

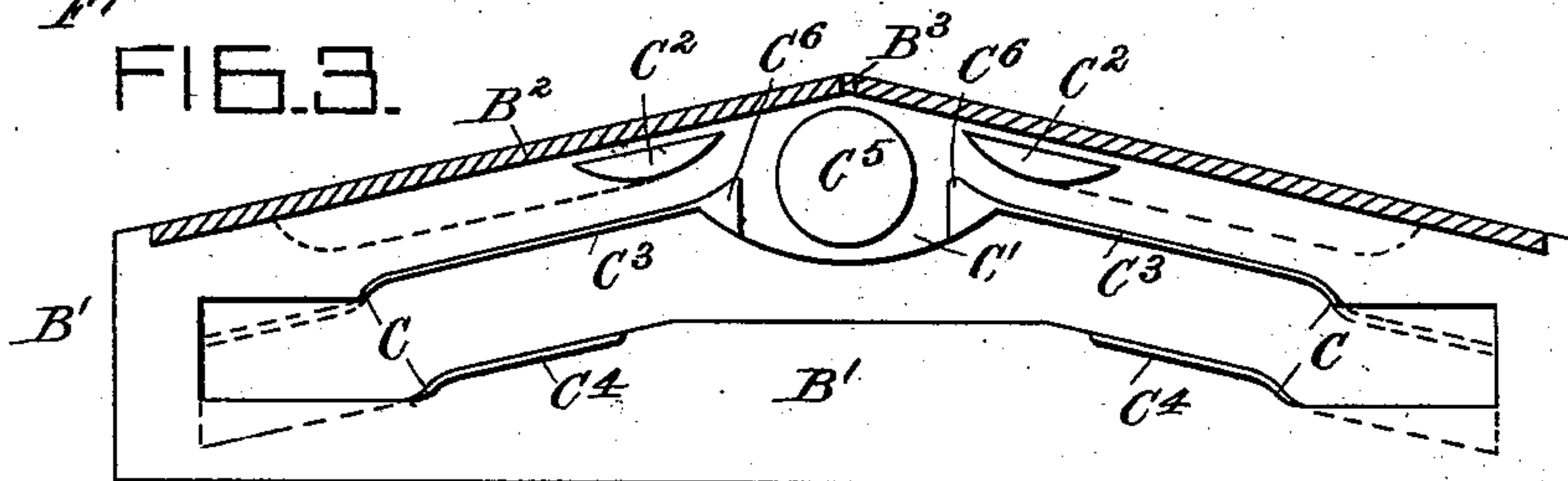
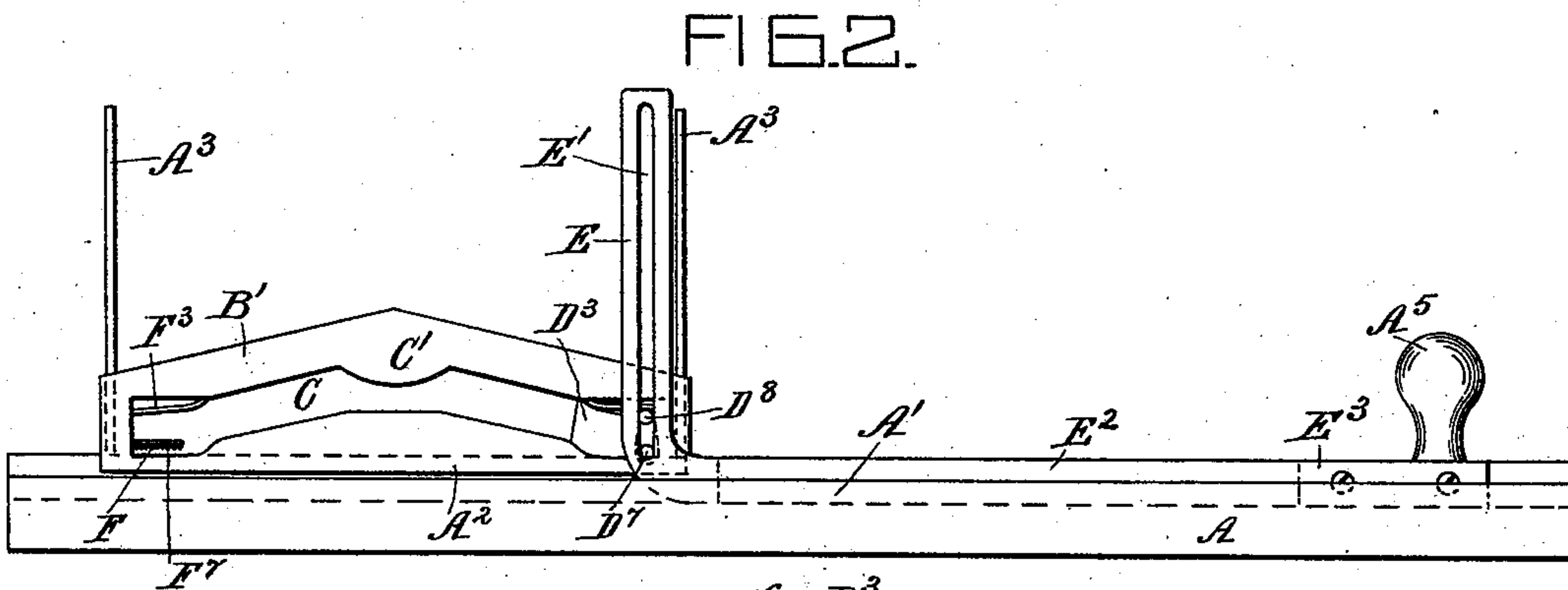
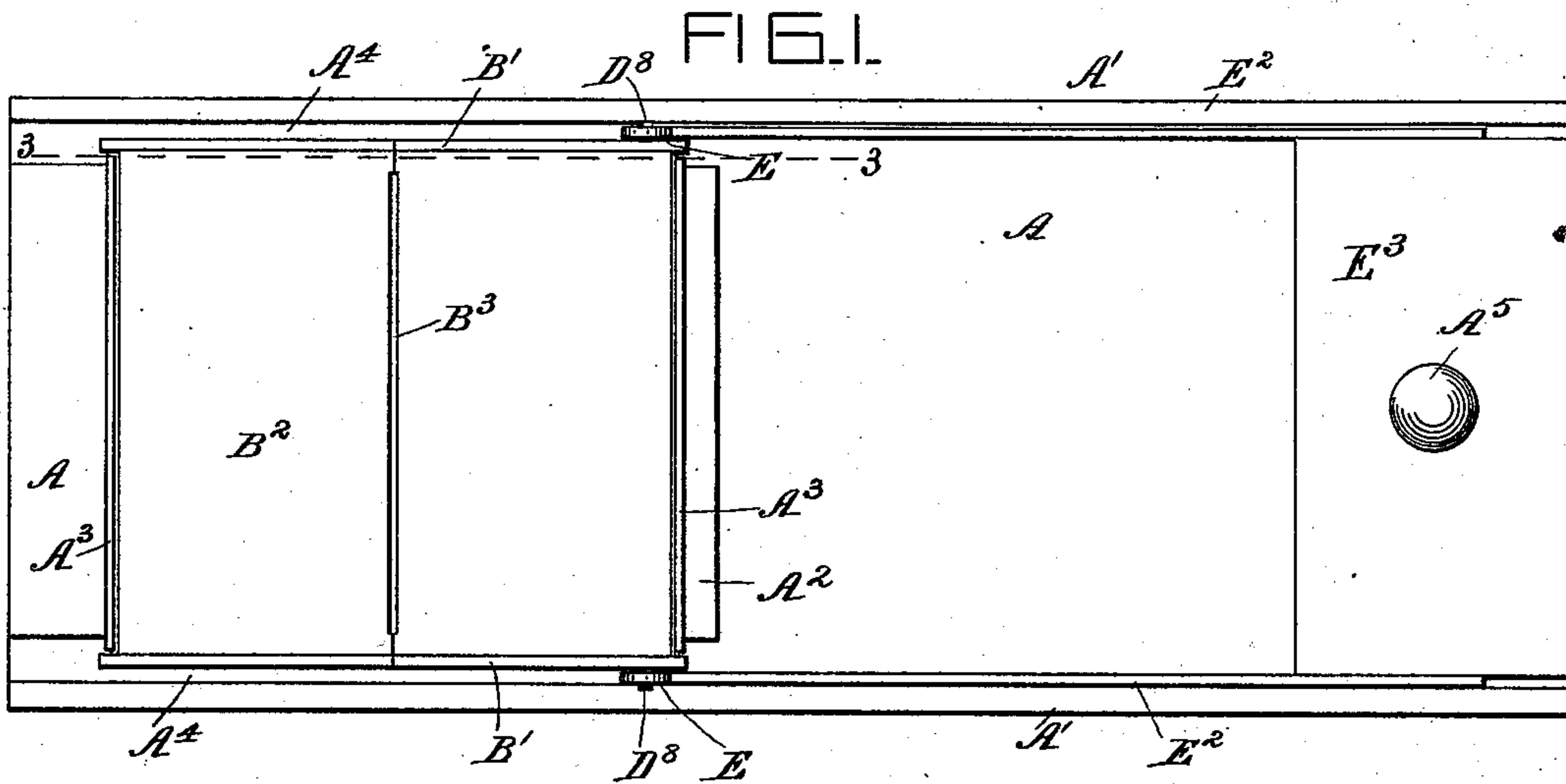
(No Model.)

3 Sheets—Sheet 1.

W. E. CURTIS.
FOLDING MACHINE.

No. 531,513.

Patented Dec. 25, 1894.



Witnesses:
A. S. Ludlow
H. Smith

Inventor:
W. Espy Curtis
per Wm. Hubbell Fisher
Attorney.

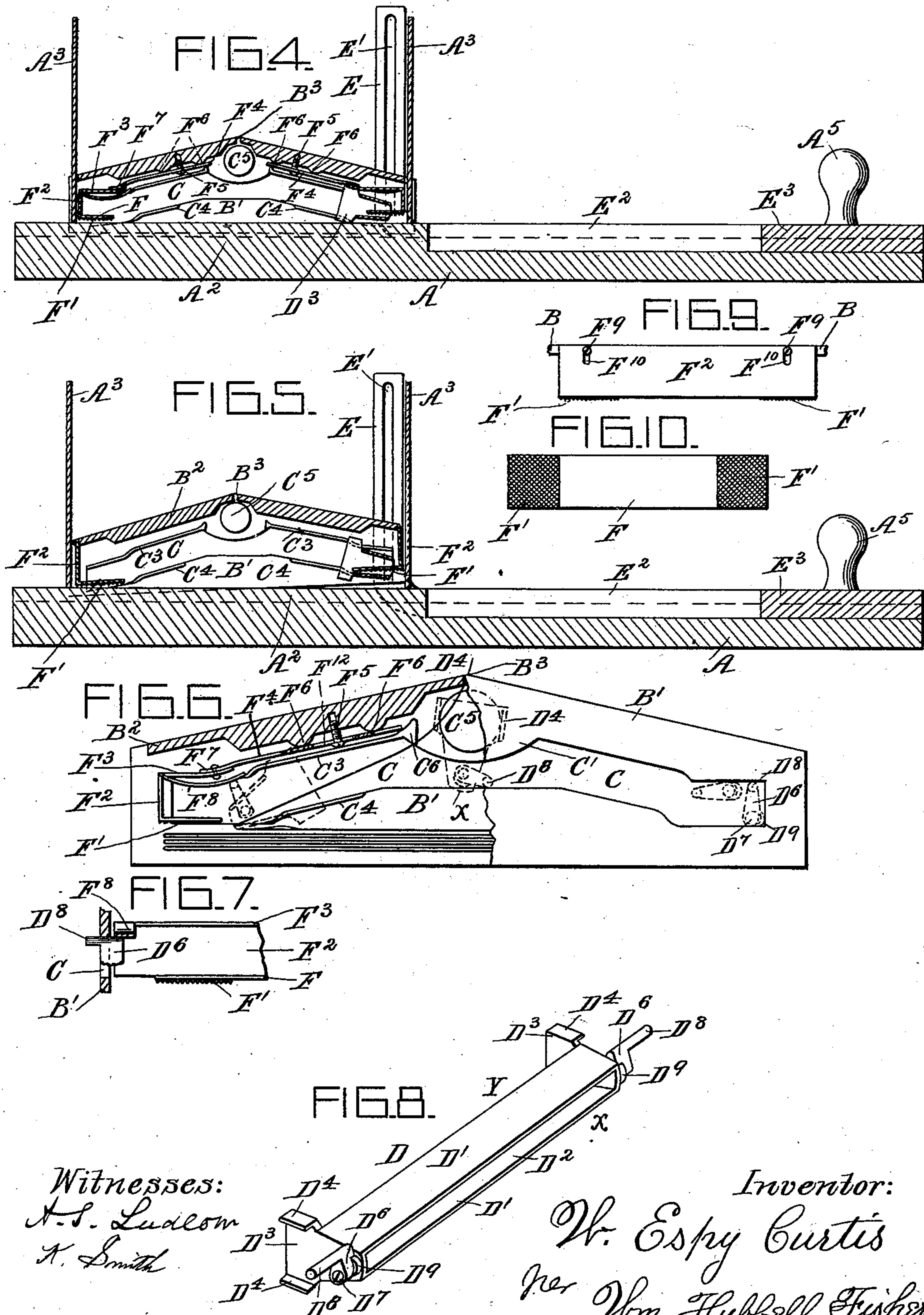
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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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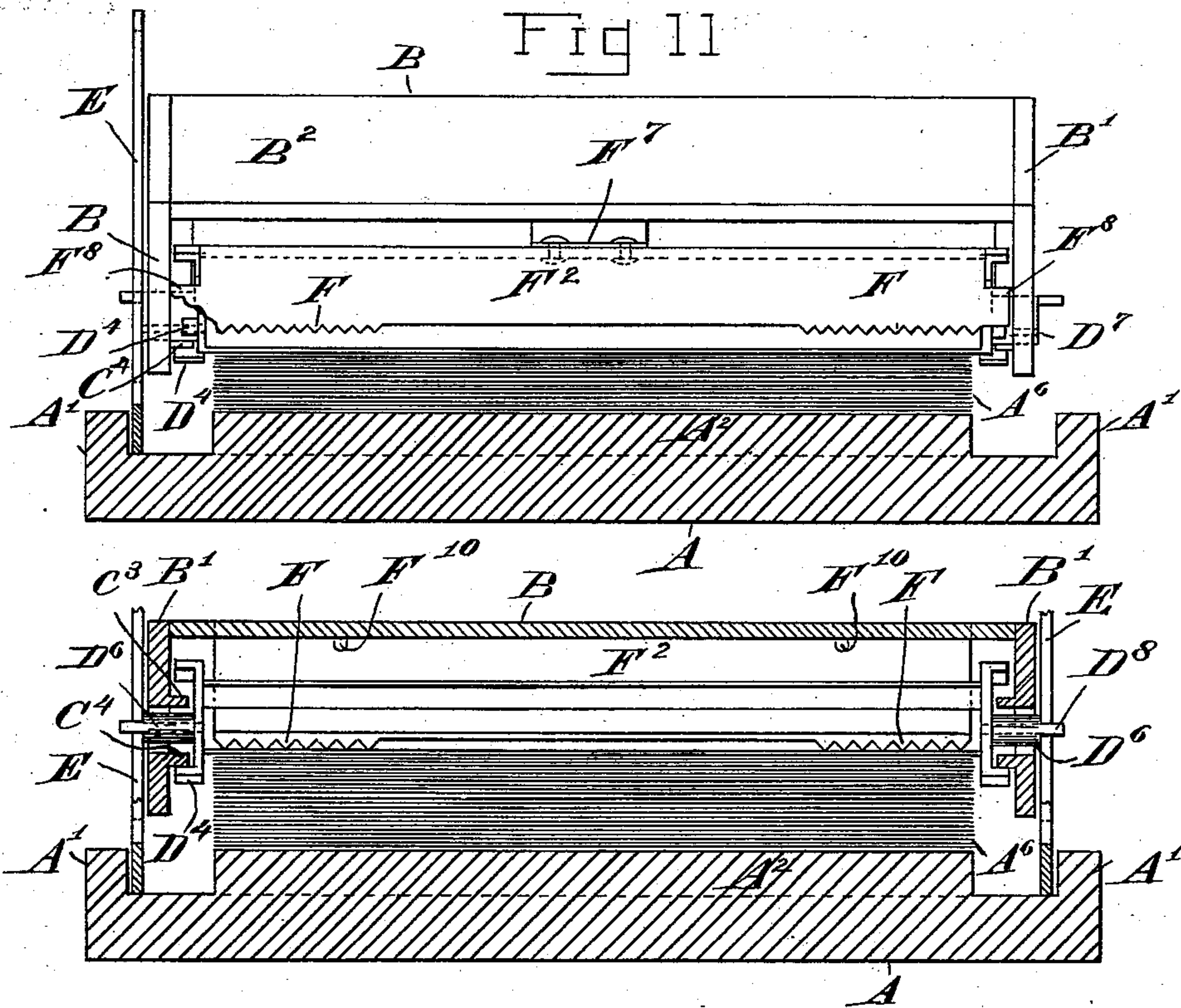
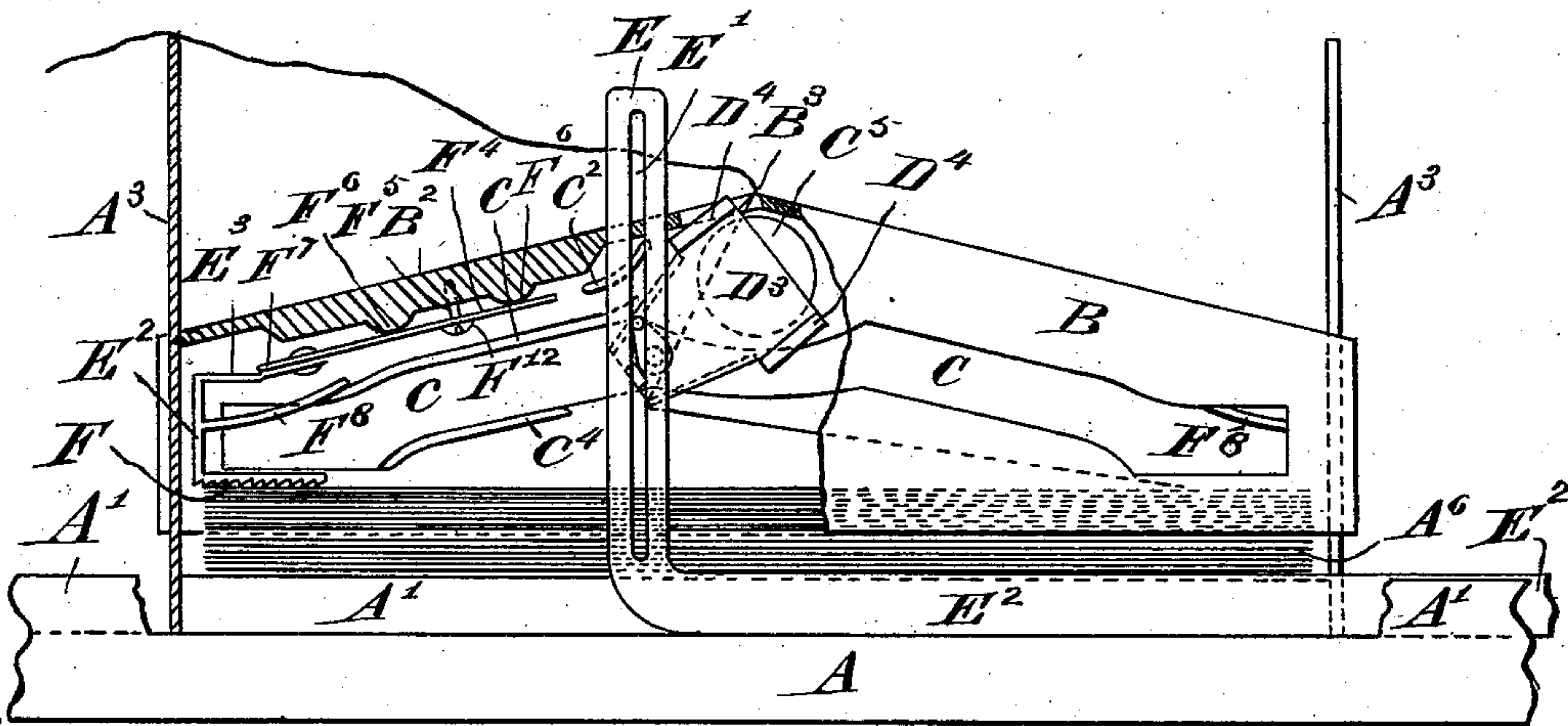


Fig 12



WITNESSES

Jos. M. Gleason
K. Smith.

Fig 13

INVENTOR

W. E. Curtis
per Wm Hubbell Fisher,
ATTORNEY

UNITED STATES PATENT OFFICE.

WILL ESPY CURTIS, OF CINCINNATI, OHIO.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 531,513, dated December 25, 1894.

Application filed March 20, 1893. Serial No. 466,875. (No model.)

To all whom it may concern:

Be it known that I, WILL ESPY CURTIS, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings making a part of this application, and to which reference is hereby made,—Figure 1, Sheet 1, is a top or plan view of mechanism embodying my invention. Fig. 2, Sheet 1, is a side elevation of the same. Fig. 3, Sheet 1, is a vertical central section of the reciprocating folder taken in the plane of the dotted line 3, 3 of Fig. 1, viz: just inside of the guides, and showing the inner side of the folder, the conveyer being removed. Fig. 4, Sheet 2, is a vertical central section with the length of the machine, illustrating the internal construction of the mechanism of the machine when springs are employed to allow the presser foot to be elastically elevated by the shuttle arm. Fig. 5, Sheet 2, is a vertical central section with the length of the machine when the said springs are omitted, and the arm elevates the foot by lifting the end of the frame, and to the extent thus specified, this figure may be considered to illustrate a modification of certain features of my invention. Fig. 6, Sheet 2, is a view partly in side elevation, partly in section, illustrating the positions of the shuttle or traveling conveyer, when springs are employed to allow the presser foot to be elastically elevated by the conveyer arm, and illustrating the oscillatory movements of the conveyer arm as it travels in the guideway of the folder. Fig. 7 is a detail view, looking from right to left, at that presser foot and its connection which is at the left hand end in the preceding figures, and showing a mode by which the arm of the conveyer is enabled to lift the presser foot. Fig. 8 is a detail view of the shuttle or reciprocating traveling conveyer. Figs. 9 and 10 are views of the details of the machine namely: outside and bottom views of the presser feet of the recip-

rocating folder. Fig. 11, Sheet 3, is an end elevation of the machine of the preferred form showing the presser foot F' in an elevated position and the folded paper beneath. It also shows the platform and raised guides. The vertical part of the drive bar E is shown on the left, but omitted on the right. Fig. 12 is a view of a transverse vertical section of a modified form, just inside of the farther end from the spectator, showing the position of the parts when the shuttle arm has dropped on the reversing of its stroke. This view shows the folded paper beneath, and the foot pressing upon the lower part of the conveyer; also the slots for vertically adjusting the feet. Fig. 13 is a view of the side of the machine of preferred form, partly in elevation and partly in section, showing the end walls and operating parts in a working position, intermediate between the center and the end of the machine. The raised guide is broken away, showing the platform and folded strips upon it, also showing the spring end F' riveted to the piece F³ of the presser foot.

A indicates the bed of the machine, provided with upraised guideways A', A'. It is also provided with a raised platform A² shown in dotted lines in Fig. 2 and in section in Figs. 4 and 5. A portion of the top of the raised platform is also seen in Fig. 1. It is likewise provided with two vertical walls A³, A³, one directly in front of the vertically moving mechanism and one directly behind the latter. Between these walls lies the elevated platform, or at least all of it which is mechanically necessary to the operation of my device. This elevated platform supports the feet of the folding mechanism, and consequently all of said mechanism which is supported by said feet. As the function of these walls is that of guiding the folding mechanism as it rises and falls, obviously posts or pins properly located may take the place of the said walls in performing the said functions. Of this last named mechanism, B' indicates the side pieces, which before sufficient material has been folded, extend down into the grooves A⁴, A⁴, present at each side of the folding platform and between it and the raised guideway A'. By the folder frame B is meant the rigid frame of the holder.

Each of the side pieces B' is provided with

a runway C. This runway is similar on both sides. It is of the same width everywhere, except at the center. At this point, the runway is preferably gradually narrowed by the curved convex projection C', extending downwardly into the runway. From this central portion, the runway extends downward in each direction, viz: forward and backward toward the respective ends of the side B'.

Each runway operates as a guide, in which travels the adjacent end of the oscillatory arm of the reciprocating conveyer D. (See Fig. 8.) This conveyer D has a central longitudinal slot D², through which the paper passes to be folded. The side parts, plates or pieces D' of the conveyer are preferably beveled so that their outer surfaces at the rear Y, are farther apart than at the front X, for reasons hereinafter mentioned. The ends D³ of the conveyer are each provided with the lugs D⁴, D⁴, whose purpose will be hereinafter described, and are each further provided with one of the said oscillatory arms. This arm consists of the shank D⁶, pivoted at D⁷ to the end D³, and having at its free end the projecting arm or projection D⁸. It will be observed that in connection with each arm D⁶, is a stop D⁹ on the conveyer, and this prevents the arm D⁶ from describing more than a semicircle, in relation to the conveyer. The functions of this stop will be obvious when the description of the mode of operation is given later on.

On the inside of each side B' of the folder are guide projections C², and immediately below these are the guide projections C³. (See more particularly Fig. 3.) Also below the guideway C are the projections C⁴. These projections project inwardly, and there is a set of them on each side of the center guide C⁵.

The end of the conveyer D and its accompaniments are applied to the said side B' and its guides as follows:—The arm or piece D⁶ is within the guideway C, while the arm D⁸ projects outside of the side B'. Here this arm D⁸ enters a slot E' vertically located in the driving piece E. There are, therefore, two such driving pieces E, E, one beyond each end of the traveling conveyer D, and they are united to some common and suitable connecting piece, so as to move simultaneously forward or backward as desired. In the present illustrative instance, each of them has a foot extension E², and these extensions are secured to the piece E³, sliding on a suitable support, one form of which is here shown, viz: the bed A. A handle A⁵ is, in the present instance, used to operate the piece E³, and hence reciprocate the pieces E.

A part of the main portion of the folder is the presser feet F, F, one located at the front and the other at the rear, substantially as shown. These feet are preferably roughened or serrated more or less. I have shown each of them roughened at each end, viz: at F'. (See Fig. 10.)

In the preferred form of my invention, the

feet elastically yield upwardly to allow the traveling conveyer to readily introduce the strip (to be folded) beneath the presser foot. To this end, the foot F is connected to a vertical piece F², and this in turn to a spring F⁴ by a suitable connection or piece as F³. (See Figs. 4 and 6.) A preferred mode of constructing the spring and combining it with other parts of the mechanism is as follows: The spring F⁴ is a flat one, and is secured in position by a set screw F⁵. On the under side of the top or roof B² of the folder B are two projections F⁶, F⁶. On these projections F⁶, F⁶, rests the spring F⁴, and between them is the securing screw F⁵. Tightening this screw depresses the end F⁷ of the spring. This end F⁷ will, therefore, cause the presser foot to offer a greater elastic resistance, and increases its downward pressure. Loosening the screw relaxes the pressure of the spring. Downward movement of the presser foot beyond a desired point is prevented by the adjacent ends of the guide C³, which latter extend for a short distance under the adjacent projections F⁸ of the piece F² of the presser foot. In the roof B² of the folder is a transverse slit B³ through which the strip to be folded passes.

The presser feet with springs are adjustable with the length of the machine because their being placed nearer together will necessarily shorten the travel of the conveyer, and the folds of the paper will be regulated accordingly.

Where the opening in the spring F⁴ through which the set screw F⁵ passes is a slot F¹², the presser foot can thereby be adjusted nearer to or farther from the center of the folder, and the length of the fold be thus regulated.

I will now proceed to describe the operation of my invention.

One end of the strip of material to be folded is passed through the slit B³, and thence through the slot D² of the traveling conveyer D, and thence carried under one of the presser feet F, (say the left.) The conveyer when the strip is passed through it, may be at any point in its travel, but for the purposes of this description, let us suppose it to be in the center. In this case, its front X will be downward (see Fig. 6) and its lugs D⁴, D⁴, will hug their respective guides C⁵, as the pieces E, E, move toward the right, draw on the arms D⁸ of the conveyer, and draw its front X forward. As the movement of the conveyer toward the right is continued, one of these lugs (the one now above) slides upon the upper side of the guide C³, while the one now below slides below the lower guide C⁴. The conveyer travels toward the right and on nearing the end of the guideway, the arms D⁶ then are standing erect, caused by contact with stop D⁹, and are forced under the piece F⁸ of the presser foot, thereby raising the presser foot. The under edge D' of the conveyer supports the weight above and carries the strip under the then elevated presser foot, in the form of a loop. At the

same time, that part D' of the conveyer which is uppermost passes over the presser foot. In other words, as the conveyer is at present constructed, the presser foot enters the slot D² of the conveyer. While this takes place, the lower side of the conveyer there holds down the strip of material. The instant the power is reversed (toward opposite end) the arm D⁶ leaves its erect position and becomes horizontal, thereby letting the uplifted presser foot F down on the fold. The conveyer is then driven toward the other end of the folder, in this case the left hand end. The conveyer backs correctly guided by its lugs D⁴, D⁴, in connection with guides C³ and C⁴, of the side B'. When it nears the center C⁵ the upward curve C⁶ of the guide C³ causes the rear Y of the conveyer to rise upwardly, and the curve C⁷ on the guide C² assists in guiding the conveyer, so that that lug D⁴ of the conveyer which is uppermost is directed upward, and the lower lug D⁴ is brought up between the left hand side of the central circular guide C⁵ and above the end C⁶ of the left hand guide C³. The conveyer is now in the position shown by dotted lines in Fig. 4, except the arm leans to the left. As the movement of the pieces E continues toward the left, the front X of the conveyer now downward will be turned toward the left. The lug D⁴ heretofore uppermost will descend and pass under the left hand guide C⁴. In the meantime, the other lug D⁴ has passed between the guides C² and C⁶ at the left of the center C⁵. The position of the conveyer will be reversed from that which it occupied when drawn toward the right hand end of the folder. The conveyer is moved to the left and upon the arm reaching the piece F⁸ of the presser foot, the latter is raised so that the lower part D' of the conveyer passes under the then elevated presser foot F, and carries a portion of the strip thereunder. The pieces E are then moved in a contrary direction, (to the right.) The arm D⁶ instantly oscillates to a horizontal position and lets the then elevated presser foot down upon the strip just over the lower part D' of the conveyer. This lower part D' backs out from under the presser foot F, and the latter takes its place in holding down the folded strip. The conveyer is then brought to the center of the folder, reversed in position, carried forward all the way to the right, and thus folds more of the strip and passes this fold under the adjacent presser foot, and so on continually. It will be noted that when the strip is under one presser foot, this acts as a holder for the strip at this point, and as the conveyer moves away from this foot, it draws a fresh amount of strip through the slit B³ of the folder, and the slot D² of itself, and folds this and lays it under the opposite presser foot.

The spring F⁴ is obviously very desirable; and is preferably present, but may be dispensed with, and in such event the presser feet are fastened to the frame B, (see Fig. 9.)

and the guideway is depressed at each end, substantially as shown by dotted lines in Fig. 3, and in solid lines in Fig. 5, in order to downwardly deflect the conveyer, or rather to cause the presser foot to be elevated by lifting the end of the machine, the lower side of the conveyer supporting the weight thereof, the spring F⁴ being omitted. The conveyer arm as it comes to the end of the guideway elevates the end of the machine. This it does by moving under and lifting the guide projection C³, while the lower side of the conveyer D slides upon whatever folded paper is at said end of the machine. In such event, the feet are provided with means for vertical adjustment, viz: slots F¹⁰, F¹⁰, (see Fig. 9,) in the pieces F² of the presser foot and set screws F⁹, F⁹, respectively passing through said slots, into the folder frame. Such adjustment contributes toward regulating the height to which the presser foot is placed in relation to the conveyer.

It will be observed that the lower guide C⁴ may be omitted, when the guide C² is sufficiently long.

Obviously the frame of the conveyer may be skeletonized and consist of wires or rods, or flat strips.

When the parts D' of the conveyer are not beveled, it is necessary that the guides C⁴, C³ should deflect still lower in order for the lower part D' of the conveyer to be inserted quite horizontally beneath the presser foot. To avoid a steep ascent of the guides mentioned, the sides D', D' are preferably beveled as shown in Fig. 8.

Instead of a handle A⁵, or hand power, other means may be employed to reciprocate the pieces E.

By the term "attendant guides" on sides B', will be understood the several guides which engage the lugs D⁴ on the ends of the conveyer.

The advantage of my machine in autographic sales registers is in folding the stored record strip; that as each record of transaction is consecutively numbered, in referring thereto the number desired may be found by simply parting the folds, substantially as finding the page in a book. When such record is rolled it, for reference, must be unrolled and again rerolled for keeping. When in the convenient form of folds, this record strip may serve as a journal in some classes of business and thus dispense with much work in book-keeping, avoiding liability to error in copying, and necessitating only one reference in tracing from the ledger to the original entry.

Similar advantages are obtained in keeping telegraph records in folded form. The minutes, or copies thereof, of business meetings may thus be kept in continuous record and no portion become displaced.

In manifolding, when desired, each strip may pass immediately from the manifolding machine into a folder, and thus each copy is

put in the convenient form of reciprocated folds.

Ribbons, lace, cambric, linens, dry goods, leather, aluminum and other flexible material in form of strips may thus be folded when desirable, by my machine being of suitable size and dimensions.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. In mechanism for folding flexible material, the presser feet, a reciprocating conveyer for locating the folded material beneath them, a frame vertically reciprocal, and containing the presser feet, and also guides whereby the conveyer is properly reciprocated in relation to the flexible material and the presser feet, substantially as and for the purposes specified.

2. In a machine for folding strips, the opposite presser feet, a frame in connection with them, the frame having sides as B', provided with guideways C, and attendant guides, and a conveyer having a slot D² therein, and having means substantially as described for engaging said guides, substantially as and for the purposes specified.

3. In a machine for folding strips, the opposite presser feet and the sides B' provided with guideways C and attendant guides, the conveyer having a slot therein, and having means substantially as described for engaging the guides, and chute or guiding slot B³ formed by connecting parts of the frame-work, substantially as described.

4. In a machine for folding strips, the opposite presser feet, a frame in connection with them, a conveyer having the slot D², and at the ends the lugs D⁴, D⁴, and stops D⁹, and arm D⁶, having projecting arm D⁸, the folder frame having an opening B³, and sides each provided with a guideway C, and guides as C³, C⁶, above and C⁴ below, and additional guides C², C², respectively located above the guides C³, C⁶, and central guide C⁵, and means for compelling the depression of the conveyer when near each end of the guideway, and the consequent elevation of the adjacent presser foot, substantially as and for the purposes specified.

5. In a machine for folding strips, the opposite presser feet F, F, and the folder frame carrying the springs F⁴, F⁴, respectively connected to said presser feet, and a conveyer having a slot D², and portions D', D', and means for enabling the conveyer to be reciprocated and alternately convey the strip to be folded to said presser feet, and lift said feet and insert one of said portions D' below the said foot, along with the strip to be folded, substantially as and for the purposes specified.

6. In a machine for folding strips, opposite presser feet, a frame connecting them, and having guides, and the conveyer having at each end lugs D⁴, D⁴, and arm D⁶, and a stop D⁹, and the reciprocating pieces E, and means for enabling the arms D⁶ to be operated by

the said pieces, and the springs F⁴, respectively connected to a connection F³ of the adjacent presser foot, substantially as and for the purposes specified.

7. In a machine for folding strips, opposite presser feet, a frame connecting them, and having guides, and the conveyer having at each end lugs D⁴, D⁴, and arm D⁶, and a stop D⁹, and the reciprocating pieces E, and means for enabling the arms D⁶ to be operated by the said pieces, and the adjustable spring F⁴, respectively connected to a connection F³ of the adjacent presser foot, substantially as and for the purposes specified.

8. In a machine for folding strips, the opposite presser feet, a frame connecting them, and having guides, and the conveyer having at each end lugs D⁴, D⁴, and arm D⁶, and a stop D⁹, and the reciprocating pieces E, and means for enabling the arms D⁶ to be operated by the said pieces, and the springs F⁴ connected by suitable connections to their respective presser feet, and the folder frame having the projections F⁵, F⁵, on which the spring rests, and the set screw F⁵ located between the said projections, substantially as and for the purposes specified.

9. A frame provided with presser feet, and guide for allowing the frame to rise and fall vertically, but preventing horizontal movement thereof, a conveyer working in said frame, and reciprocating therein, the folded portions of the strips being beneath the folding frame, the superincumbent weight of the frame being adapted and exerted to fold the strip and retain it in a folded condition, substantially as and for the purposes specified.

10. In a machine for folding flexible strips, the oppositely arranged presser feet, under which the opposite folds of the strip respectively lie, and a folder frame connecting the feet, located above the folded strip, and a conveyer in conjunction with the presser feet for folding the strip, the conveyer adapted to reciprocate between and under the presser feet and over the folded strip, and means substantially as described for enabling the front edge of the conveyer to be turned under and reversed and to successively fold alternate ends of the strip, substantially as and for the purposes specified.

11. In a machine substantially as described for folding flexible strips into reciprocated folds, the oppositely arranged presser feet, under which the opposite folds of the strip respectively lie, and a frame, and a conveyer having parts D', D', and slot D², and at each end an arm D⁸, the frame having a guideway therefor, consisting of elongated slots extending toward the opposite presser feet, and means for reciprocating the conveyer between and under the feet, substantially as and for the purposes specified.

12. In a machine for folding strips, the opposite presser feet, a frame connecting them, and having guides, and the conveyer having at each end lugs D⁴, D⁴, and arm D⁶, and a stop

D⁹, and the reciprocating pieces E, and means
for enabling the arms D⁶ to be operated by
the said pieces, and the springs F⁴ connected
by suitable connections to their respective
5 presser feet, and the folder frame having the
projections F⁶, F⁶, on which the spring rests,
and the set screw F⁵ located between the said
projections, the spring F⁴ having the slot F¹²,

for enabling the presser foot to be adjusted
nearer to or farther from the center of the ro
folder, substantially as and for the purposes
specified.

W. ESPY CURTIS.

Attest:

A. S. LUDLOW
K. SMITH.