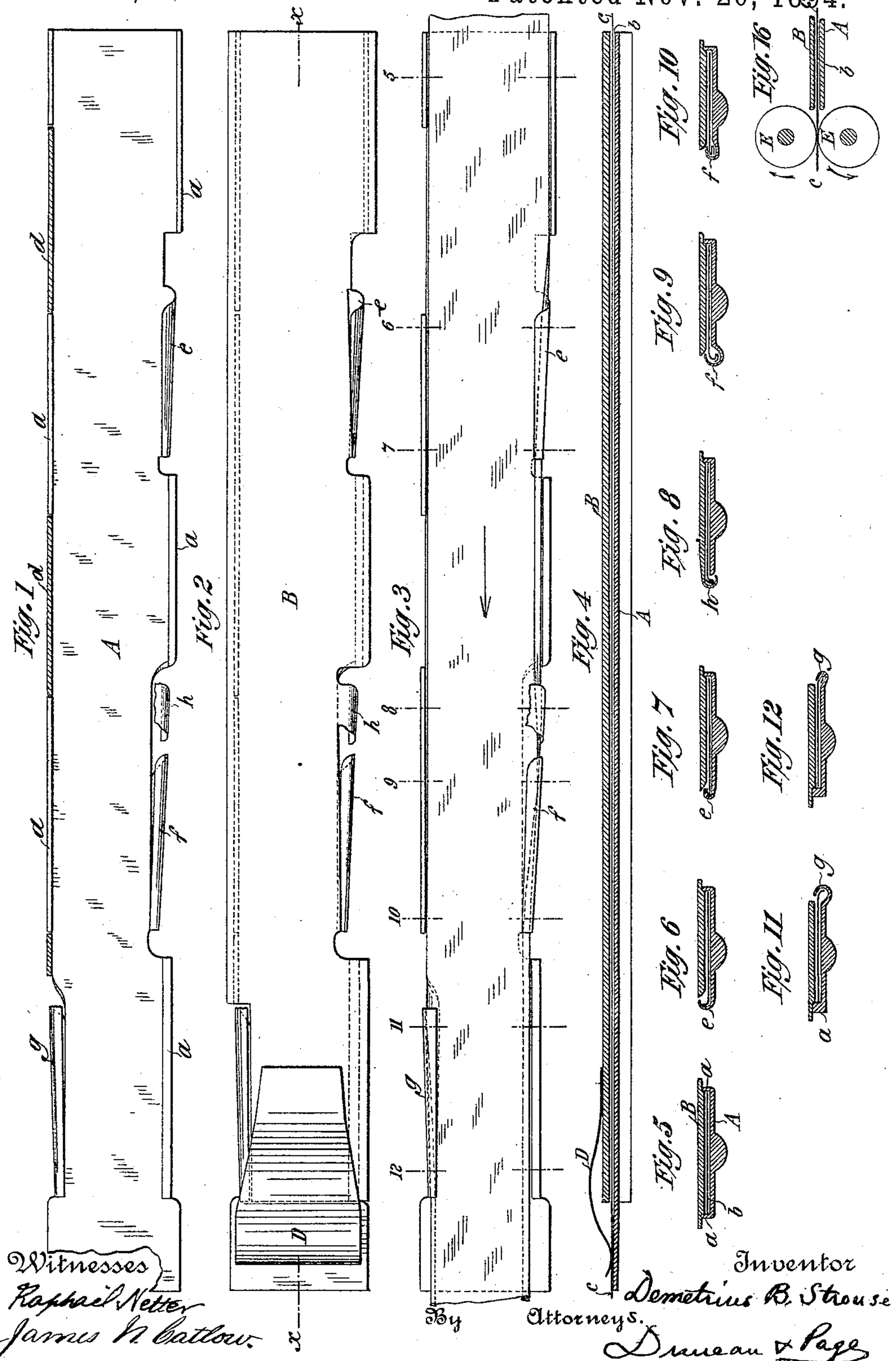
(No Model.) 2 Sheets—Sheet 1.

D. B. STROUSE.

TUBE MACHINE.

No. 529,426. Patented Nov. 20, 1894.



Witnesses
Raphael Netter
James N. Catlow.

Inventor
Demetrius B. Strouse
By Attorneys.
Duncan & Page

(No Model.) 2 Sheets—Sheet 2.

D. B. STROUSE.

TUBE MACHINE.

No. 529,426. Patented Nov. 20, 1894.

Fig. 13

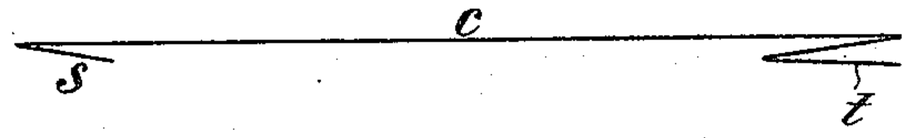


Fig. 14

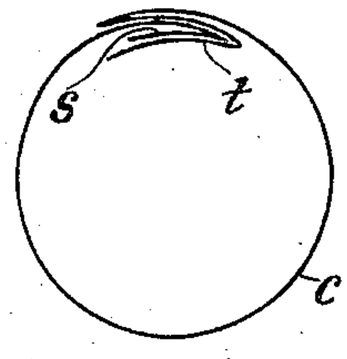
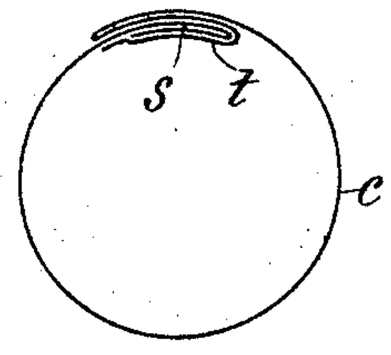


Fig. 15



Witnesses:
Raphael Netter
James N. Catlow

Inventor
Demetrius B. Strouse
by Duncan & Page
Attorneys

UNITED STATES PATENT OFFICE.

DEMETRIUS B. STROUSE, OF SALEM, VIRGINIA, ASSIGNOR TO THE BONSACK MACHINE COMPANY, OF SAME PLACE.

TUBE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 529,426, dated November 20, 1894.

Application filed October 14, 1893. Serial No. 488,128. (No model.)

To all whom it may concern:

Be it known that I, DEMETRIUS B. STROUSE, a citizen of the United States, residing at Salem, in the county of Roanoke and State of Virginia, have invented a certain new and useful Improvement in Devices for Folding Strips of Paper or other Material for the Manufacture of Tubes, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The present invention relates to a device for folding over the edges of a strip of paper or similar flexible material in such manner that the opposite folded edges of the strip when brought together to form a tube, can be inserted the one into the other and secured by crimping, indenting or otherwise to form a completed seam.

The invention consists of a channel of sufficient width and height to readily permit the passage of the strip to be folded and of folding guides located upon either edge of such channel and constructed and arranged to turn or fold the edges of the strip to form upon one edge a double fold or lap and upon the other edge a single fold or lap, the folds when completed lying upon the same side or surface of the strip. For convenience of construction it is preferred to make the folding device in two nearly equal parts, a portion of the folding guides being attached to each of these parts and the parts being properly secured together.

A device containing my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the upper face of the lower part of the device, the re-entering flanges of the upper part being shown in section. Fig. 2 is a plan view of the entire device. Fig. 3 is a plan of the lower part of the device, showing the strip in position and its edges in the process of being folded. Fig. 4 is a central longitudinal section through the line *x*—*x* of Fig. 2. Figs. 5 to 12 inclusive are cross-sections on the lines 5 to 12 respectively of Fig. 3, with the upper part of the device superimposed. Fig. 13 is a cross-section of the strip with its opposite edges folded. Fig. 14 is a cross-section of the strip bent into tubular form with the folds of its opposite edges brought into proper engagement with each other to form the seam. Fig. 15 is an enlarged view of the completed seam; and Fig. 16 shows a modification of the device for pressing the lapped edges down upon the body of the strip.

In the drawings A represents one main part of the folding device, which is arranged in the drawings as the lower part. B represents the upper part thereof. The part A is preferably provided with edge flanges *a* so related to the under surface of the part B that when the latter is superimposed it will rest upon the flanges *a* and form a low channel or passageway *b* between the inner surfaces of the two parts A and B. This channel may be of any width to accommodate the width of the strip to be folded. The part A is preferably provided with recesses in its margin into which flanges *d* on the part B fit to prevent the two parts from moving lengthwise relatively to each other. The part A is also provided upon one of its edges with folding guides *e* and *f*, and upon its opposite edge with a folding guide *g*, these guides being located relatively to the side walls of the channel *b* so that the edges of the strip will be folded over as hereinafter described and shown in the drawings. The part B is provided with an edge folding guide *h* located slightly in the rear of the guide *f* when the parts A and B are superimposed. These guides are all preferably semicircular and taper in the direction of the passage of the strip and are inclined toward the medial line of the channel *b*, so that the edges of the paper will be gradually more and more folded as it passes through the guides.

For convenience and economy of construction, the main pieces A and B are struck from sheet metal, the flanges *a* and recesses being properly formed, and the folding guides *e*, *f*, *g* and *h* are formed in separate parts and secured to the main pieces by brazing, soldering or otherwise. The parts thus formed may be held together by clamps, screws or other desirable means.

The operation of the device is briefly as follows: A strip of paper *c* or other similar material is introduced through the channel B, its opposite edges being threaded through the

folding guides *e*, *f*, *g* and *h*. This threading is more conveniently done by removing the pieces A and B from each other and when the threading is completed superimposing them as shown in Fig. 2 of the drawings. As the paper strip is drawn or fed through the channel B by hand or any other desirable means, the edge of the strip contiguous to the folding guides *e*, *f* and *h* will be folded by the action of these guides as shown in Figs. 6 to 10, inclusive, and be brought into substantially the shape shown in cross-section at the left hand of Fig. 13. The operation of the guide *e* to make a single fold is shown in Figs. 6 and 7. This edge of the strip, having then a single fold or lap formed upon it, is operated upon by the guide *h* to fold the single lap in an opposite or downward direction, as shown in Fig. 8, after which the guide *f* operates to still further turn the single lap toward the body of the strip to form a double fold as shown in Figs. 9 and 10, the double fold being formed upon the opposite side or face of the strip from the single fold which is shown in Fig. 7. The opposite edge of the strip will be folded by the guide *g* as shown in Figs. 11 and 12 and brought into the form of a single lap or fold, as seen in cross-section at the right hand of Fig. 13.

It is preferred that the guide *g* should be narrower than the guides *e* and *f*, that is, it should not be set inwardly from the edge of the paper so far as the last named guides, in order that the free end of the lap made by the guide *g* may be narrower than the lap formed by the guides *e* and *f* for the purposes hereinafter more specifically described.

It is desirable to flatten down the folds made in the edges of the strip and two forms of pressure device for this purpose are shown, one in Figs. 2 and 4 and the other in Fig. 16. The former consists of a sheet metal spring D attached to the piece B and having its free end resting upon the surface of the piece A with sufficient force to press down and flatten the folds formed upon each edge of the strip so that when the strip is bent into tubular form the folds will retain their shape and the single folded edge can be readily slipped into the double folded edge when the same is slightly opened out either by the fingers of the operator or by any automatically operating device, and the opposite edges of the strip being thus engaged can be then secured into a completed seam. The other form of pressure device shown in Fig. 16 consists of a pair of rollers, one of which is preferably positively driven, located in front of the folding device and operating to press together the folds of the edges of the strip, these rollers, in addition to pressing the folds together, having the capacity to assist to feed or draw the paper through the folding device.

Strips of paper or other similar material having their edges folded as I have indicated by being passed through my device, may be brought into tubular shapes and their opposite edges brought into engagement with each other and the engaged edges secured together into a complete seam by hand or by the use of any means or devices adapted for this purpose. A strip of this paper so folded is especially advantageous for wrapping a continuous filler of tobacco to form a continuous cigarette, the strip being continuously wrapped around the filler by the use of well known devices, and its edges being progressively and continuously brought into engagement with each other by inserting the single folded or lapped edge into the opening made in the double lapped or folded edge and the edges thus engaged being secured together by crimping or indenting devices to form a completed seam.

A paper strip having its edges folded as above described by passing it through my device, may also be used in the manufacture of individual cigarette wrappers by bringing the same into tubular form, bringing the opposite fo'ded edges into engagement with each other and securing them together by crimping, indenting or otherwise, and then cutting the continuous tube into short pieces and stuffing it with compressed tobacco. I do not, however, wish to limit my device to the folding of the edges of strips of thin paper for cigarette wrappers, as it may be used for the preparation of strips of paper of greater thickness in the manufacture of tubular structures for many other purposes.

An examination of the strip *c*, when it is folded as described and its opposite edges engaged with each other as shown in Figs. 14 and 15 of the drawings, shows the following relation of parts: first, that the seam thus formed is made up of five thicknesses of paper, which number is considered far more desirable than two or three thicknesses, to form a seam by crimping or indenting the parts together; second, that the edge flaps *s* and *t* of the folded strips are arranged to form the interior part of the seam, which results from arranging the double and single fold to lie upon the same side or surface of the strip and then bringing such strip into tubular shape as shown in Fig. 14, and, third, that the edge flap *s* of the single fold is narrower than the edge flap *t* of the double fold, so that, when the folds are brought together and the single fold is inserted into the double fold as shown in Figs. 14 and 15, the flap *t* of the double fold will overreach the flap *s* of the single fold, and when the parts are properly secured together the flap *s* of the single fold will be inclosed in a pocket formed by sealing the free edge of the flap *t* of the double fold upon the part contiguous thereto.

I do not wish to limit my invention to the exact construction hereinbefore described and shown in the drawings, as it is evident that considerable changes in the locations and shapes of the folding devices can be made

without departing from the principle of the invention.

What is claimed as new is—

1. The combination, substantially as described and shown, in a strip-folding device, of a channel or passage through which the strip can be passed and curved guides *e*, *h* and *f* arranged upon one edge of the channel and adapted to fold one edge of the strip in the following manner: guide *e* to gradually fold the edge of the strip into a single lap or fold, guide *h* to gradually fold the single lap in an opposite direction, and guide *f* to continue the folding in the opposite direction and complete the double lap or fold.

2. In a strip-folding device, a channel for the passage of the strip, curved guides *e*, *h* and *f* arranged upon one edge of the channel and adapted to fold one edge of the strip in the following manner: guide *e* to gradually fold the edge of the strip into a single lap or fold, guide *h* to gradually fold the single lap in an opposite direction, and guide *f* to continue the folding in the opposite direction and complete the double lap or fold, in combination with a guide *g* arranged upon the opposite edge of the channel and adapted to fold the opposite edge of the strip into a single fold or lap lying upon the same side of the strip as the said double fold or lap.

3. In a strip-folding device a channel for the passage of the strip, curved guides arranged upon one edge of the channel and adapted to fold one edge of the strip into a double fold or lap, in combination with a curved guide located upon the opposite edge of the channel constructed and arranged to fold the opposite edge of the strip into a single fold, whose edge flap *s* is of less width than the width of the edge flap *t* of the double fold on the opposite edge of the strip.

4. A device for folding a strip of paper or similar flexible material into a double fold or lap upon one of its edges and a single fold or lap upon its opposite edge, consisting of two plates A and B arranged relatively to each other to form a channel *b* between them for the passage of the strip, folding guides *e* and *f* secured to one edge of the plate A, and guide *h* secured to the corresponding edge of plate B and located between guides *e* and *f*, to form one edge of the strip into a double fold, and a folding guide *g* secured to the opposite edge of the plate A to form the opposite edge of the strip into a single fold, substantially as and for the purpose described.

DEMETRIUS B. STROUSE.

Witnesses:

S. D. McCOMMON,

D. G. ARMSTRONG.