding machine. The absence of the ironer however, does not affect the operation of the folding mechanism.

The commercial operation of the machine also contemplates the use of a stacking device depositing the folded articles on a pile and in alignment so that they are assembled ready for being tied in bundles or for direct use.

The invention also consists of various details of construction that are more fully set forth hereinafter and finally embodied in the claims.

The invention is illustrated in the accompanying drawings in which Figure 1 is a plan view of a machine embodying our invention. Figure 2 is a side view thereof and Figure 3 is a front view of the machine. Figure 4 is a section on line 4—4 in Figure 3 and Figure 5 is a section of the frame and one of the folding guides, this section being taken on line 5—5 in Figure 3. Figure 6 is a detail section taken on line 6—6 in Figure 1 and Figures 7 and 8 are detail sections showing the folding operation and being taken on line 7—7 in Figure 1, showing the parts on a large scale. Figure 9 is a detail view of a rocker arm operating the carrier of the piling or stacking device and Figure 10 is a perspective view of a finger for holding the edge of the material after the first fold and to hold it in position for the second fold.

The machine comprises an ordinary frame made of the usual wooden or similar uprights or braces which are not described in detail but indicated in general by the reference numeral 10 and they support a table 11 on which table is laid the sheet to be folded, either the handkerchief or napkin or the like and to enable the operator to quickly place the articles in position, we arrange guides which consists of a guide 12 adjustable on the side plates 13 by any suitable means such as the pegs 14 fitting in holes 15 and the guide 12 is provided with a transverse guide 16 similarly adjustable so that the edges of the guide 16 and the guide 12 define a slightly raised and provide elements in which one corner of the article is seated and it is then in position to be folded. The guides are shown in Figure 1 in position to receive a relatively small-sized article and the guides are, of course, properly treated to receive a larger size.

When the article is placed on the table it is also placed over one of the members of the folding mechanism which, when the article is placed on the table, is depressed to be approximately at the level of the table. This member of the folding mechanism comprises a standard or post 17 which has a vertical movement to a limited extent, the post 17 having transversely projecting bars 18 and 19 which are spaced apart and are substantially parallel and have no support at the other end so that the folder finger can pass between them. This construction will be evident from Figure 5.

One mechanism for raising and lowering the folder guide by means of its post 17 is shown in Figure 5 and comprises a lever 20 pivoted at 21 and raised and lowered by a cam 22 on the shaft 23. The shaft 23 is suitably driven and we show it as being operated by the gears 24 from a shaft 25 which is driven by means of the worm gear 26 in the worm 27 on the motor 28.

The folding mechanism, in addition to the folder guide just described, consists of a folder finger 29 which is propelled by suit.
able means but we illustrate a crank 30 on the shaft 25, the crank being connected by
a link 31 with the rocker arm 32 pivoted at
the frame of the machine and having
a sliding connection at its free end with the
slide piece 34 sliding on a suitable track or
other guiding means 35 and having secured
therto the folder finger 29. The folder
finger 29 rests at its free end on a plate 36,
the end of the folder finger 29 just resting
on the plate for support and which short
end enables it to clear the post 17 as will be
evident from Figure 1.

The parts are so synchronized that the
folder finger 29 is well in advance of the folder
guide with its bars 18 and 19 when an ar-
ticle is laid on the table ready to be folded
and the folder guide remains down after
the folder finger comes back, as will be
evident from Figure 7. When, however,
the folder finger 29 has passed to the rear
of the folder guide and is ready for its for-
ward movement as shown at a in dotted out-
line in Figure 7, the mechanism in this case,
the cam 52, raises the folder guide so that
as the folder finger comes forward it car-
rries the handkerchief or other article with
it and gauging it at the centre and carrying
it between the bars 18 and 19 of the folder
guide as shown in Figure 8.

To take out any wrinkles that might oc-
cur in the cloth and to keep it taut while
it is being folded, we place a tension plate
37 so that it projects forward, the bar 18
being slightly pivoted thereon, this plate ex-
tending the full width of the bar approxi-
mately, and preventing the cloth from fall-
ing down and resting in the path of the for-
ward movement of the folder finger in
advance of the folder finger and the cloth
carried by it.

This tension plate is preferably of smooth
metal and offers no obstruction to the pack-
ing of the cloth sufficient to make the oper-
ation of the machine difficult and is usually
of a length so that when the folder finger
has engaged it and slightly lifted it to pass
under it, the edge of the cloth as shown at
b in Figure 8, has passed up on the tension
plate and is thus out of the path of the
folder finger.

A second tension plate 38 is pivoted as at 39
to the table and rests on the bar 19 and pro-
vides a smooth flat surface over which the
cloth in rear of the folder finger when the
folding begins is kept taut and is pressed
smooth on its passage through the folder
guide and is prevented from falling down
into the trough or hole that is made in the
table for the reception of the folder mecha-
nism when it is depressed.

In the operation of this folder, as the
folder finger 29 sweeps forward carrying the folded
article from the guide the operator of the
machine stands ready to put another article
in position on the table which is done as
soon as the finger 29 is out of the way. The
guide on the post 17 has, in the meantime,
descended and the new article is laid over
it. The finger then slides back and operates
as before to carry and fold the article in
the opening in the folder guide.

In the usual machine it is necessary to fold
twice, once as above described and then
across at right angles to the first fold. For
accomplishing this we show a second folder
which is illustrated as substantially a dupli-
cate of the first one. The second folder has
the post 40 which is a duplicate of the post
17, the post 40 being raised by the cam 41
operating on the lever 42 which is pivoted
at 43 and has its end resting under the post
40. The folded piece is now narrower so
that the bars 44 and 45 are shorter than the
bars 18 and 19. The finger 46 operates the
same as the finger 29 and being carried by
the slide 47 on the track 48 and swung by
the lever 49, the link 50 and the crank 51
on the shaft 23. The tension plates 52 and
53 operate the same as the tension plates
37 and 38.

In the case of this second folder the finger
46 when it leaves the space between the bars
44 and 45 it passes over a second table 54
(see Figure 6). The table 54 is elevated
and supported at its front edge 55 so that
there is a clear space underneath. This
space is necessary because the first fold of
one article is being made when the second
fold of the preceding article is being made,
that is, after the folded article carried by
the finger 46 has been carried across the top
of the table 54 and the finger 46 is return-
ing to its starting position the finger 29
is sliding the next article under the table
54 and over the guide on the post 40, which
in the meantime has descended. These move-
ments of the respective fingers and guides
are performed in their proper sequence by
the synchronized movements of the cams 22
and 41 and the cams 30 and 51.

When the folded article is carried for-
ward by the finger 29 it is held against re-
treating by the spring clamp 55 held down
by a spring and hinged at 56 to the table
11. The slide 34 (see Figure 10) has a
spring lip 57 which raises the finger 58 of
the clamp 55 and allows the front edge of
the finger 29 to put the folded edge under
the clamp 55. The finger 55 and the lip 57
are of thin spring metal and the lip 57 passes
under and past the finger 58 and on the
return stroke, as the finger retreats, the lip
57 rides over the finger 58 and holds the
clamp 55 down while the folder finger 29
slides out from the folded edge of the
article.

In case the folded article is to be pressed
we install the rollers 59 and 60, one or both
of which may be heated, which rollers are.
disposed so that the finger 46 on the end of its folding stroke delivers the folded goods far enough forward to let the rollers get a "bite" on the folded edge and they then draw it through. The screw 60 provides for pressure adjustment. The rollers are shown as driven by the belt 61, connecting pulleys 62 and 63 which latter is driven by the shaft 44 which in turn has the pulley 65, the belt 66, and the pulley 67 on the shaft 25 to drive it.

To receive the folded articles in piles or stacks, I provide a table 68 which receives each article in turn from the swinging plate 60 which has an adjustable stop 70 to receive the folded article which slides from the rollers 69 and 60 over the shield 61 onto the swinging plate 69. The plate is pivoted as at 72 and is reciprocated by means of the pinion 73 and the segmental rack 74 which rack is pivoted on a shaft 75 and is rocked by a rocker arm 76 which is provided on its end with a roller 77 in contact with the cam 78 on the shaft 25.

The throw of the segmental gear can be regulated by the screw connection 79. This cam 78 operates the rocker arm 76 in one direction the segmental rack being operated in the other direction by the spring 80. To provide against jamming in case the spring 80 becomes inoperative for any reason, the emergency roller 81 adjacent the cam 78, is engaged by this cam to push the rocker arm back but a smoother operation is performed by the spring 80 and the roller 81 is only operative if the mechanism should stick.

The table 68 descends as the pile of folded articles increases in height on its top face by any suitable means for permitting it to descend, the form shown comprising a rack 82 held against downward movement by the pinion 83 which is operated by the balance lever or pawl 84 operated by the rod 85 from the small arm 86 and the shaft 75 of the segmental gear.

It will thus be seen that as each article is deposited on the table 68 by a swinging of the plate 69, the balance pawl 84 permits the pinion to rotate one tooth which permits an increase in descent by gravity of the rack 82 and the table 68.

To permit a rapid re-setting of the table, we provide the ratchet connection 87 shown in Figure 3. This ratchet holds the rack and pinion supporting the table from descending except by a gradual step-by-step movement but permits it to be raised to the position from which it starts its descent.

We claim:

1. A fabric folding machine comprising a vertically movable folder guide, a horizontally movable folder finger, tension plates on the guide, and means for raising the guide and advancing the finger through the guide to fold a piece of fabric deposited on the guide.

2. A fabric folding machine comprising a vertically movable guide, a horizontally movable folder finger, tension plates on the guide, and means for raising the guide and advancing the finger through the guide to fold a piece of fabric deposited on the guide.

3. A fabric folding machine comprising a guide with spaced bars and which is movable to slightly raise a piece of fabric deposited thereon, and a finger to pass through the guide and fold and carry the said fabric when the guide is raised.

4. A fabric folding machine comprising a folder guide with an opening therein, a folder finger to pass laterally through the guide, and means for placing the guide and finger out of alignment when the finger retreats and to place the finger in line with the opening in the guide when the finger advances.

5. A fabric folding machine comprising a vertically movable guide including spaced bars and tension plates adjacent the same, a folder finger to pass between the bars to carry a sheet of fabric and fold it by passing it between the bars and plates, means for moving the guide to place it in and out of the path of the finger, and means for reciprocating the finger.

6. A fabric folding machine comprising a table to hold a piece of fabric, a folder guide to rest close to the table and also to be elevated to raise a part of the fabric where the fold is to be, a folder finger to pass through the guide to carry the fabric so raised and fold it on its passage through the guide, means for reciprocating the guide and means for reciprocating the finger, a second folder to receive the folded piece, said second folder including a guide, and a finger operating transversely to the direction of motion of the finger of the first folder, and means for operating the second folder.

7. A fabric folding machine comprising a table to hold a piece of fabric, a folder guide to rest close to the table and also to be elevated to raise a part of the fabric where the fold is to be, a folder finger to pass through the guide to carry the fabric so raised and fold it on its passage through the guide, means for reciprocating the guide and means for reciprocating the finger, a second folder to receive the folded piece, said second folder including a guide, and a finger operating transversely to the direction of motion of the finger of the first folder, and means for operating the second folder.

8. A fabric folding machine comprising a table to hold a piece of fabric, a folder guide to rest close to the table and also to be elevated to raise a part of the fabric where the fold is to be, a folder finger to pass through the guide to carry the fabric so raised and fold it on its passage through the guide, means for reciprocating the guide and means for reciprocating the finger, a second folder to receive the folded piece, said second folder including a guide, and a finger...
operating transversely to the direction of motion of the finger of the first folder, means for operating the second folder, a pair of rollers to receive and press the folded fabric, the second finger being propelled until its folded fabric is grasped by the said rollers.

9. A fabric folding machine comprising a table on which a sheet of fabric is supported, a folder guide on the table and having spaced elements through which the fabric can pass when folded, a finger adapted to be reciprocated above the table, and means for elevating the guide when the finger advances so that the finger carries the fabric between the elements on the guide to fold it.

10. A fabric folding machine comprising a table on which a sheet of fabric is supported, a folder guide on the table and having spaced elements through which the fabric can pass when folded, a finger adapted to be reciprocated above the table, means for elevating the guide when the finger advances so that the finger carries the fabric between the elements on the guide to fold it, a second table, a second folder means as the first but operating at right angles thereto and including a folder guide and a folder finger, the parts being disposed so that the first finger passes beneath the second table and the second finger passes above it.

11. In a machine for folding fabric, a table, a folder guide vertically movable on the table, the guide including a post, a pair of parallel bars extending from the post, a tension plate extending forwardly from one bar and a second tension plate secured to the table and extending forwardly between the bars, and a folder finger slideable between the bars and between the plates to carry a sheet of fabric between the bars and plates and thus keep it taut and fold it.

12. A fabric folding machine comprising a folder guide on which a piece of fabric is adapted to be laid, the folder guide elevating said piece intermediate its ends, and a horizontally movable finger adapted to pass through the guide and to carry and fold the piece by said passage, and means for reciprocating the finger.

13. A fabric folding machine comprising a folder guide disposed so that a piece of fabric can be laid substantially flat thereon, a horizontally movable finger disposed so as to pass through the guide and carry and fold the fabric by the said passage, and means for reciprocating the finger.

14. A fabric folding machine comprising a guide with a space therein, the guide being adapted to allow a piece of fabric to be laid thereon, a finger disposed so as to move above the fabric and then through the guide to carry and fold the fabric by the said passage, and means for reciprocating the finger.

In testimony that we claim the foregoing, we have hereto set our hands, this 4th day of August, 1924.

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