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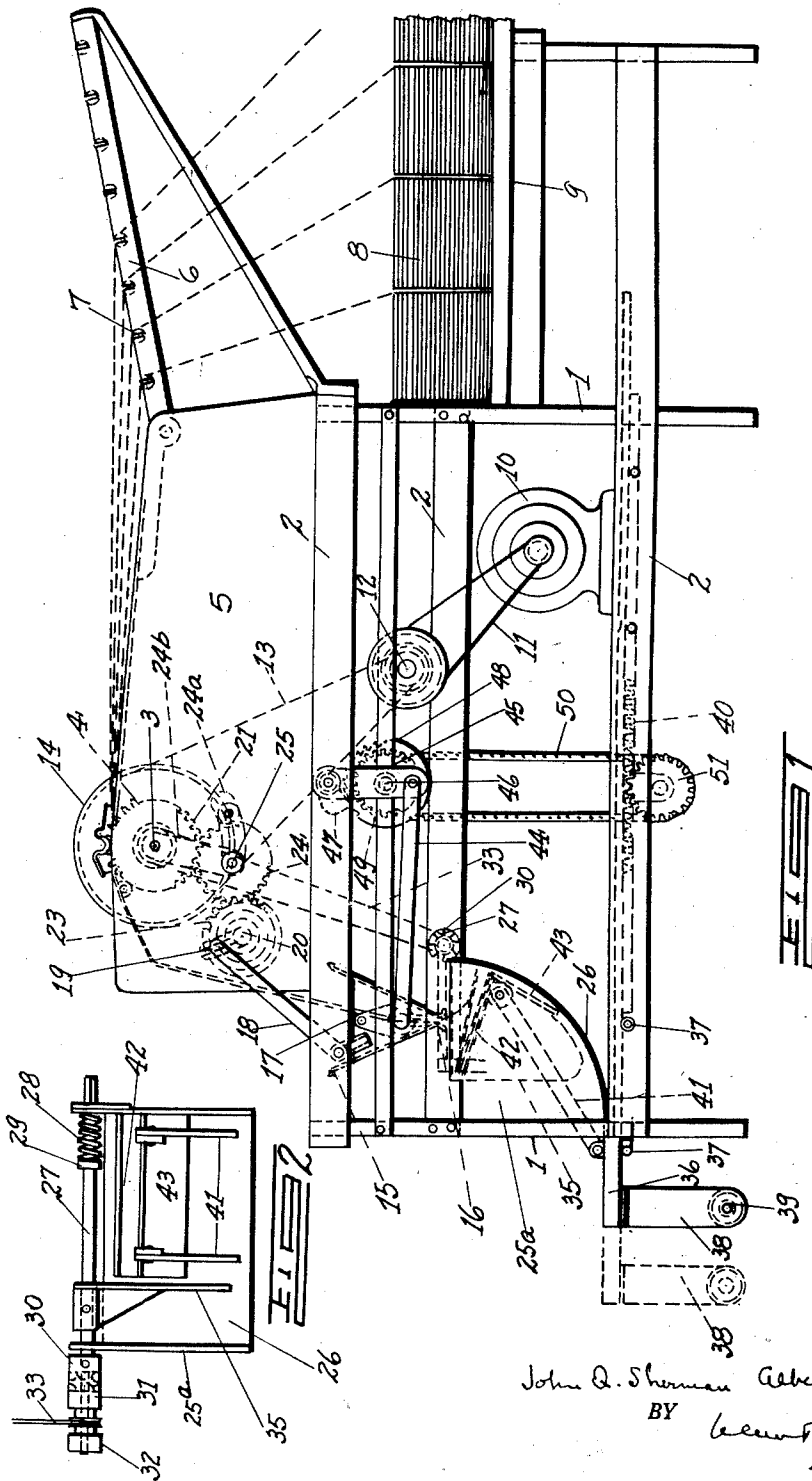
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J. Q. SHERMAN ET AL

PAPER FOLDING MACHINE

Filed Jan. 7, 1927

2 Sheets-Sheet 1



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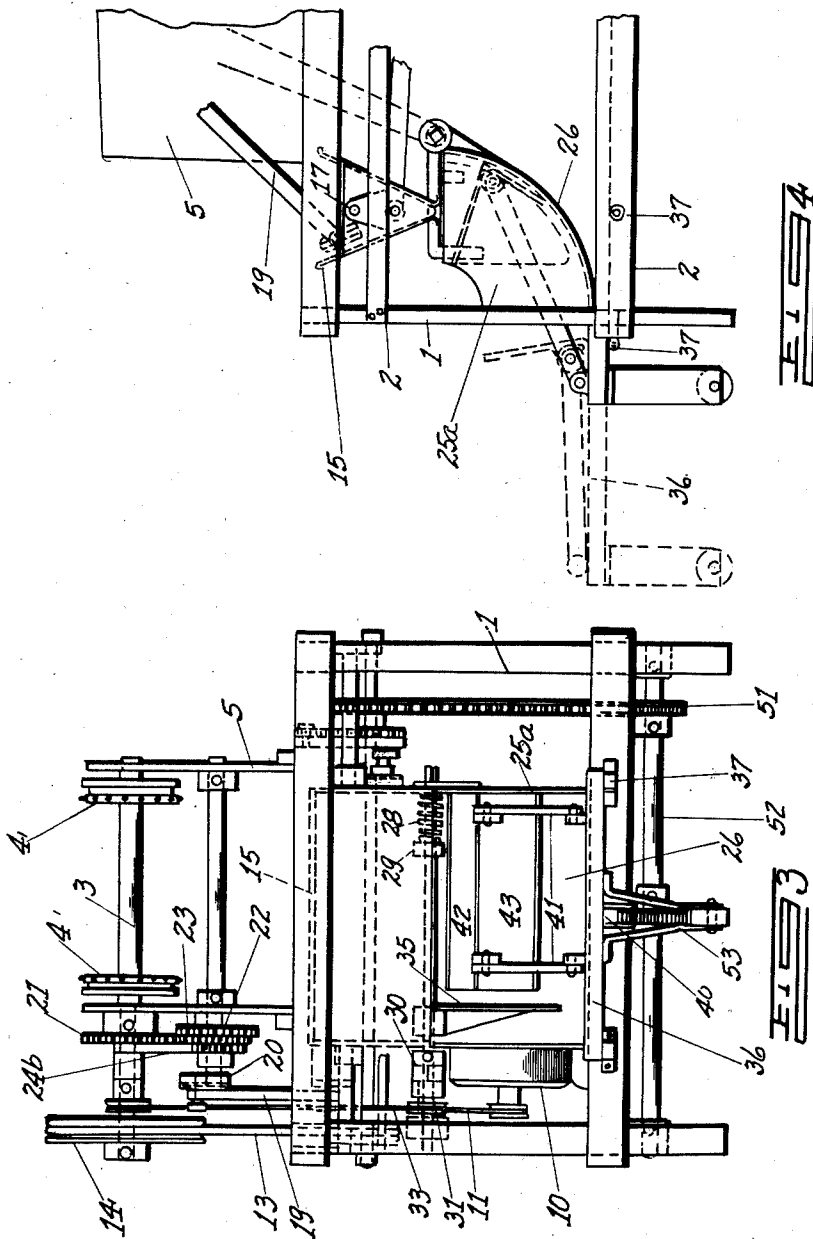
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PAPER FOLDING MACHINE

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2 Sheets-Sheet 2



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PAPER-FOLDING MACHINE.

Application filed January 7, 1927. Serial No. 159,676.

Our invention relates to the folding of
manifolding paper in a plurality of strips,
into single bundles in which the established
lines of fold of several individual flat folded
strips form the line of fold in a unit bundle
formed of all of the strips.

A bundle of flat folded manifolding forms
of the type produced by our machine, is
known in the trade as a "superfolded" bundle.
The paper webs are arranged and fed in
superimposed and collated relation to a fold-
ing device which lays down a series of folds
first to the right and then back to the left,
forming a single flat pack of a length equal to
one form length.

It is the object of our invention to provide
a machine for the purpose noted, in which a
large quantity of paper can be handled, kept
in alignment and folded into an even pack.
It is an object thus to provide means for keep-
ing the packs even at the sides, and for a take
off device in the form of a moving tray, onto
which the paper passes as it is folded, and
which may be driven automatically to take
the folded paper as it comes from the folding
element, and serve as a support therefor.

The machine, as we show and describe it,
has various attachments for perfecting its op-
eration, some of which may be omitted or al-
ternative structures used, and we do not wish,
because of a full description of the machine
in its details, thus to limit the scope of our in-
vention, which it is purposed to outline in the
appended claims.

We accomplish our objects by that certain
construction and arrangement of parts to be
hereinafter more specifically pointed out and
claimed.

In the drawings:—

Figure 1 is a side elevation of the machine.
Figure 2 is a detail view of the lateral pack-
ing device and pack starting device.

Figure 3 is a front elevation of the machine.
Figure 4 is a detail side elevation of the
bundle forming and take off devices.

Referring to the illustrated embodiment of
our invention, there is a frame provided, hav-
ing uprights 1, and suitable cross bars 2, form-
ing a fixed framework on which the several
parts are mounted.

In the particular machine shown, the mani-
folding paper is of the type having regularly
spaced marginal holes therein, by means of
which a true, self-aligning paper feed may be
had in the manifolding machine. Thus the

feed for the paper into the machine is formed
of a shaft 3, on which are the pin wheels 4,
which engage and feed the paper. The shaft
is located in a frame 5, from the rear of which
extend the roller supporting bars 6. These
bars are provided with idlers 7, one for each
paper web, and the paper in bundles 8 already
folded, and thus having an established line
of fold, is set on the rear table 9.

It will be understood that the printing ma-
chines which print the forms, may be pro-
vided with folding devices to fold the web
back and forth on the dividing lines between
forms, and in this way the fold lines in the
bundles are provided.

Each paper web is provided with its own
idler roller 7, and passes thence over the pin
wheels, which bring the forms together, keep
them in alignment, and feed them down into
the superfolding device that forms a single
bundle of all of the webs used.

There are other types of aligning feed, and
these may be employed instead of the feed
used, but it is desirable that some type of self-
alignment or readjustment of forms be re-
sorted to to avoid bringing the fold lines of the
webs into the wrong place in forming the sin-
gle bundle or superfold. Very slight errors
in form length will accumulate in a feed
which feeds many thousands of forms, until
a large error arises, and hence it is necessary
to provide for a safeguard in the form of some
kind of a readjustment for the best and most
continuous operation of the machine.

The drive of the machine may be an elec-
tric motor 10, from which chains and
sprockets or belts and pulleys extend to the
various parts. Thus a belt 11 from the motor
drives a shaft 12 arranged across the machine,
which shaft drives the paper feed shaft by a
belt 13 to a pulley 14 on the shaft. The pul-
leys 13 and the pin wheels may be changed
for various lengths of forms, as may the
spacing of the pin wheels for various widths.

The paper passes from the pin wheels,
which delivers it as noted, to a swinging hop-
per 15, having a downwardly tapered forma-
tion, terminating in a nozzle like transverse
opening 16. This hopper is pivoted at 17
on two opposite side pieces of the main frame,
and is rocked by a crank arm 18 pivoted to
said hopper, and to a crank 19 on the shaft 20.

The latter shaft is mounted across the ma-
chine and is driven by gears from a main
gear 21 on the paper feed shaft. There is a

collar 22 on the shaft 20, which carries gears of three sizes as at 23. An idler gear 24, mounted on a stud 25, is arranged to be moved to position of mesh with the gear 21 and the selected gear of the group 23, by mounting the stud in a slotted bracket 24^a held on one of the side frames of the paper feed device. The stud is arranged on an arm 24^b, held on shaft 3.

10 The paper is guided at the start, down through the hopper, and as the hopper swings to and fro and the feed continues to advance the plural webs of paper, the folding of the paper is accomplished by leaving sufficient as pendant webs from the mouth of the hopper to the point of support of the paper.

15 The receiving box is formed with straight side walls 25^a, and a curved base 26. The box is fixedly mounted in the main frame, and will be as wide as the widest paper to be handled. A shaft 27 is slidably mounted in its walls, and is pressed, in the instance shown, to the left by means of a spring 28, coiled about it and engaging a collar 29 thereon.

25 The shaft extends out through the one side of the box and is equipped with a cam collar 30. A sleeve 31 is set over the shaft, which shaft has a bearing 32 in the side of the main frame, and the sleeve is revolved by a belt and pulley device 33 from the paper feed shaft. The sleeve has a bearing against the frame and against the cam collar on the shaft 27, and itself has a cam face which engages the cam face on the collar. As a result, the shaft 27 is caused to reciprocate across the top of the receiving box. The end 34 of the shaft may be squared to prevent it from revolving, as it reciprocates in the walls 25^a.

40 The shaft 27 has a plate 35 thereon, and adjustably held by a set screw, and the arrangement will be such that as the shaft is reciprocated, the plate taps against the side of a paper bundle being formed in the receiving box.

45 It is important that the base of the receiving box be slanted or curved so as to permit the paper to move down out of the open side of the box as it is piled up from above.

50 The receiving tray is formed as a table 36, which slides on rollers 37 set in cross pieces of the frame. It has legs 38 and wheels or rollers 39 at its outer end, and has mounted along one side, extending inwardly from its other end, a rack bar 40, whose teeth depend from the tray.

55 The tray has a pair of arms 41 hinged thereto which carry a cross plate shaped to present a receiving support 42 for paper, and a depending flange 43 to follow the base of the receiving box. The arms with the receiving support are swung to a position to receive the first part of the bundle as it is formed, as indicated in the inner position thereof in Figure 4, and as indicated in Figure 1.

The rack on the tray is driven to feed the tray gradually outward from the receiving box. The mode shown of accomplishing this is a link 44 mounted pivotally on the hopper and swung thereby, which link swings to and fro, thus moving a pawl carrier arm 45 mounted on a stud 46, and bearing the pawl 47. The pawl engages a ratchet 48, also on the stud, said ratchet being fast to a sprocket 49. A chain 50 from the sprocket 49 engages another sprocket 51 on the shaft 52. The shaft 52 is supported in the frame and carries the gear 53 that meshes with the rack on the tray. By this means, a slow movement of the tray is provided, the movement being such that the paper is kept at approximately the same level within the receiving box, the previously folded and bundled portions moving along with the tray so as to be out of the way.

85 When the tray has moved outwardly, the arms and the receiving plate thereon that are pivoted to the tray, move with it, and the plate acts as an abutment for the paper.

It will be evident from the above description of parts that the paper in plural plies is fed through the hopper, which as it swings, permits the pendent ends of the webs to arrange themselves on the receiving plate within the receiving box in a plural ply flat bundle, preserving the original fold lines of the individual webs.

As the bundle builds up, it is tapped at the side to keep the walls thereof straight, and the receiving plate moves down, carrying the base of the bundle, so that the tray gradually becomes filled with the superfolded paper, with the plies thereof standing erect.

100 The operator may swing the receiving plate out of the way and move the paper bundle along the end of the tray, substituting some other abutment, thus permitting the tray to be filled with paper. The paper, when the tray is filled, may be moved to a point for making up smaller packs from the superfolded paper by moving the tray itself, or by lifting the paper off sideways onto a suitable carrier.

105 It will be noted that various parts of our machine could be omitted, with the exception of the swinging hopper and the provision of some mechanism to advance plural webs of superimposed paper to the hopper, and the operator do the rest of the work by hand. It is an advantage, however, to provide a machine which needs only to be started and stopped, because a single operator can tend to several machines at once.

115 Having thus described our invention what we claim as new and desire to secure by Letters Patent is:—

1. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, means for advancing the paper from the bundles in unison and

superimposed upon each other, and a swinging frame through which the paper passes, and means for receiving the paper as it is piled by the swinging frame.

2. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, means for advancing the paper from the bundles in unison and superimposed upon each other, and a swinging frame through which the paper passes, and means for receiving the paper as it is piled by the swinging frame, said receiving means being located sufficiently below the end of the swinging frame from which the paper issues, to permit of a freely swinging pendent web portion above the receiving means.

3. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, means for feeding in superimposed relation, webs of paper from said single bundles, said feeding means cooperating with the paper to provide automatic alignment of the webs with each other, and swinging frame through which the paper passes from the feeding means in a downward direction, and a receiving means for the paper located below the end of the frame from which the paper issues.

4. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a frame having its side walls arranged to lie outside the pendant web, and terminating in a restricted orifice of at least the width of the web, and means for moving the frame.

5. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a folding means arranged to engage said pendant web and swing it to and fro.

6. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a folding means arranged to engage said pendant web and swing it to and fro, said means comprising a tapered hopper like structure having a narrow issuing orifice at its lower end of at least the width of the paper.

7. In a machine for forming plural ply, flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a folding means arranged to engage said pendant web and swing it to and fro, and a re-

ceiving device for the paper, arranged to present a sloping base wall, and means for supporting the paper bundle in erect position after it leaves the said sloping base wall.

8. In a machine for forming plural ply flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a folding means arranged to engage said pendant web and swing it to and fro, and a receiving device for the paper, arranged as an open sided box, having a downwardly curved bottom, and means for presenting a supporting surface to the paper bundles as it starts to be formed within the said box.

9. In a machine for forming plural ply flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a folding means arranged to engage said pendant web and swing it to and fro, and a receiving device for the paper, arranged as an open sided box, having a downwardly curved bottom, and means for presenting a supporting surface to the paper bundles as it starts to be formed within the said box, and driving means for moving said starting supporting surface down through the box as the paper accumulates thereon.

10. In a machine for forming plural ply flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendant composite web, and a folding means arranged to engage said pendant web and swing it to and fro, and means for supporting the bundle as it is formed, and for tapping said bundle on the side to keep it in transverse alignment.

11. In a machine for forming plural ply flat folded paper bundles from a series of single flat folded bundles, means for advancing the paper from the bundles in unison and superimposed upon each other, and a swinging frame through which the paper passes, and means for receiving the paper as it is piled by the swinging frame, and means for tapping said bundle on the side to keep it in transverse alignment.

12. In a machine for forming plural ply flat folded bundles of paper from single ply bundles, comprising means for delivering and rocking to and fro, the webs of paper from said single ply bundles in superimposed pendent relation, a receiving box having a curved bottom, in which the bundle is formed from said webs, and a receiving tray located to receive the paper from the bottom of the box in position with the plies of the bundle vertically disposed, said tray being movable to

take off the paper as the box becomes filled.

13. In a machine for forming plural ply flat folded bundles of paper from single ply bundles, comprising means for delivering and rocking to and fro, the webs of paper from said single ply bundles in superimposed pendent relation, a receiving box having a curved bottom, in which the bundle is formed from said webs, and a receiving tray located to receive the paper from the bottom of the box in position with the plies of the bundle vertically disposed, said tray being movable to take off the paper as the box becomes filled, and means for driving said tray mechanically to move in synchronism with the pendent paper web movement, in a path away from the receiving box.

14. In a machine for forming plural ply flat folded bundles of paper from single ply bundles, comprising means for delivering and rocking to and fro the webs of paper from said single ply bundles in superimposed pendent relation, a receiving box having a curved bottom, in which the bundle is formed from said webs, and a receiving tray located to receive the paper from the bottom of the box in position with the plies of the bundle vertically disposed, said tray being movable to

take off the paper as the box becomes filled, and means for driving said tray mechanically to move in synchronism with the pendent paper web movement, in a path away from the receiving box, said tray being formed as a platform having supporting legs at the forward end, and supported with the delivering and rocking means at the other end.

15. In a machine for forming plural ply flat folded paper bundles from a series of single flat folded bundles, a paper feeding means arranged to deliver the individual webs from said bundles in superimposed relation into a pendent composite web, and a folding means arranged to engage said pendent web and swing it to and fro, and receiving box having a downwardly curved base, and a receiving tray slidably mounted in the machine and having hinged thereto a starting support for the paper within the box, and means for mechanically driving the tray to move it away from the box, whereby the starting support becomes a vertical abutment for the paper bundle as it accumulates on the tray, moving thereto by gravity from the box.

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