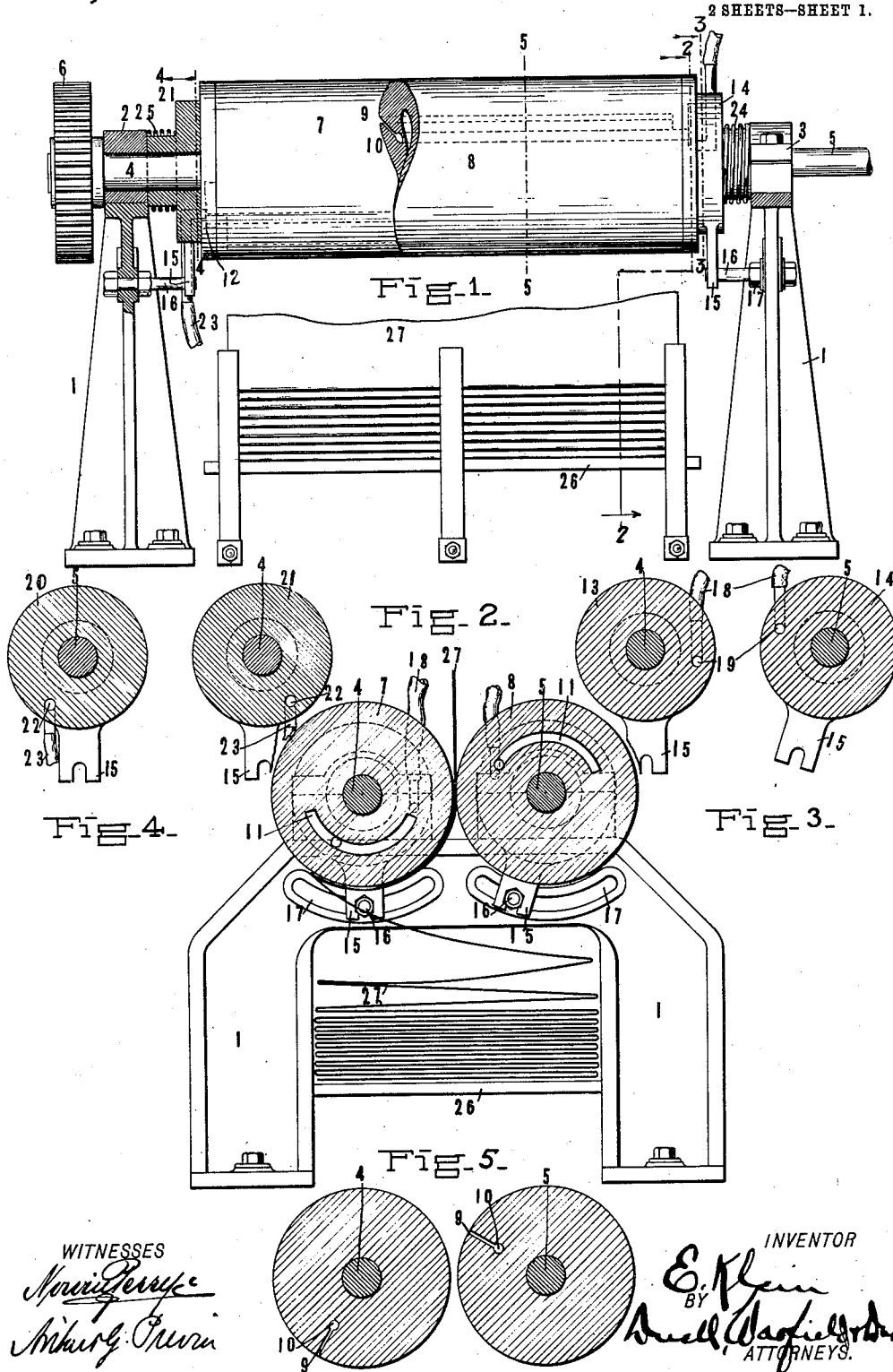


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WEB FOLDING MECHANISM.
APPLICATION FILED JULY 15, 1907.

940,933.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 1.



WITNESSES
Henry Perry
Arthur C. Brown

INVENTOR
E. Klein
BY *Small, Dargatzis & Co.*
ATTORNEYS.

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FIG-6.

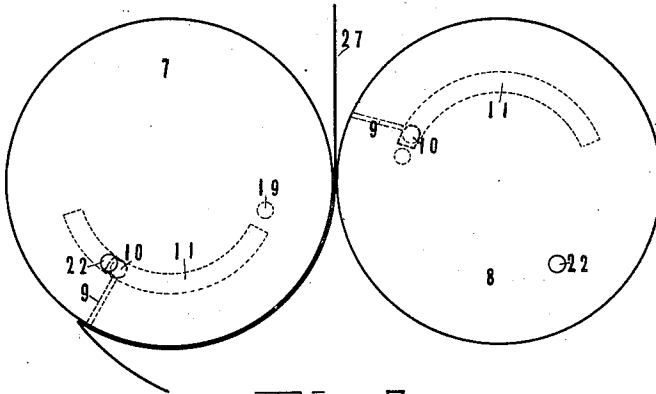
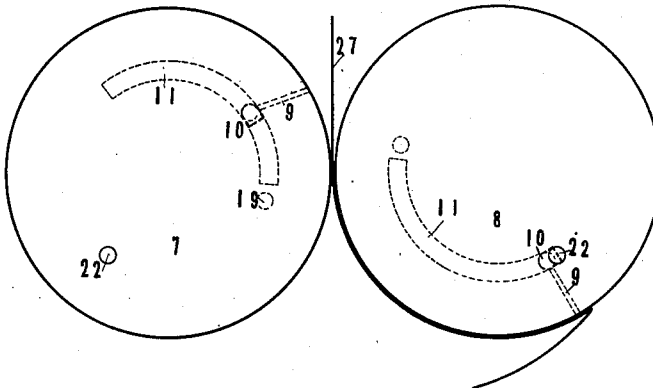


FIG-7.



WITNESSES
Horatio Perry
Arthur G. Brown

INVENTOR
E. Klein
BY
Adell, Warfield & Adell
ATTORNEYS.

UNITED STATES PATENT OFFICE.

EUGEN KLEIN, OF DRESDEN, GERMANY, ASSIGNOR TO THE CARTER-CRUME CO.
(LIMITED), OF NIAGARA FALLS, NEW YORK, A CORPORATION OF CANADA.

WEB-FOLDING MECHANISM.

940,933.

Specification of Letters Patent.

Patented Nov. 23, 1909.

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To all whom it may concern:

Be it known that I, EUGEN KLEIN, residing at Dresden, in the Kingdom of Saxony and Empire of Germany, have invented certain new and useful Improvements in Web-Folding Mechanism, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to folding mechanism, and is more particularly directed to mechanism adapted for folding continuously-fed webs.

One of the objects of the invention is to provide simple and improved mechanism for alternately folding a web in opposite directions, whereby the folded portions are superimposed one upon another in zigzag arrangement.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is illustrated one of the various possible embodiments of this invention,—Figure 1 is a view in front elevation, certain of the parts being shown in section better to illustrate the construction; Fig. 2 is a vertical sectional view, taken on line 2—2, Fig. 1, through the machine near one end thereof; Fig. 3 is a view in section on line 3—3, Fig. 1, of the stationary valve members provided in one end of the folding cylinders; Fig. 4 is a similar view on line 4—4, Fig. 1, of the valve members at the opposite end of the folding cylinders; Fig. 5 is a view in vertical section taken through the folding cylinders; Figs. 6 and 7 are diagrammatic views showing the relative position of the cylinders at different points in the folding operation.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings, 1 indicates a pair of upright standards in the upper end of which journals 2 and 3 are provided for driving shafts 4 and 5, said

shafts being provided outside the journals at one end thereof with intermeshing gear wheels, one of which is shown at 6. Power may be furnished to drive the shafts through either one thereof.

Mounted upon each of shafts 4 and 5, and adapted to be rotated thereby, are rollers or cylinders 7 and 8, respectively. Shafts 4 and 5 rotate these cylinders toward each other at their upper portions, so that they may receive the web which is to be folded. Apertures, preferably in the form of elongated slits 9, are formed in each of the cylinders, said slits being connected by means of canals 10 with arc-shaped channels 11 formed in one end of the cylinders. Canals 10 also lead to apertures 12 located at the opposite end of the cylinders.

Seated in one end of cylinders 7 and 8 are valve members 13 and 14 respectively. These members rest upon shafts 4 and 5 respectively, which extend loosely there-through, are held against rotation by means of depending arms 15 and are held against rotation by bolts 16 which are adjustably secured in arch-shaped slots 17 formed in standard 1.

Members 13 and 14 at one end of the cylinders are each connected with a source of air suction by means of tubes or pipes 18, which lead thereinto, said members being provided with canals 19 the mouths of which terminate in their inner faces, and the disposition of the mouths of these canals and the channel 11 being such that at certain times during the revolution of the cylinders they come into registry thereby connecting the peripheral slits 9 of the cylinders with the source of suction. At the opposite end of cylinders 7 and 8 members 20 and 21 respectively, similar to those at the opposite end, are provided and adjustably mounted and held stationary in a similar manner. These members are also provided with canals 22 which communicate at given intervals during the revolution of the cylinders with apertures 12 of the canals 10 cut in the ends of the cylinders. The canals 22 of these members are connected by pipes 23 with a source of air pressure, so that at predetermined times during the revolution of the cylinders air under pressure is forced from the peripheral slits of the cylinders.

The members 13 and 14 and 20 and 21, set in the opposite ends of the cylinders in con-

junction with the cylinders, constitute valves whereby the suction and air pressure are alternately turned on and off at predetermined rotative points of said cylinders.

5 Springs, as at 24 and 25, are provided for holding the several members resiliently in contact with the ends of the cylinders.

Arranged underneath cylinders 7 and 8 is a table 26 which receives the superimposed folded portions of the web, and if desired this table may be made elastically depressible by means of springs to accommodate the continuously falling folded web.

Having thus described the construction of this embodiment of this invention, the operation thereof may now be understood, which, it is thought, may be most readily grasped by making reference to Figs. 6 and 7, which illustrate the position of the cylinders at the end of two of the folding operations. The web 27, which will usually be perforated and will be folded at the perforated portions, is received between the cylinders, the feed being so arranged with respect to the peripheral slits of the cylinders that the perforated portions will come into registry therewith. At this point it may be noted that during the operation of the machine, successive portions of the web are alternately held in contact with the cylinders by suction, and carried with the cylinders either to the right or to the left during the rotation thereof, and that at given times in the rotative movements of the cylinders said portions are disengaged from the cylinders by forcing compressed air through the slits which have before been connected with the source of suction.

In Fig. 6 a portion of the web is shown as having been carried to the left by cylinder 7, by reason of the peripheral slit thereof and channel 11 having been connected with canal 19, which is in communication with the source of suction through pipe 18. At this point in the rotation of cylinder 7, channel 11 has been moved from registry with the suction canal 19, and the canal 10 of the cylinder is coming into registry with the canal 22 which is in communication with the source of compressed air by means of pipes 23, so that the air blast being forced outward through the slits will disengage the web from the cylinders. Simultaneously with this operation the peripheral slit of cylinder 8 is coming into communication with the source of suction and the next succeeding portion of the web will be carried about cylinder 8, as shown in Fig. 7 of the drawings, when the web will be disengaged from said cylinder by the blast of compressed air which is then passing through the peripheral slit, the source of suction having been cut off from the arc-shaped channel 11 of the cylinder.

35 The alternate carrying to the right and left

of the successive portions of the web effects the folding thereof in zigzag form or arrangement, as shown in Fig. 2 of the drawings. It will be understood that the adjustable mounting of the members 13 and 14, which are seated in opposite ends of the cylinders, enables them to be readily adjusted relatively to each other and to the cylinders to cause the sources of suction and compressed air to engage and disengage the web at the desired intervals in the rotation of the cylinders. The succeeding portions of the web, after being disengaged from the cylinders, fall by gravity upon table 26 in superimposed relation.

It will accordingly be seen that there is provided a construction well adapted to attain the several objects and aims of this invention in an exceedingly simple and efficient manner. The holding of the web in contact with the cylinders being merely effected by air pressure upon the opposite sides of the web, the mechanism of the apparatus is greatly simplified in that no mechanical contrivances or grippers are employed in the folding operation.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In combination, a pair of revoluble cylinders adapted to receive a continuously fed web, and means for forcing a fluid in different directions through said cylinders, whereby said fluid alternately engages different portions of the web and deflects the same in different directions to superimpose them one upon another in zigzag form.

2. In combination, a pair of revoluble cylinders adapted to receive a continuously fed web, and means for directing air alternately inward and outward through the periphery of said cylinders, whereby successive portions of said web are deflected in opposite directions and the web folded in zigzag form.

3. In combination, a pair of rotatable cylinders adapted to receive a continuously fed web, and suction means operated through the periphery of said cylinders adapted alternately to hold different portions of said

web in contact with the cylinders, and air pressure means acting through the periphery of said cylinders adapted alternately to force therefrom the portions of the web which have been held in contact by suction.

4. In combination, a pair of revoluble cylinders adapted to receive a continuously fed web, means cooperating with each cylinder adapted to suck a portion of the web into contact therewith at one point in its rotation, whereby the web is conducted by the cylinder to a given position, and means adapted when such position is reached to force compressed air against the web to disengage the same from the cylinder.

5. In combination, a pair of revoluble cylinders adapted to receive a continuously fed web, means cooperating with each cylinder adapted to suck a portion of the web into contact therewith at one point of its rotation, whereby the web through its contact with the cylinder is conducted thereby to a given position, and means adapted when such position is reached to force compressed air against the web to disengage the same therefrom, said cylinders operating alternately upon successive portions of the web and conducting said portions in opposite directions.

6. In combination, a pair of revoluble cylinders adapted to receive a continuously fed web, and means cooperating with each of said cylinders adapted to effect alternate suction and repulsion upon portions of said web, whereby said portions are held in contact with the cylinder during a portion of its rotative movement, said cylinders acting alternately upon successive portions of the web and carrying the portions so acted upon in different directions, whereby they are superimposed one upon another in zigzag arrangement.

7. In combination, a pair of cylinders revolving in opposite directions adapted to receive a continuously fed web, and means cooperating with each of said cylinders adapted at predetermined intervals to cause pressure upon opposite sides of the web, whereby successive portions thereof are alternately held in contact with said cylinder during a predetermined arc of its rotation and then disengaged therefrom.

8. In combination, a pair of cylinders revolving in opposite directions adapted to receive a continuously fed web, and means cooperating with each of said cylinders adapted at predetermined intervals to effect fluid pressure upon opposite sides of the web, whereby successive portions thereof are alternately held in contact with said cylinders during predetermined arcs of rotation thereof and then disengaged therefrom, the alternate successive portions of said web being carried by the cylinders in opposite directions and deposited one upon another in zigzag form.

9. In combination, a pair of cylinders revolving in opposite directions adapted to receive a continuously fed web, and means cooperating with each of said cylinders adapted at predetermined intervals to cause fluid pressure to act upon opposite surfaces of the web, whereby each alternate portion of the web is held in contact with one of said cylinders during a portion of its rotative movement and released therefrom at a predetermined point in an arc of rotation of said cylinder, said cylinders acting alternately upon successive portions of the web and deflecting the same in opposite directions, whereby said portions are deposited one upon another and folded in zigzag arrangement.

10. In combination, a pair of cylinders adapted to rotate in opposite directions, between which is fed a web, and means cooperating with each of said cylinders adapted at predetermined intervals to cause fluid pressure to act upon opposite surfaces of the web, whereby alternate successive portions thereof are alternately held in contact with said cylinder and disengaged therefrom, the points of the application of the pressure upon the web being determined by said cylinders during their rotative movements.

11. In combination, a pair of cylinders rotating in opposite directions adapted to receive a continuously fed web, said cylinders being provided with means whereby at predetermined intervals, fluid pressure is caused to act upon opposite sides of the web, whereby successive portions of said web are alternately held in contact with said cylinders during a predetermined arc of rotation and then disengaged therefrom, and valves operated by said cylinders adapted to regulate the times of the application of said pressure and the direction thereof upon said web.

12. In combination, a pair of cylinders revolving in opposite directions adapted to receive a continuously fed web, said cylinders being provided with peripheral apertures, a member connected with a source of suction cooperating with the apertures of said cylinder, a member connected with a source of air pressure also cooperating with said apertures, said members in conjunction with said cylinders constituting valves which, during the rotation of said cylinders, effect pressure upon opposite sides of said web at predetermined intervals, thereby engaging and disengaging alternate successive portions of the web with each cylinder, whereby said portions are deflected in opposite directions and folded one upon another in zigzag form.

13. In combination, a pair of rollers adapted to rotate toward each other, each of which has channels extending therethrough which terminate at its periphery, a stationary member seated in the opposite end of each of said

cylinders, one of which has a connection with a source of suction and the other thereof with a source of fluid pressure, said members cooperating with said cylinders during the rotation thereof to cause alternate suction and pressure upon opposite surfaces of the web, whereby alternate successive portions thereof are held in contact with each cylinder during a predetermined arc of its rotation and then disengaged therefrom, said cylinders operating to deflect the alternate successive portions of the web in different directions and superimpose them one upon the other in zigzag arrangement.

14. In combination, a pair of rollers adapted to rotate toward each other, each of which has channels extending therethrough which terminate at its periphery, a stationary member seated in the opposite end of each of said cylinders, one of which has a connection with a source of suction and the other thereof with a source of fluid pressure, said members cooperating with said cylinders during the rotation thereof to cause alternate suction and pressure upon opposite surfaces of the web, whereby alternate successive portions thereof are held in contact with each cylinder during a predetermined arc of its rotation and then disengaged therefrom, said cylinders operating to deflect the alternate successive por-

tions of the web in different directions and superimpose them one upon the other in zigzag arrangement, and means for adjusting the relative position of said members with respect to the cylinders.

15. A cylinder for a fluid pressure operated web folding machine comprising, in combination, a cylindrical member provided with peripheral apertures which lead toward either end thereof, means located at one end of the cylinder for drawing air inward through said apertures, and means located at the opposite end thereof for forcing air outwardly therethrough.

16. A cylinder for a fluid pressure web-folding apparatus comprising, in combination, a cylindrical member provided with peripheral apertures which lead toward either end thereof, and a member seated in one end of said cylinder and cooperating therewith to draw air inward through said apertures, and a member seated in the opposite end of said cylinder for forcing air outwardly through said apertures.

In testimony whereof I affix my signature, in the presence of two witnesses.

EUGEN KLEIN.

Witnesses:

ALFRED A. BREDOW,
PAUL ARRAS.