

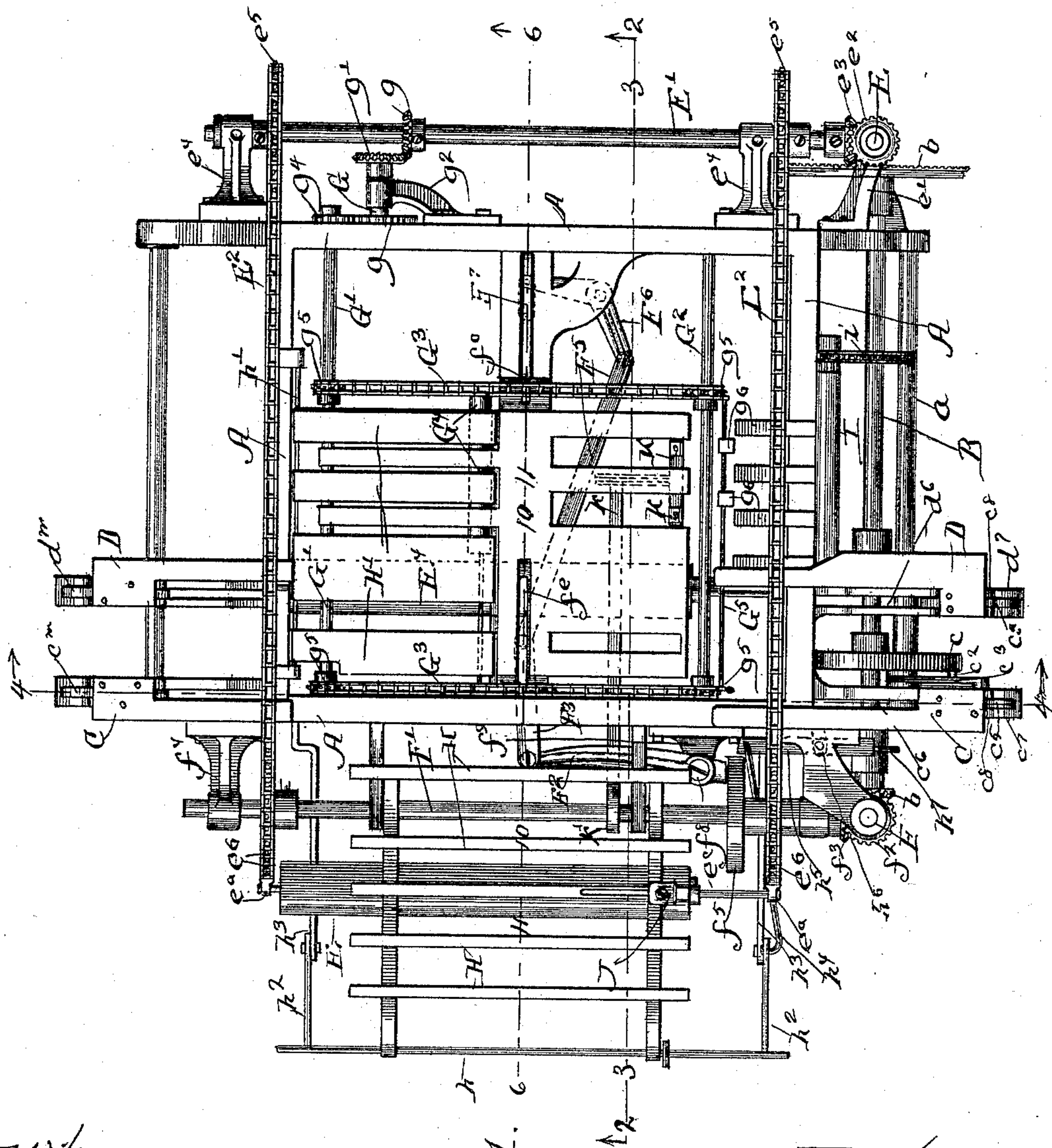
(No Model.)

5 Sheets—Sheet 1.

A. H. GALE.
PAPER FOLDING MACHINE.

No. 495,548.

Patented Apr. 18, 1893.



Witnesses:

Chas. G. Harvey
Ad. E. Brown

Fig. 1.

Inventor:

Amel H. Gale
by *Wm. C. Moore & Putnam*
Attys.

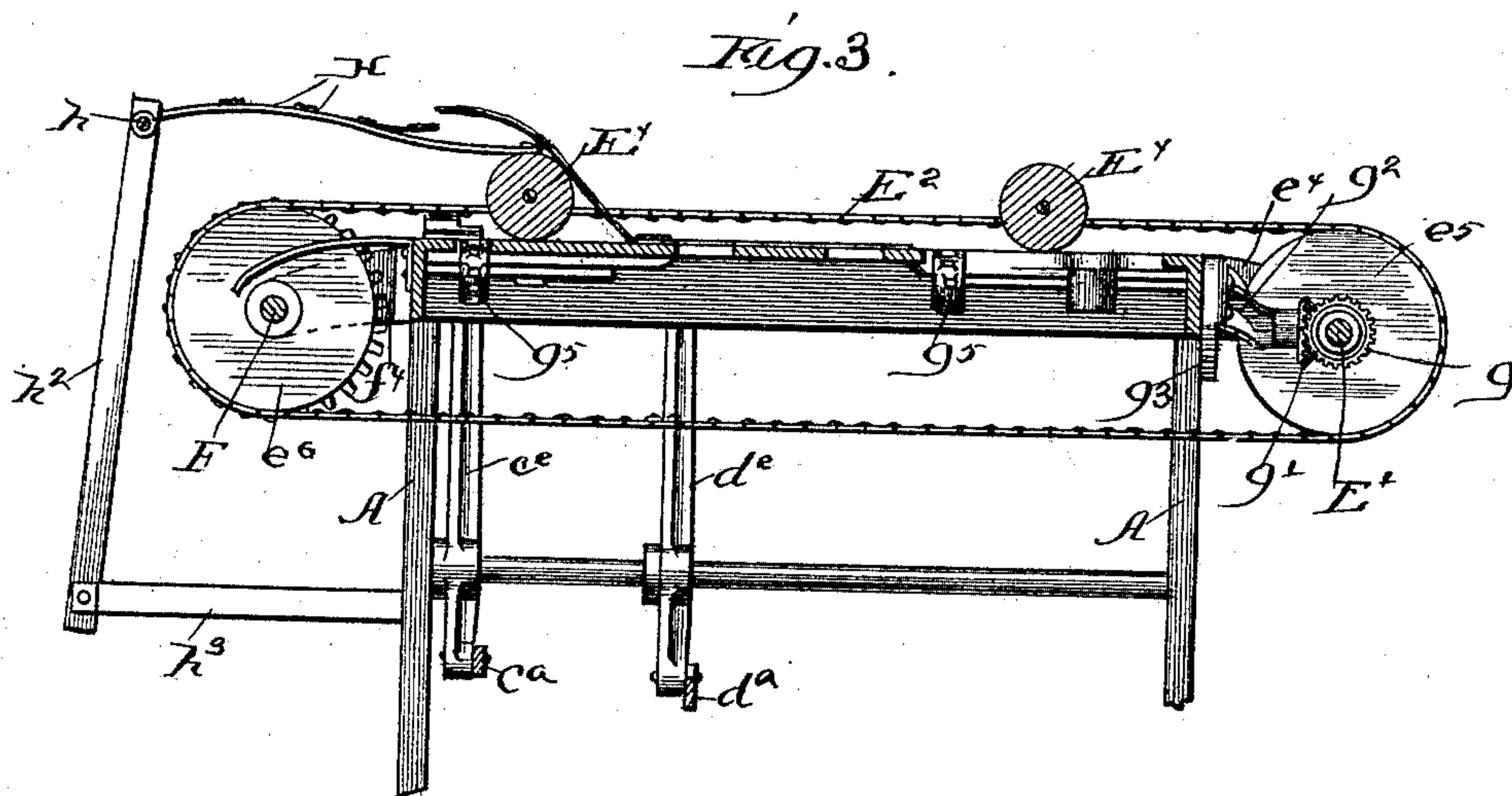
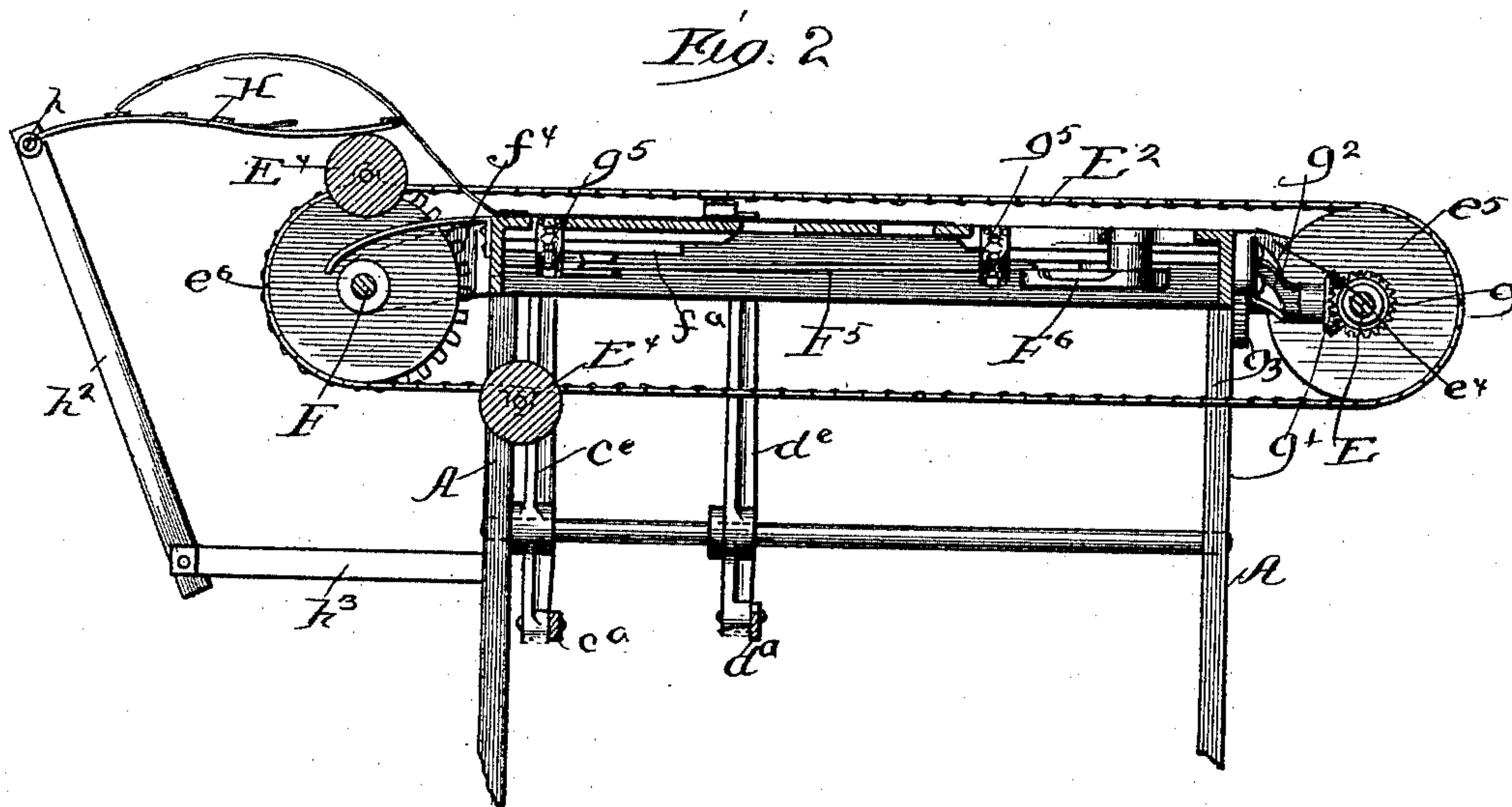
(No Model.)

5 Sheets—Sheet 2.

A. H. GALE.
PAPER FOLDING MACHINE.

No. 495,548.

Patented Apr. 18, 1893.



Witnesses:

Chas. Sherry
A. S. Johnson

Inventor:

Amel H. Gale
by Miles, Green & Putner
Attys

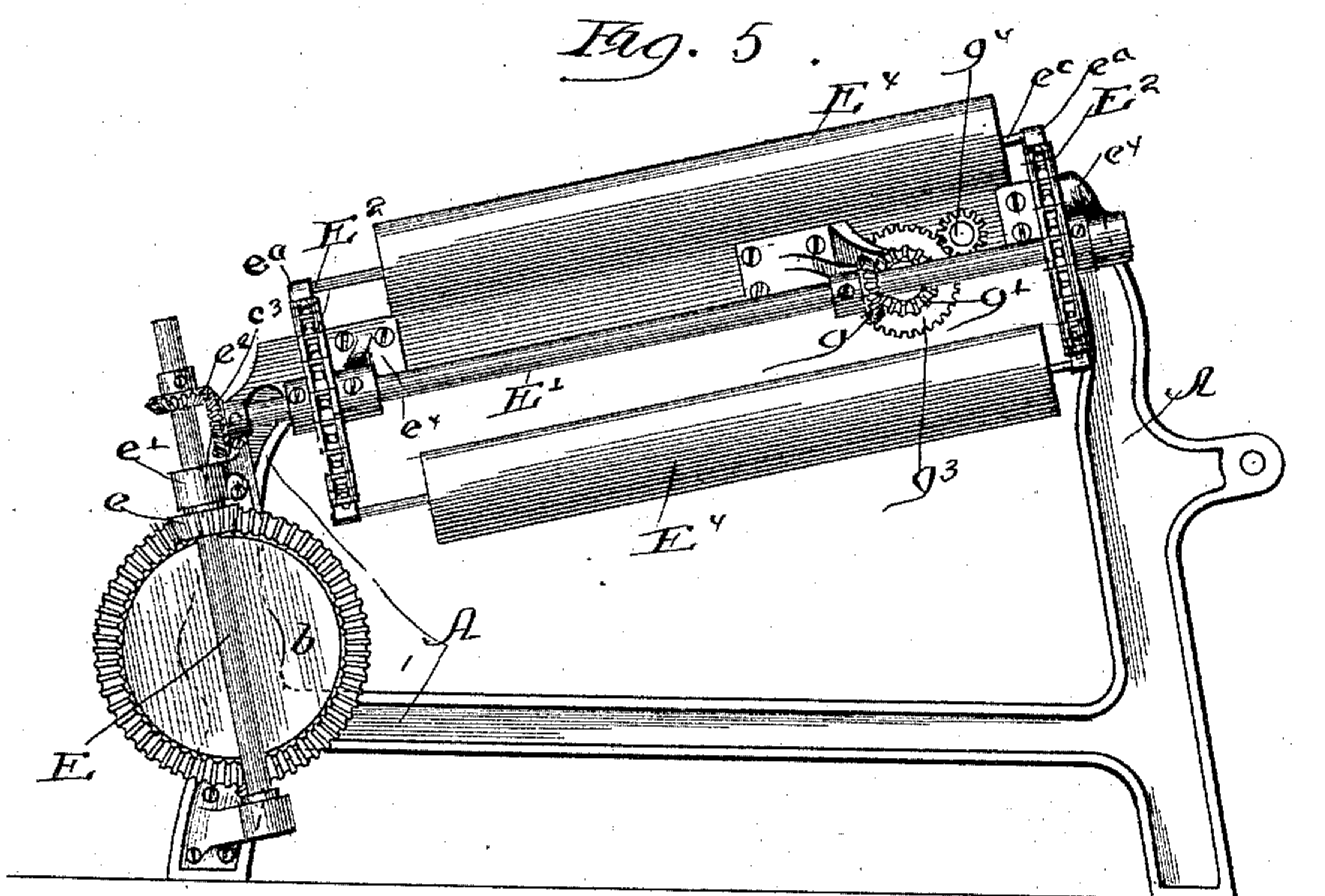
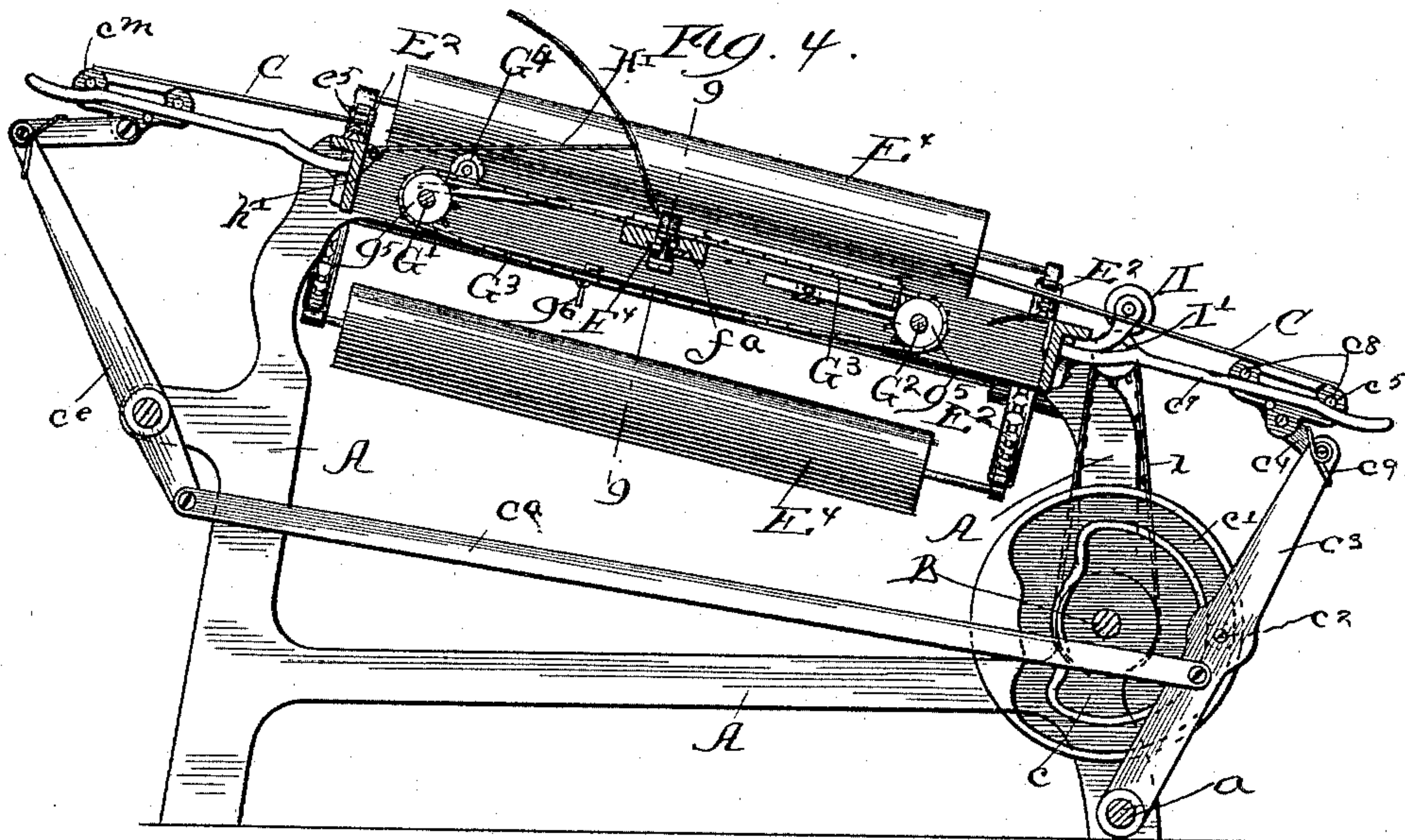
(No Model.)

5 Sheets—Sheet 3.

A. H. GALE.
PAPER FOLDING MACHINE.

No. 495,548.

Patented Apr. 18, 1893.



Witnesses:

Chas. Leroy
A. J. Johnson

Inventor:

Amel H. Gale
by Wiles, Green & Pitman
Attys.

(No Model.)

5 Sheets—Sheet 4.

A. H. GALE.
PAPER FOLDING MACHINE.

No. 495,548.

Patented Apr. 18, 1893.

Fig. 6.

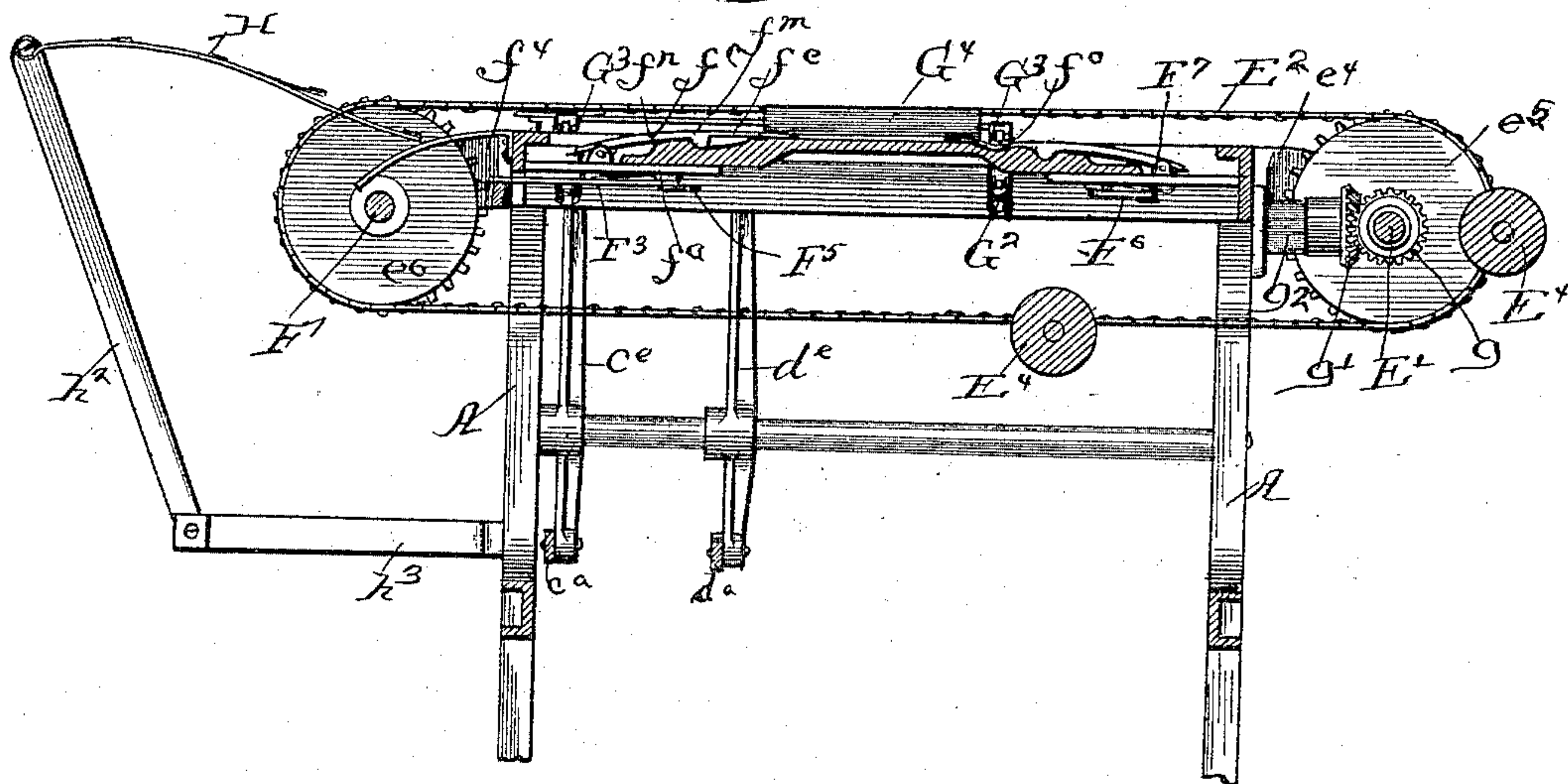


Fig. 7.

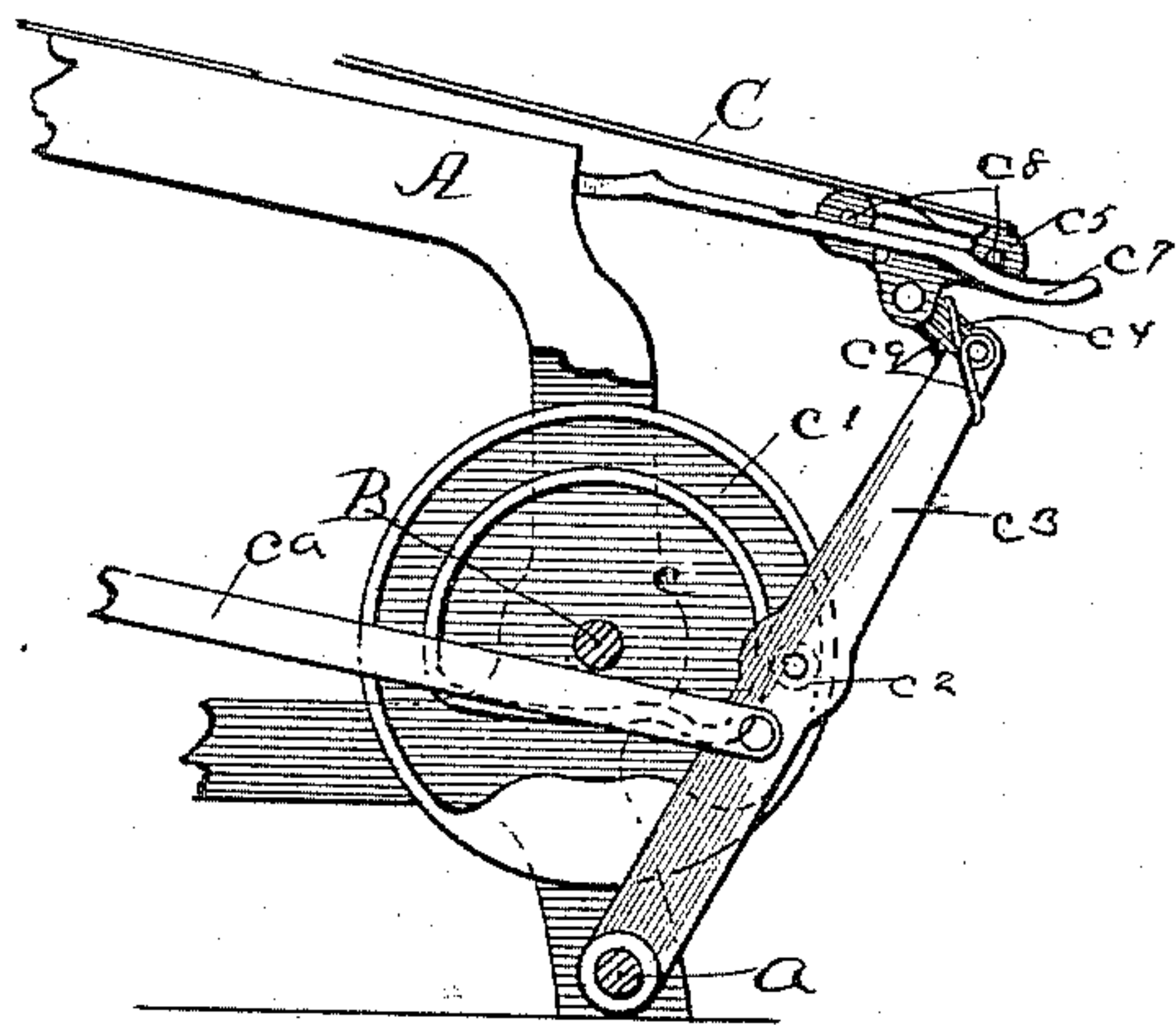
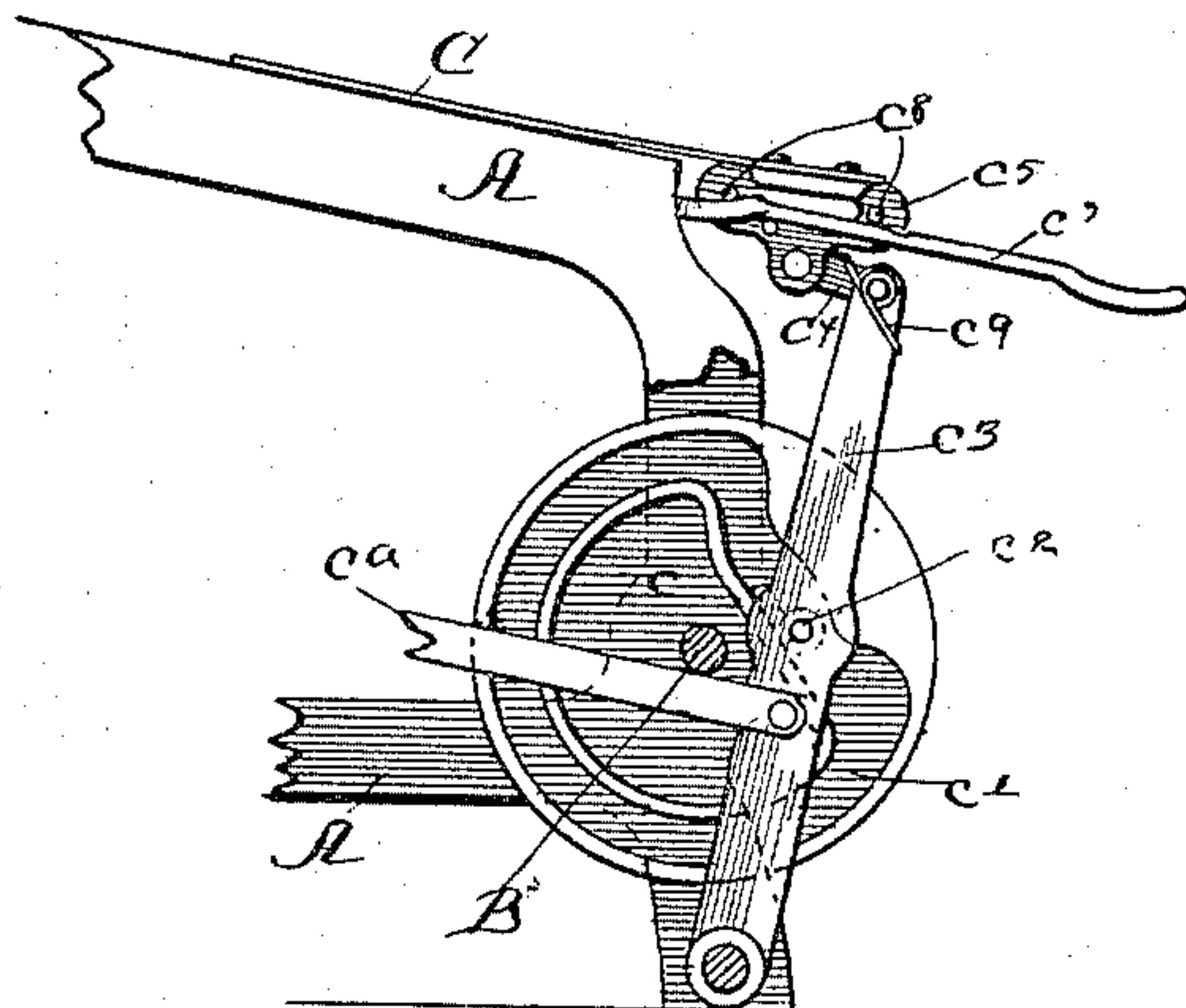


Fig. 8.



Witnesses:
Chas. Starvoey.
A. J. Ebbesen

Inventor:
A. H. Gale
by Wm. Green & Putnam
Attys

(No Model.)

5 Sheets—Sheet 5.

A. H. GALE.
PAPER FOLDING MACHINE.

No. 495,548.

Patented Apr. 18, 1893.

Fig. 9.

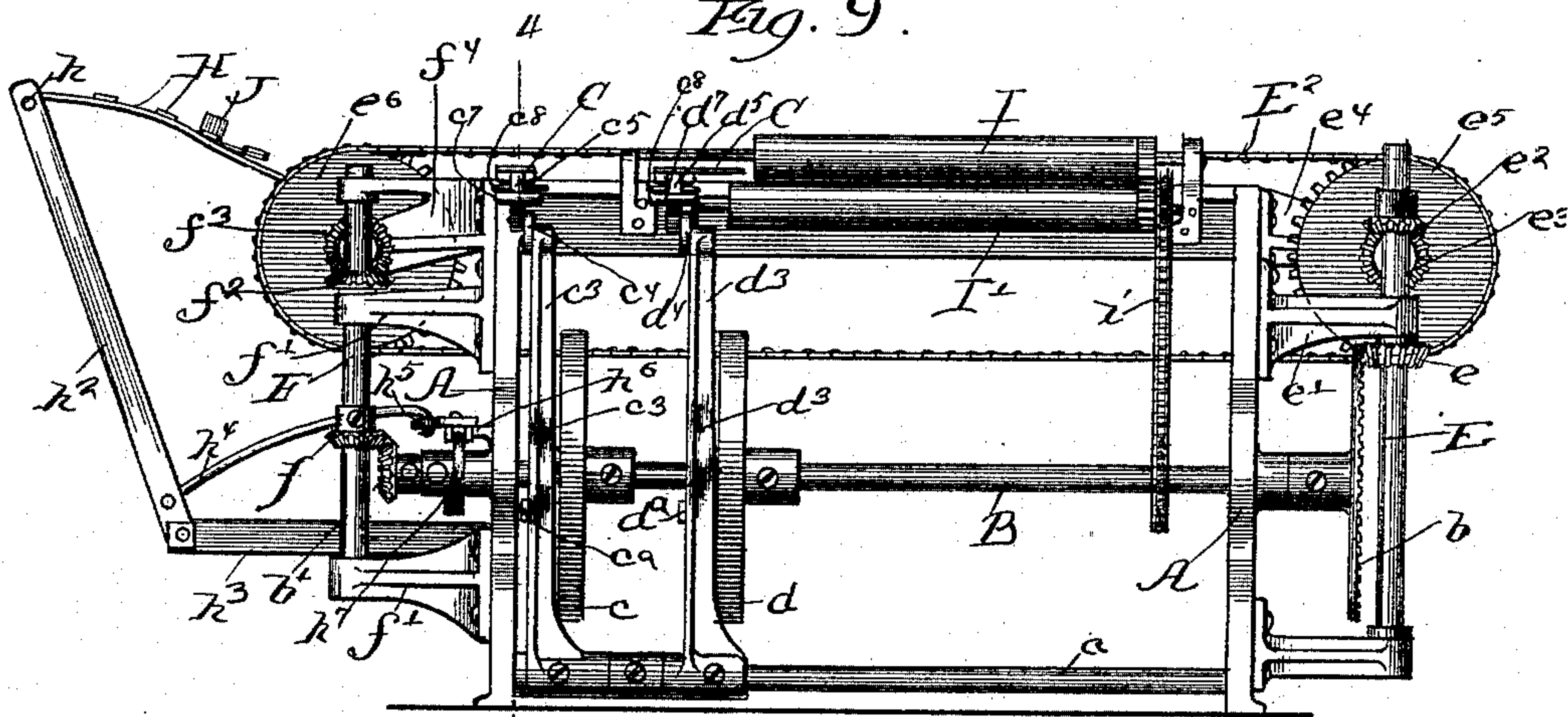


Fig. 10.

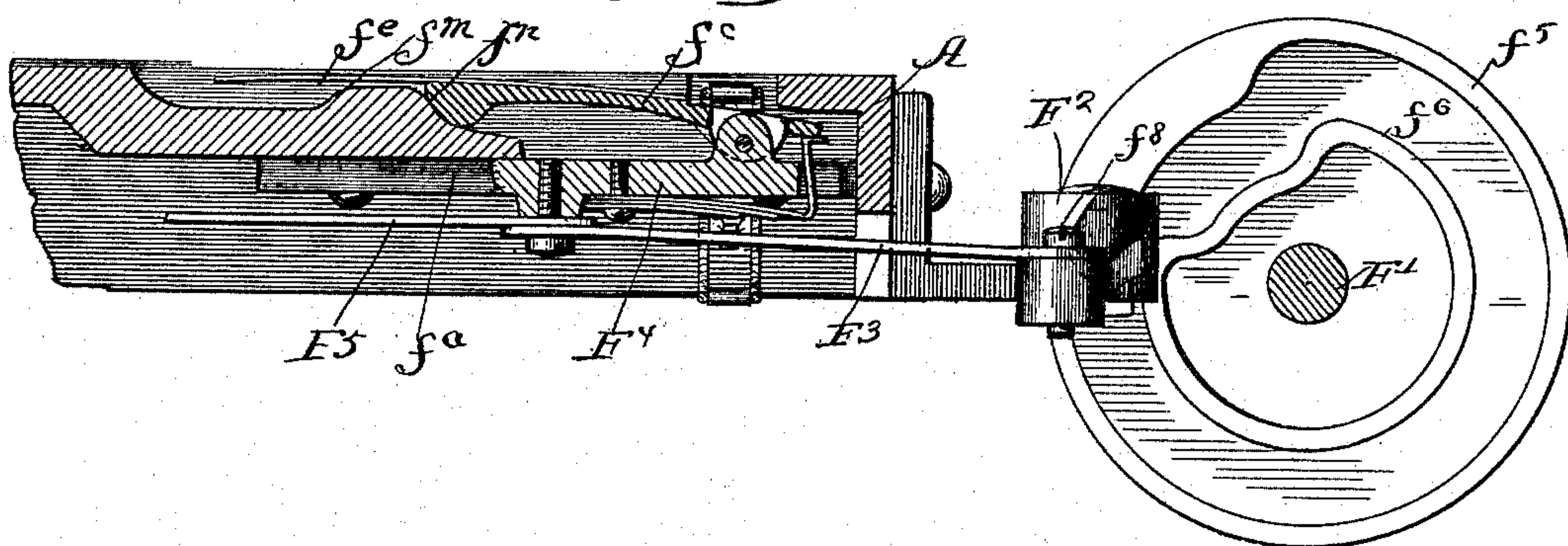
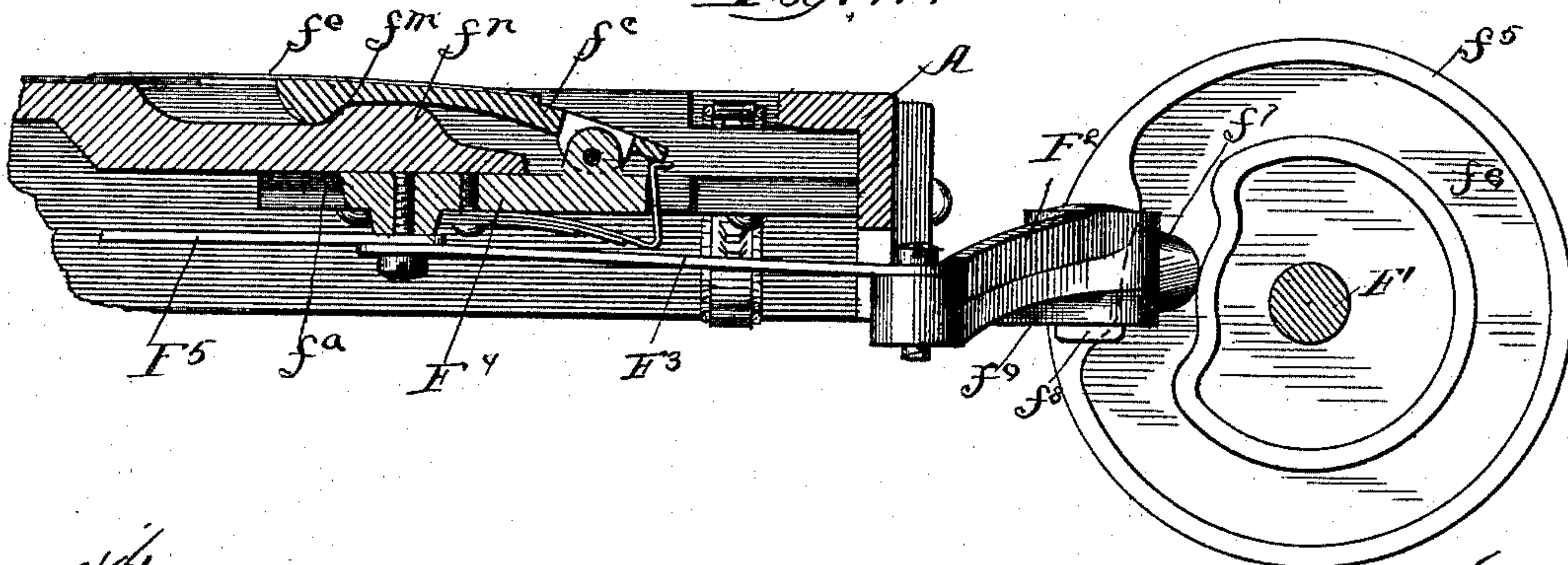


Fig. 11.



Witnesses:

Chas. Harvey
A. J. Ebbesen

Inventor:

Amel H. Gale
by Niles, Green & Putnam
Attys

UNITED STATES PATENT OFFICE.

ANSEL H. GALE, OF CHICAGO, ILLINOIS.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 495,548, dated April 18, 1893.

Application filed May 12, 1892. Serial No. 432,735. (No model.)

To all whom it may concern:

Be it known that I, ANSEL H. GALE, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

The machine, in the construction of which the invention, described in this application was made, is designed more especially to fold printed matter such as newspapers or circulars as they leave the press in which they are printed.

The general purpose of the invention is to provide the simplest, most durable and most reliable means for folding such articles without moving them about from place to place, as is common in the ordinary folders now in use. The folding of the paper without moving it from its first position has many advantages, among which perhaps the most noticeable are that the folds can be more accurately made and the floor space required is much less.

In its general construction the machine, in which I have embodied my invention, consists, first, of a table upon which the paper to be folded is received; second, a series of fingers so located as to grasp the paper along the lines of the different folds and so timed as to spring into action at the proper moment; and third, a series of rollers geared to rise through the table at the proper places to fold the paper over the fingers by means of which it is held. The parts enumerated when properly constructed make up a machine adapted to fold a sheet of paper once. By multiplying these parts, so arranging them as not to interfere one with another, any number of folds in any desired order can be made.

To illustrate my invention I have shown in the drawings a machine adapted to make threefolds, the first of which doubles the sheet upon itself, the second doubles the two thicknesses in a line parallel to the first fold, and the third doubles the four thicknesses in a line at right angles to the first folds.

In the drawings, Figure 1 is a plan view of the machine. Figs. 2, 3, 4, 6, 10 and 11 are vertical sections taken in lines 2—2, 3—3, 4—4, 6—6, 10—10, 11—11, of Fig. 1, the view being in the direction of the arrows 2, 3, 4, 6,

10, and 11, of said Fig. 1. Figs. 5 and 9 are end and side elevations, respectively, of the machine taken from the points and in the directions indicated by the arrows 5 and 9, of said Fig. 1; and Figs 7 and 8 are detail broken views of the arrows 7 and 8, and having portions broken away to show the parts behind them, said last mentioned figures showing the same parts in different positions.

The frame work of the machine is lettered A, and the top thereof forms the table, or paper-support. A main driving shaft B, (Figs. 1 and 9) is journaled in said frame and geared by any suitable connection with the printing-press or other driving mechanism. This shaft imparts motion directly to two pairs of fingers C, C, D, D, (Figs. 1, 4, 7 and 8.) For this purpose the shaft is provided with disks *c*, *d*, bearing cam grooves *c'*, (see Figs. 4, 7 and 8.) These figures show only the disk *c*. The face of the disk *d*, is exactly the same, however, the only difference being that said disk is rotated upon the shaft a sufficient distance to properly time the relative positions of the two pairs of fingers. Running in these grooves are rollers *c*², *d*², mounted upon arms *c*³, *d*³, pivoted at one end upon a rod *a*, secured in the frame and connected at the opposite end by means of links *c*⁴, *d*⁴, with slides *c*⁵, *d*⁵, traveling in slots *c*⁶, *d*⁶, in guides *c*⁷, *d*⁷, secured to the frame. The slides rest upon the upper surface by means of pins *c*⁸, *d*⁸, and said upper surface is shaped to give the proper motion to the fingers C, D. The slides are held upon the guiding surfaces by means of springs *c*⁹, *d*⁹, in order that the pins *c*⁸, *d*⁸, may actually follow the upper surface of the guides. Links *c*^a, *d*^a, Figs. 4 and 9, extend across the bed beneath the machine and engage with levers *c*^e, *d*^e, pivoted to the frame and engaging by means of devices, like those just described, with slides *c*^m, *d*^m, equipped in the same manner as the slides *c*⁵, *d*⁵. It should be noticed that the connections between the two slides are such that their motion is toward or from each other.

Upon one end of the shaft B, is a bevel gear *b*, (see Figs. 1 and 9) meshing with a bevel pinion *e*, fast upon a shaft E, journaled in brackets *e'*, secured to the frame, said shaft carrying also a miter gear *e*², meshing with a miter *e*³, fast upon a shaft E', journaled in

brackets e^4 , also secured to the frame. The shaft E' , carries a pair of sprocket-wheels e^5 , e^5 , which drive chains E^2 , extending across the top of the frame to another pair of sprocket-wheels e^6 , e^6 , and back beneath the bed of the machine. The sprocket-wheels e^6 , are journaled upon a shaft F' , journaled in brackets f^4 , secured to the frame. The chains E^2 , carry boxes e^a , (seen at the left in Fig. 1, and also in Figs. 4 and 5) in which are journaled spindles e^c , carrying rollers E^4 , which, as the chain moves across the top of the machine, roll over the table. The shaft F' , is run by means of a miter gear b' , (see Fig. 9) upon the shaft B , meshing with a miter f , upon a shaft F , journaled in brackets f' , and carrying a miter f^2 , in mesh with a miter f^3 , upon said shaft F' . The latter has fast upon it the disk f^5 , (see Figs. 1, 10 and 11) having upon its face a cam groove f^6 , in which runs a roller f^7 , upon one end of an arm F^2 , pivoted at f^8 , to a bracket f^9 , and connected at its other end by means of a link F^3 , with a slide F^4 , guided in grooves f^a , in the frame. To the slide F^4 , is pivoted an arm f^c , carrying a projecting finger f^e , which, as the slide travels back and forth, is moved vertically by means of cam surfaces f^m , f^n , upon the arm and frame, respectively. A link F^5 , extends across under the bed of the machine (see Fig. 1) and is pivoted at its opposite end to a lever F^6 , pivoted to the frame and imparting motion by means of its other end to a slide F^7 , opposite to and in line with the slide F^4 , and also carrying a finger similar to the one on the former slide, but containing a downward bend f^o , (see Fig. 6) to accommodate a chain, not yet described. The arm, or crank, F^6 , reverses the motion of the link F^5 , so that the two slides are moved toward each other or away from each other as the arm F^2 , is oscillated by the cam disk f^5 .

The shaft E' , has a miter gear g , fast upon it (see Figs. 1 and 5), said miter being in gear with another g' , fast upon a shaft G , journaled in a bracket g^2 , secured to the frame, and there is also fast upon said shaft a gear g^3 , meshing with a pinion g^4 , upon a shaft G' , journaled in the frame. This shaft and another G^2 , upon the opposite side of the machine carry chains G^3 , by means of sprocket-wheels g^5 , and said chains are provided with a roller G^4 , Figs. 1 and 6, which travels over the bed of the machine in the same manner as the rollers E^4 , but in a direction at right angles to that of the latter. The chains G^3 , also carry a cross-rod G^5 , (see Figs. 1 and 4) upon which are stops g^6 , arranged to engage with the paper after it is folded and remove it from the rack. A pair of rollers I , I' , are arranged in the path of the paper as it leaves the machine and driven by a sprocket chain i , from the main shaft to press the folded paper to insure a proper creasing. It is obvious, of course, that inasmuch as the rollers, E^4 , E^4 , travel across the table either wholly or in part, and return beneath it, provision must be made to enable them to pass through

said table at certain points. Mere openings might be provided for this purpose, but, to avoid leaving openings in the bed, I prefer to add pivoted racks H , H' , (see Figs. 1, 6 and 4) the latter being hinged upon a rod h' , supported by the frame, and the former upon a rod h . This rod h , is carried by arms h^2 , pivoted at their other ends to brackets h^3 , rigidly secured to the frame (see Fig. 9) and a link h^4 , is connected with the arm h^2 , between its ends, said link extending to a lever h^5 , (see Figs. 1 and 9) pivoted to the frame at h^6 , and engaging at its opposite end with a cam h^7 , upon the shaft B . This cam is so shaped as to oscillate the lever and thereby move the rack H , toward the right in Fig. 1, during certain portions of the folding operation.

To check the paper in the proper position as it comes from the printing-press, an adjustable stop J , (see Fig. 1) is mounted upon the rack H , and stops K , are adjustably secured to a pivoted arm k , operated by means of an eccentric k' , upon the shaft F' .

Fig. 1 shows the machine in the proper position to receive the paper to be folded, as it comes from the press. It should be so delivered as to reach the stops J , K , and, if it is the largest size, which the machine can fold, it will reach to the left hand extremity of the rack H . The fingers C , first close in upon it and grasp it firmly along its middle line, holding it until one of the rollers E^4 , rises beneath the pivoted rack H , as seen in Fig. 2, and passing to the right folds the paper over the fingers C . As soon as the roller has passed, these fingers are raised slightly by means of the cam-shaped guides c^7 , and the rack H , is drawn forward by the link h^3 , until it approaches the fingers D , which have in the meantime closed in upon the doubled paper and clamped it firmly to the bed across the middle line of the once folded sheet. The fingers C , are now withdrawn and another roller advances beneath the rack H , as seen in Fig. 3, and folds the doubled sheet over the fingers D . When this roller has passed and before said fingers release the paper, the fingers f^e , f^o , grasp it across its middle line at right angles to the folds already made. As soon, now, as the fingers D , are withdrawn from the paper, the roller G^4 , rises from beneath the pivoted rack H' , as seen in Fig. 4, and folds the paper over the fingers f^e , f^o . Said roller is followed by the stops g^6 , which engage with the rear edge of the paper as soon as the fingers f^e , f^o , are withdrawn and force the folded sheet forward over the stops k , which have been withdrawn, and between the rollers I , which deliver it from the machine.

To enable the machine to be adjusted to any size of paper, the stops J , K , are made so that they can be moved toward or from the fingers f^e , f^o , to bring said fingers in the middle line of the sheet in one direction. Also the arms, c^3 , d^3 , are arranged to slide along the rod, a , (see Fig. 9,) the disks, c , d , to slide along the shaft, B , and the guides, c^7 , c^7 , are

arranged to slide along the side of the supporting frame, upon which they are carried, so that by moving all of these parts the fingers, C, D, may be brought to any desired lines where folds are to be made. The corresponding arms and guides upon the opposite side of the machine are made adjustable in the same manner.

To adjust the machine to a particular size of paper, the desired folds are marked upon the latter, and it is laid upon the machine. The stops, J, K, are first so adjusted as to bring the fingers, f^o, f^o , in the line of the middle fold. The fingers, D, are then brought to the line of the double fold, and the fingers, C, to the line of the single fold.

I claim as new and desire to secure by Letters Patent—

1. The combination in a folding-machine, of a table to receive the paper, retaining devices to grasp the latter along the folds and pressing rollers provided with suitable supporting devices whereby they may be made to rise through openings in the table provided therefor and pass over the paper to press the same down over the retaining devices; substantially as described.

2. The combination in a folding-machine, of a supporting table, retaining devices adapted to grasp the article to be folded along the lines of the folds, a series of hinged racks in the top of the table and rollers provided with suitable supporting devices whereby they may be made to rise through these racks and fold the paper over the retaining devices; substantially as described.

3. The combination in a folding-machine, of a supporting table, a series of fingers adapted to grasp the paper to be folded along the lines of the folds, rollers provided with suitable supporting devices whereby they may be made to travel over the top of the table and return beneath it, and a hinged rack adapted to open and allow said rollers to pass up under the paper and provided with a shifting device adapted when one fold has been made, to advance said rack to a succeeding fold; substantially as described.

4. In a folding-machine, the combination with a supporting table and a series of rollers traveling across the top thereof and returning beneath it, of a hinged rack adapted to rise and allow the rollers to pass upward beneath the paper and provided with a shifting device adapted, when one fold has been made, to advance the rack to a succeeding fold, a retaining device adapted to grasp the paper along the line of said first fold and afterward to lift said paper to allow the rack to slip beneath it in passing to another fold; and a second retaining device adapted to grasp the paper along the line of the second fold substantially as described.

5. In a folding-machine, the combination with a supporting table provided with a series of openings, of a series of retaining devices adapted to grasp the paper along the lines of the folds, rollers provided with suitable supporting devices whereby they may be made to rise through said openings, pass across the table in the directions in which the folds are made, stops to check the paper when it reaches the proper position and means for delivering it from the machine when the folding is completed; substantially as described.

ANSEL H. GALE.

Witnesses:

H. BITNER,

CHAS. O. SHEVEY.