

No. 770,508.

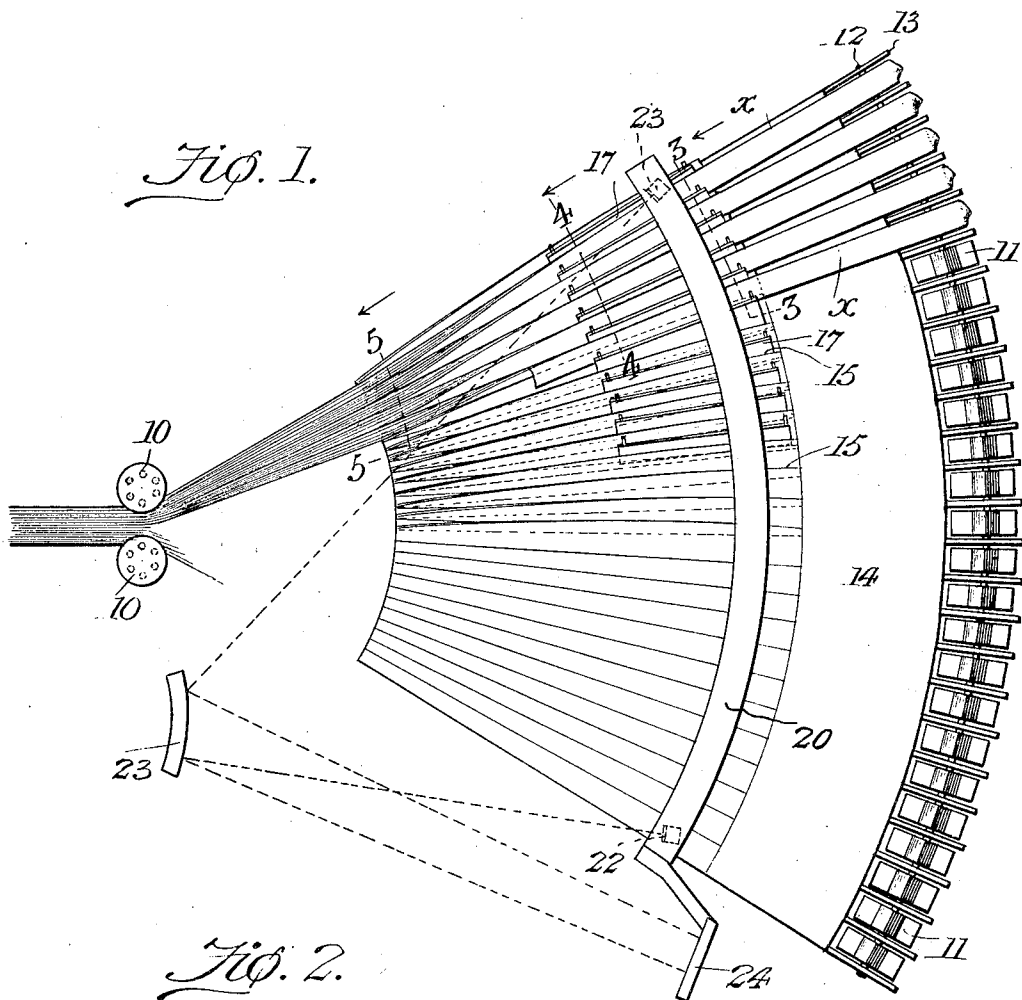
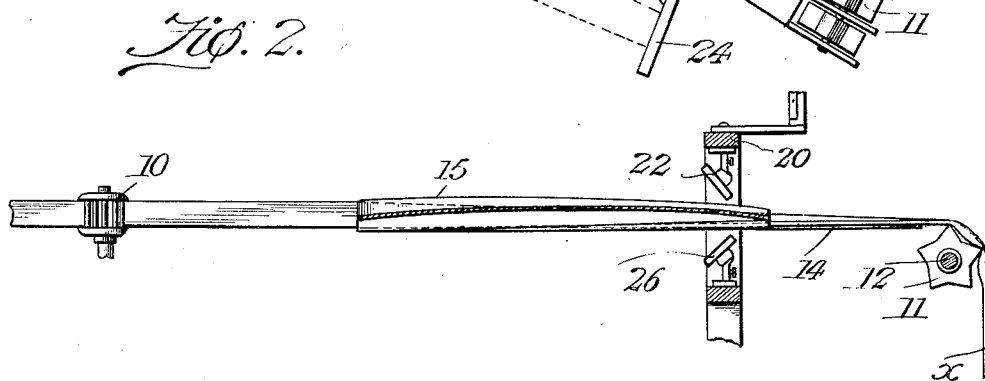
PATENTED SEPT. 20, 1904.

A. E. SEXTON.
WEB INTERLACING MACHINE.

APPLICATION FILED MAR. 7, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses
E. C. Stewart
Geo. E. Parker

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by *C. A. Snow & Co.* Attorneys

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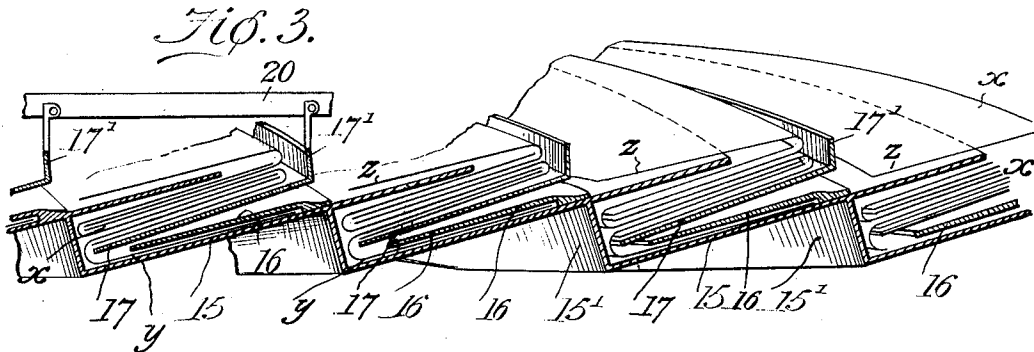
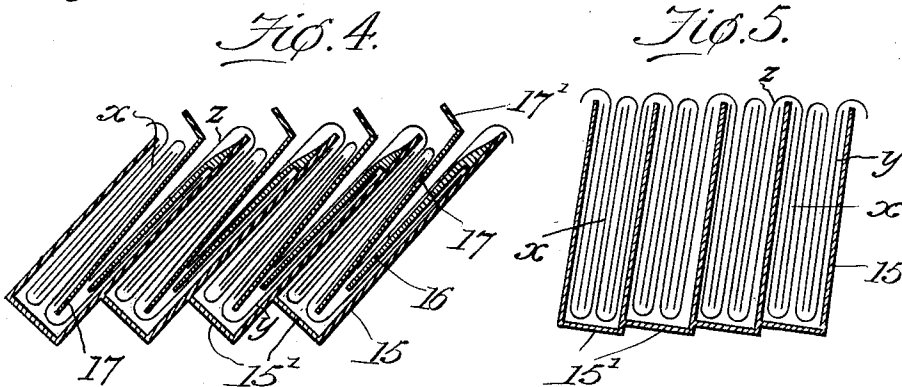
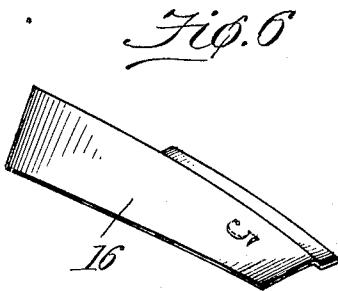
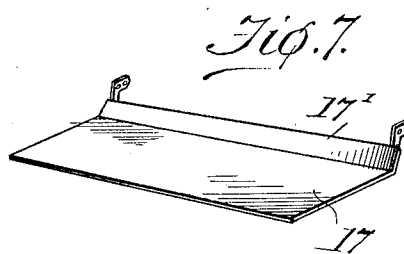
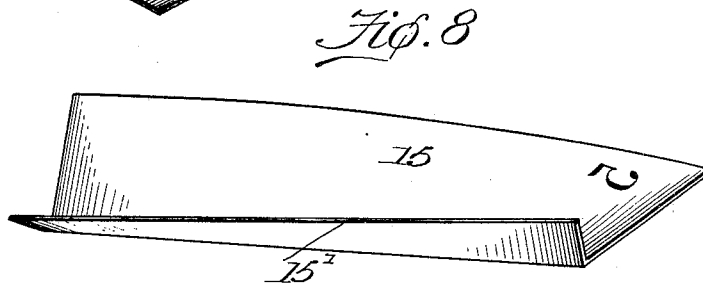
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

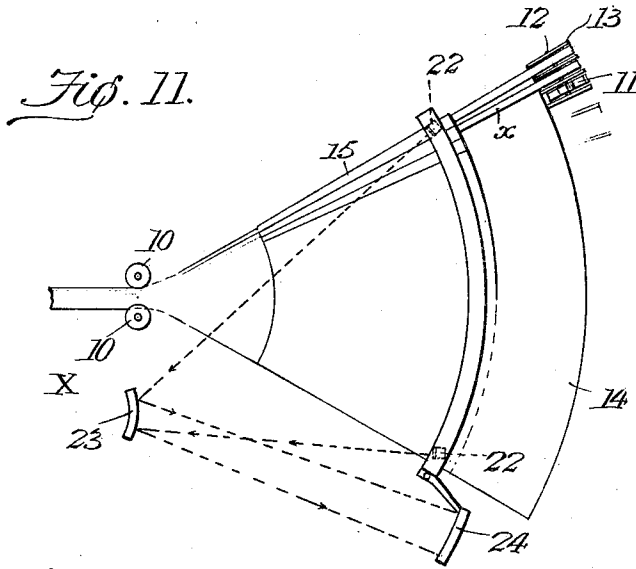


Fig. 12.

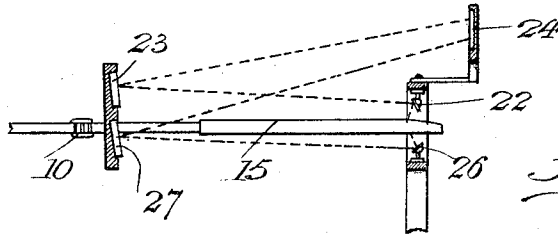


Fig. 10.

Fig. 9.

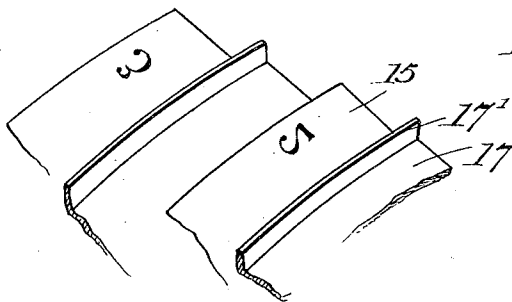
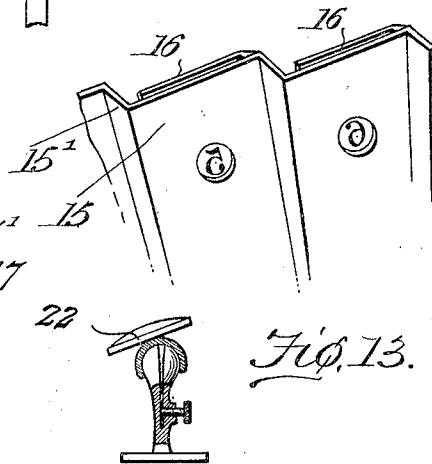


Fig. 13.

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4 SHEETS—SHEET 4.

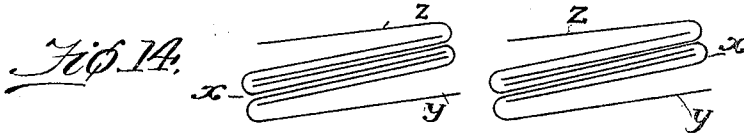
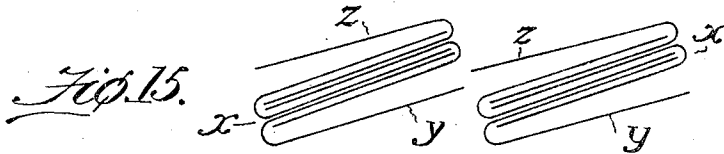


Fig. 16.

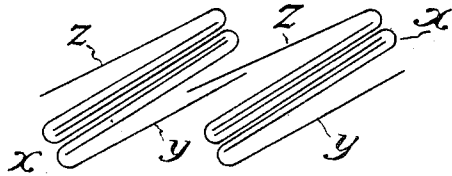


Fig. 17.

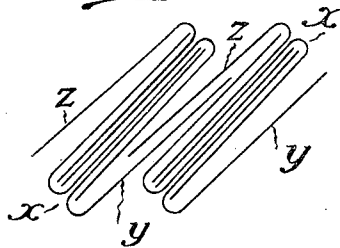


Fig. 18.

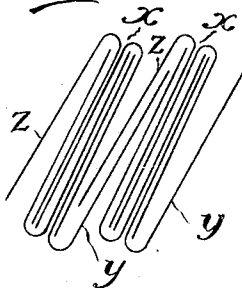
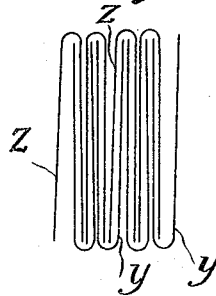


Fig. 19.



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UNITED STATES PATENT OFFICE.

ARTHUR E. SEXTON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO
SINGLE-SHEET PAPER COMPANY, OF LOS ANGELES, CALIFORNIA,
A CORPORATION OF CALIFORNIA.

WEB-INTERLACING MACHINE.

SPECIFICATION forming part of Letters Patent No. 770,508, dated September 20, 1904.

Application filed March 7, 1903. Serial No. 146,733. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. SEXTON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Web-Interlacing Machine, of which the following is a specification.

This invention relates to certain improvements in machines for the formation of strips of paper and similar material into webs in which the strips are interfolded, the fold-lines of the sheets being disposed in opposite directions.

The principal object of the invention is to provide a machine wherein a number of comparatively small webs each comprising six or seven or any other desired number of strips may be assembled together by interfolding the outer leaves of the outer strips of two or more webs, and thus fold a series of interfolded strips in the form of a web of any desired thickness, so that full packages of the finished product may be formed by severing the web into short sections.

A further object of the invention is to provide an improved mechanism for accomplishing this interfolding operation in which the provision is made for taking up any slack due to twisting or bending of the web or webs while the latter are being introduced into the machine.

A still further object of the invention is to provide a machine of this character with means for allowing constant inspection of the operation both from the upper and lower sides of the webs being interfolded, the arrangement being such as to call the operator's attention to any part of the machine where the interfolding operation is incomplete.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or

sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a plan view of a paper-folding machine constructed in accordance with the invention. Fig. 2 is a longitudinal sectional elevation of the same. Figs. 3, 4, and 5 are detail sectional views of portions of the machine on the lines 3 3, 4 4, and 5 5, respectively, of Fig. 1, the views being taken in the directions indicated by the arrows. Figs. 6, 7, and 8 are detail perspective views of portions of the folding or strip-guiding devices. Figs. 9 and 10 are views illustrating the arrangement of the indicating devices disposed at the entrance ends of the guides, these being normally covered by the strips of material being folded, but when exposed by tearing or disarrangement of the material being reflected to a mirror in view of the operator. Figs. 11 and 12 are views, partly in the nature of diagrams, of a system of mirrors. Fig. 13 is a detail view of the form of mirror-mounting which may be employed. Figs. 14 to 19 are diagrams illustrating successive steps in the interlacing operation.

Similar characters of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The present invention aims to improve the construction of mechanism employed for the production of strips or sheets of interfolded paper for toilet and other purposes, the finished product being in the form of sheets of paper each bent or folded to form two leaves and each leaf of each of the sheets being interfolded between the two leaves of the adjoining sheets, so that when one sheet is withdrawn from a box or other containing device the next interfolded sheet will be partly drawn through the discharge slot or opening in convenient position to be grasped and removed at the next operation. In the manufacture of packages of paper of this character there is little or no difficulty in folding a small number of strips together for the formation of a web, the term "web" being here used as a matter of convenience and

designating a plurality of interfolding strips or ribbons of paper. When these small webs are assembled together to form a web of a thickness equal to the finished packages, the operation is accomplished at the expense of considerable time and labor, and up to the present time it has been found impracticable to manufacture a single web of the required thickness at one operation. The present machine therefore is designed more particularly for the formation of one thick or great web from a plurality of previously-folded smaller webs, and the mechanism is so arranged as to interfold the outer leaves of the outer strips of any desired number of webs.

The frame of the machine is of any suitable height and supports the several folding devices, these extending in substantially radial lines from a pair of feeding reels or rollers 10 to points adjacent to guiding-wheels 11. The guiding-wheels 11 are in the form of star-wheels and are loosely mounted on spindles 12, adapted to brackets 13, carried by the frame of the machine. These several star-wheels are so arranged that their upper portions shall be approximately in the same horizontal plane with an arcuate plate 14, forming a supporting-bridge by which the webs of paper or other material are guided from the wheels to the folding devices. The end of the web x is carried up from any suitable source of supply, such as receiving-bin or from a strip-folding machine disposed at a lower level, and turned on its side to a horizontal position over the star-wheels and then drawn across the supporting plate or bridge 14. In this supporting-plate there is a slight twist, which at the discharge end of the bridge is disposed at an angle of about ten degrees from the horizontal, which brings the web into proper position for entrance into the guides or folding devices.

During turning movement of a comparatively thick web comprising, say, forty or fifty interfolded strips there is danger of the lower or innermost layers buckling or crimping if turned over an ordinary roller and its direction changed from a vertical to an approximately horizontal position. This natural buckling of the paper would naturally tend to force the layers nearest the roller downward or backward on the vertical portion of the web, and thus disarrange the sheets. To overcome this difficulty, the star-wheels are employed, and the layers of paper in contact with the star-wheels will bridge from point to point, and the recesses between the points will allow the paper to bend freely, and thus gather up the slack and forward the same through the horizontal run of the web, and there will be no tendency to accumulate slack and disarrange the layers.

Each of the interfolding mechanisms for engagement with a web comprises three plates 15, 16, and 17, and as the construction of the

similar members of each set is precisely the same a description of one set will be sufficient to correctly understand the invention. The plate 15, which is preferably formed of a thin strip of galvanized iron, is of greater width at one end than at the other, and one edge of said strip is turned or bent at a right angle to the main body of the strip, as indicated at 15', the flange thus formed being in an approximately vertical position or at about ten degrees from the vertical position at the supporting or bridge plate 14, while at the discharge end adjacent to the reels or drawing-rollers 10 these flanges assume the nearly horizontal position, as indicated in Fig. 5, the strip being twisted throughout its entire length in order that the web of paper guided thereby may be gradually turned from horizontal to the vertical position. Above the guide-plate 15 is mounted a second guiding-strip 16, the latter being secured at one edge only to the strip 15 and mounted slightly above and parallel with said strip 15, so as to form a contracted passage for the lower leaf y of the web of paper, and this strip 16 extends parallel with the strip 15 throughout a part of the length of the former in order that the lower leaf y of each web may be properly guided to a position under the upper leaf z of the next adjacent web, and so on throughout the whole width of the machine. Above the guiding-plate 16 is mounted the third guiding-plate 17, said plate serving as a convenient means of support for the leaf next to the lowermost leaf of each web and forming a gradually-contracted space for the reception of the upper leaf of the next adjoining web. The strip 15 extends over the flange 15' of the next adjacent strip and is secured thereto, and all of said strips are gradually twisted, so that starting in an approximately horizontal position at the feed end of the plates the webs will be gradually turned until they assume a substantially vertical position and are interfolded or interlaced, so as to form one large web of a thickness equal to that of the finished bundles, and to complete the bundling operation it is merely necessary to sever this thick web into short sections. The upper plate 17 is strengthened by the formation of a flange 17' at one edge thereof, and said flange is suspended in position by hangers depending from the supporting-bar 20.

When the paper leaves the ends of the guiding-plates, the several members which go to form the finished web are disposed at a slight angle to the vertical, but between the discharge end and the rolls or reels 10 are turned to a vertical position and pass between said rolls or reels. The reels 10 are formed of a series of spaced rods held in position by upper enlarged disks, there being a sufficient space between them to allow the passage of the convergent interlaced or interfolded webs which go to make up the finished great web. These

reels may be driven in any suitable manner in order to assist in drawing the several small webs of paper through the guide-plates and avoid the necessity of employing fixed guides; 5 which would result in considerable friction on the outer faces of the great web and impair the work of the machine. They further possess advantages over solid cylindrical rollers in that free movement is permitted in order 10 to allow any of the sheets or strips which may have been puckered or wrinkled to re-assume proper position. This completes the folding operation, and the thick or great web is then ready to be cut into small sections for 15 the formation of the finished packages.

In the operation of this machine, especially where strips of thin and easily-torn paper are being folded, it becomes necessary to closely watch the operation in order that in the event 20 of breakage or tearing of any one strip or the disarrangement of said strip from its proper position in the guides the operator may either stop the machine or guide the strip to its proper position. In a large machine, such as 25 it is proposed to employ for the production of webs of great thickness, it becomes impossible for a single operator to closely watch all of the strips and strip-guides, and to lessen the liability of accident I provide means whereby 30 the existence of a tear or disarrangement of the paper the fact is instantly signaled to the operator stationed at about X of Fig. 1, the signal also giving the exact location of the irregularity.

On the upper surface of each of the guides 35 15 at a point near the unflanged edge is placed a suitable indicating-mark, such as a numeral, or I may employ any other marks having similar relations, such as letters of the 40 alphabet. The surface of the guiding-strip is preferably painted black, and the distinguishing characters are of a contrasting color and arranged in proper order from one side 45 are so fixed that when that portion of the web passing over the guide is in normal position the characters will be covered; but in case a strip is torn or disarranged the character is exposed. Immediately over each 50 of the numerals or other characters and supported by a suitable adjustable bracket is a mirror 22. These mirrors are so adjusted adjacent to the several guides that the numerals will be reflected to a convex mirror 55 23, arranged near the discharge end of the machine, and are thence reflected to a mirror 24, where they may be observed by an attendant stationed at X, Fig. 1. The mirrors 22 are preferably curved in the same manner 60 as the well-known distorting-mirrors in order to increase the size of the numeral reflected, and thus more quickly attract attention. The final telltale-mirror 24 may be comparatively small and the convex mirror 23 so arranged 65 that all of the numerals will be reflected to a

common point in the telltale, so that if the operator's attention is attracted by any number or numbers reflected in the mirror he may instantly stop the machine and ascertain the 70 location of the trouble. In some cases, however, the telltale-mirror may be of sufficient size and of such character that the several numerals, if all are exposed, will be reflected in consecutive order, following one another 75 across the whole width of the mirror. If one or two or more numerals are exposed by accidental tearing or disarrangement of the paper, said numerals will be immediately reflected in their proper positions in the mirror 80 to thus notify the attendant of the exact location of the torn or disarranged strip. In order to provide for a similar exposure of the position of the lower folds or leaves of each of the webs, the under surface of each guide-plate 16 is provided with a blackened portion, 85 and on these are marked similar indicating characters in contrasting color, said indicating characters being arranged directly opposite openings 25, formed in the guiding-strips 15. Under each of the openings is placed an 90 adjustable mirror 26, preferably also of the distorting type, which reflects the adjacent character to a mirror 27, and from thence is again reflected to the mirror 24 in view of the 95 operator. This arrangement permits of constant inspection of the folding operation, and the operator is not only able to detect at a glance any failure on the part of any one of the strips, but may also determine by the 100 numeral or other character the exact location of the trouble. For convenience it is preferred that the numerals of the upper and lower sets, respectively, shall be of different color and reflected, respectively, in upper and 105 lower rows in the common mirror 24.

While the telltale-mirror is preferably disposed at the point indicated in order that the operator may also view the complete operation of the machine without turning, it will be understood that such mirror or mirrors 110 may be placed at any other convenient point without departing from the invention.

In some cases it will be unnecessary to employ the arcuate bridge-piece between the star-wheels and the entrance to the guides, 115 and it will be understood that this feature may be dispensed with without departing from the invention.

Having thus described the invention, what is claimed is— 120

1. In a machine for interlacing strips, a plurality of guides arranged in convergent lines at their discharge ends, each guide being twisted to gradually alter the positions of the strips. 125

2. A device for interengaging previously-folded strips, including convergent strip-guides adapted to engage and partly open the folds of said strips and to direct the same into interfolded position. 130

3. In combination, convergent strip-engaging guides adapted to direct previously-folded strips into engagement with each other and to partly open the folds thereof preliminary to their engagement with each other, and means for causing the strips to pass through said guides.

4. In a device of the class specified, a plurality of convergent guides adapted to engage and partly open previously-folded strips, said guides being so disposed as to gradually change the angle of the strips and to interfold the same in the form of a web.

5. In a device of the class specified, a plurality of sets of convergent guiding-strips adapted to engage with a plurality of webs each formed of a number of previously-interfolded strips of material, said guiding-strips being partly twisted to change the angle of the material from an approximately horizontal plane to an approximately vertical plane as they near the point of convergence.

6. In a device of the class specified, a plurality of sets of convergent strip-guides adapted to engage with webs each formed of a plurality of previously-interfolded strips, each set of guides comprising a web-support, and means for engaging with the outermost folds of the webs, the guides being convergent and adapted to direct the outermost folds into engagement with each other.

7. In a device of the class specified, the combination with a plurality of sets of convergent strip-engaging guides, each set of guides being gradually narrowed or tapered from the feed to the discharge end and being twisted to gradually lessen the angle of the strips as they pass through the guides.

8. In a device of the class specified, a plurality of convergent strip-engaging guides, each guide including a plurality of strip-engaging plates tapering in width from end to end and disposed in approximately parallel relation, said plates being gradually twisted so that their two end portions shall be approximately at a right angle to each other.

9. In a device of the class specified, a plurality of sets of convergent strip-engaging guides, each set comprising a lower plate having an angular flange at one side, a second plate disposed above the first and slightly spaced therefrom to permit the entrance of the lowermost fold of a web of material, and an upper strip slightly spaced above the second strip and forming a support for the main body of the web.

10. In a device of the class specified, the combination with convergent strip-engaging

guides, of loosely-mounted wheels adapted for engagement with the material to be folded, the peripheral portions of the wheel being recessed for the reception of slack in said material.

11. In a device of the class specified, the combination with a plurality of sets of convergent strip-engaging guides, of loosely-mounted star-wheels for preliminary engagement with the strips of material to be acted upon.

12. In a device of the class specified, the combination with a plurality of sets of convergent strip-engaging guides, of recessed wheels for preliminary engagement with the strips, and a stationary table disposed between the wheels and the guides and serving to partly change the angle at which the strip is presented to said guides.

13. In a device of the class specified, the combination with a plurality of convergent strip-engaging guides, of a pair of reels having spaced bars or teeth for engaging the material after it is drawn through the guides.

14. In a device of the class specified, the combination with the strip-engaging guides having distinguishing-marks, of a plurality of mirrors for reflecting the mark when exposed to a common visual point.

15. In a device of the class specified, the combination with a plurality of strip-engaging guides each bearing a designating-mark, an operator's mirror, and a plurality of spaced mirrors adjusted to reflect all of said marks when exposed into the operator's mirror.

16. In a device of the class specified, the combination with a plurality of convergent strip-engaging guides each bearing a designating-mark normally covered by a portion of the strip to be folded, a mirror disposed adjacent to the designating-mark of each guide, a convex mirror into which the reflections of all the small mirrors are focused, and an operator's mirror within convenient distance of the operator and into which all of the exposed characters are again reflected.

17. In a device of the class specified, the combination with strip-guides having distinguishing-marks, of mirrors for reflecting said marks to a point within view of an operator or attendant.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ARTHUR E. SEXTON.

Witnesses:

J. ROSS COLHOUN,
C. E. DOYLE.