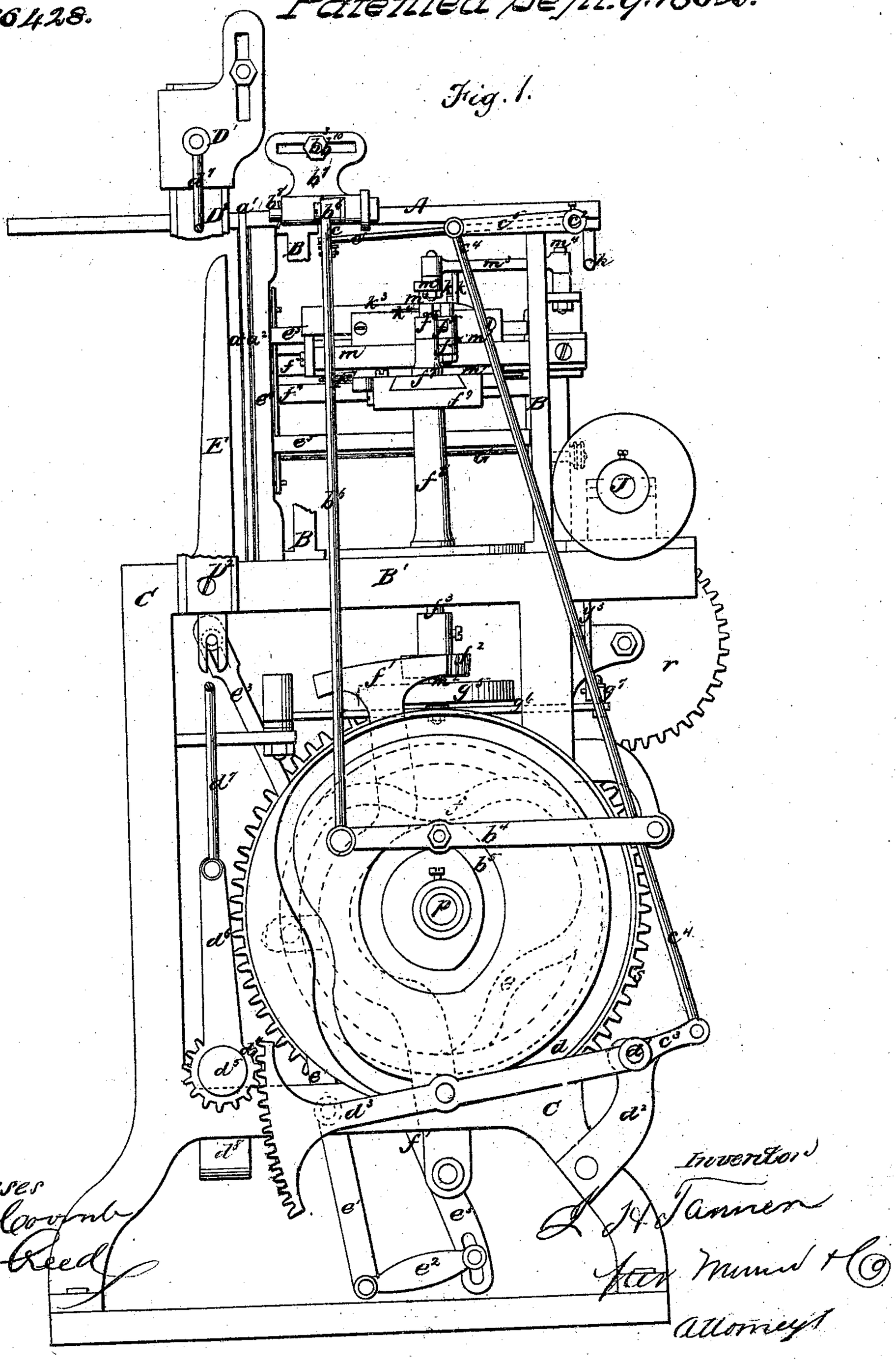
J. H. Tanner. Sheet 1. 3 Sheets.

Mach. for Folding & Stitching Paper.

No. 36428. Patented Sept. 9. 1862.

Fig. 1.



Witnesses
J. W. Coombs
G. W. Reed

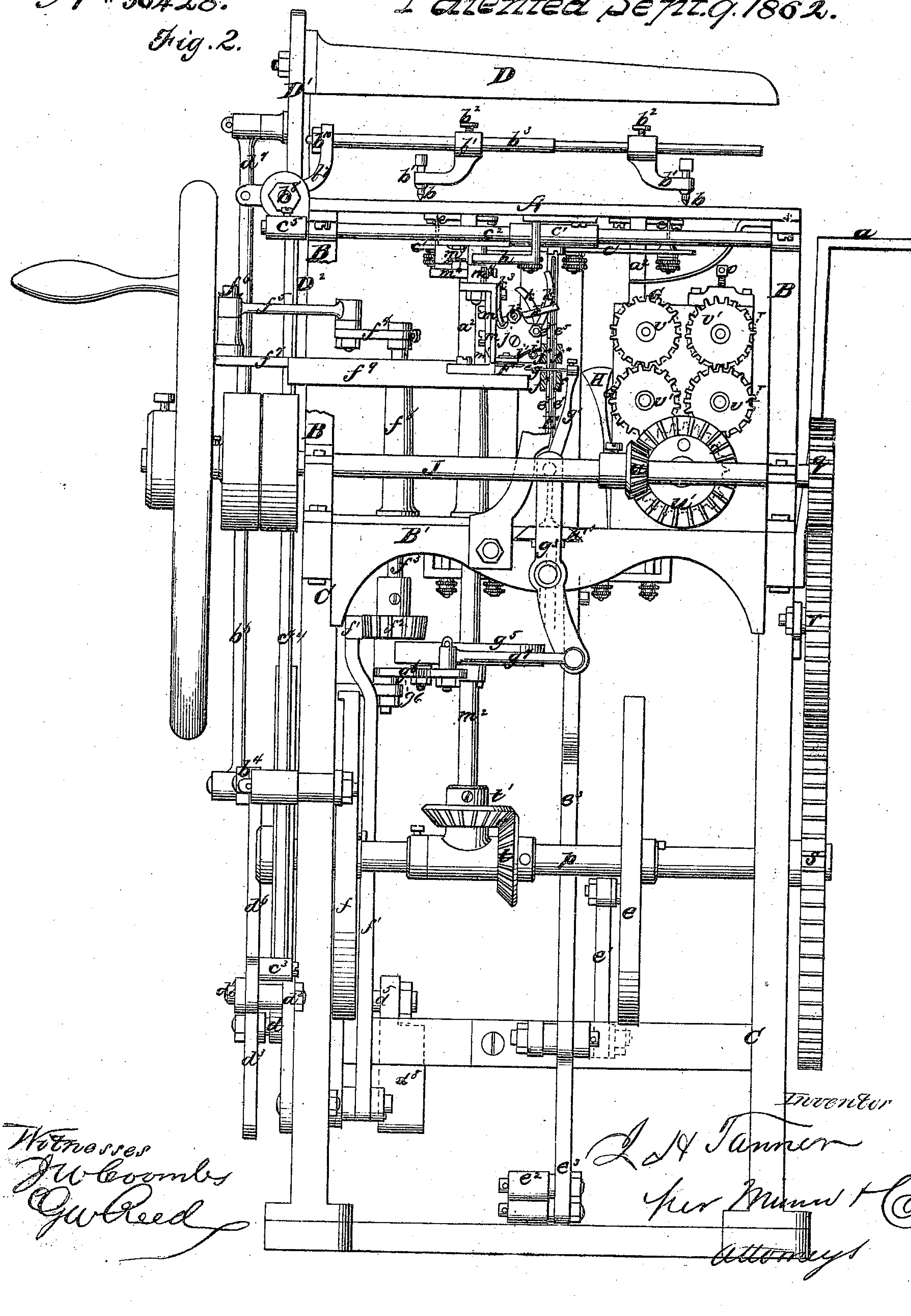
Inventor
J. H. Tanner
per Munn & Co
Attorneys

J. H. Tanner. Sheet 2. 3 Sheets.

Mach. for Folding & Stitching Paper.

No. 36428. Patented Sept. 9. 1862.

Fig. 2.



Witnesses
J W Coombs
G W Reed

Inventor
J H Tanner
per Munn & Co
Attorneys

J. H. Tanner. Sheets. 3 Sheets.

Mach. for Folding & Stitching Paper.

No. 36428. Patented Sept. 9. 1862.

Fig. 3.

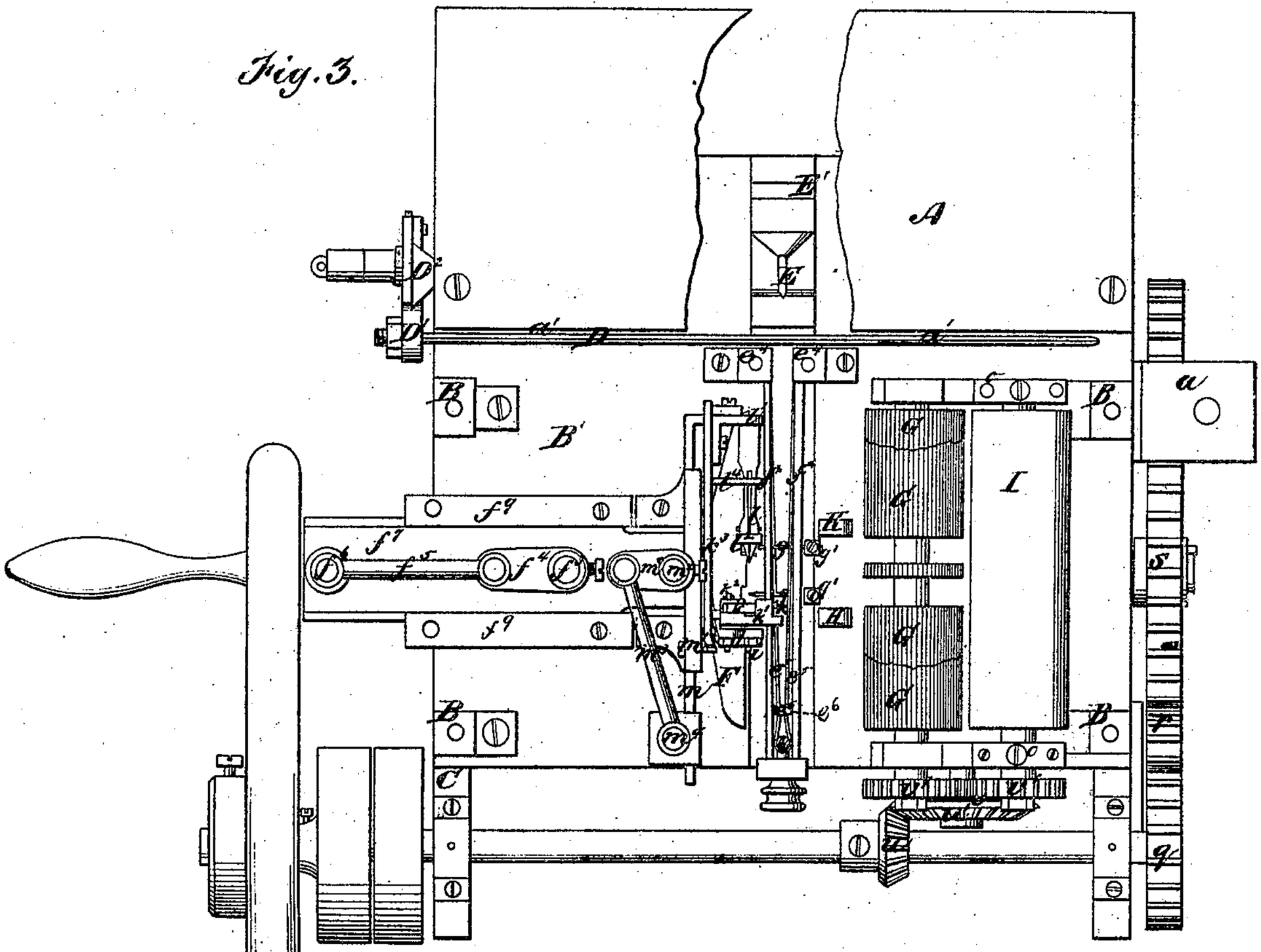
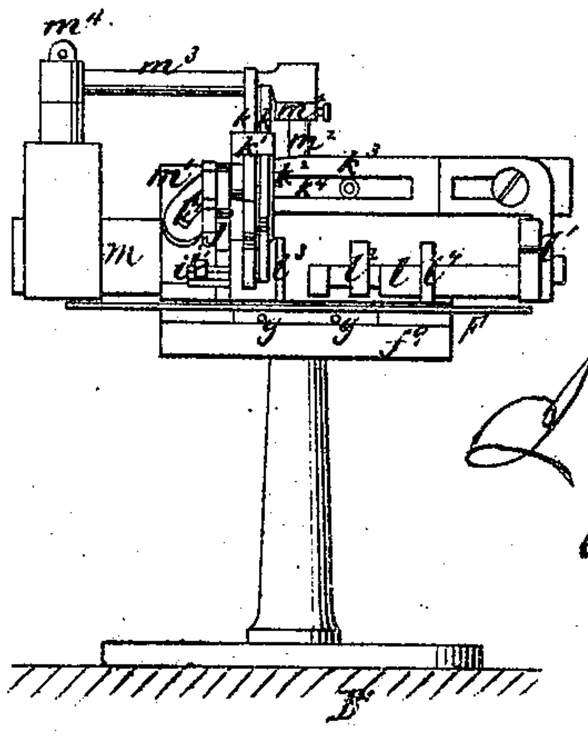


Fig. 4.



Witnesses.
J. W. Coombs
G. W. Reed

Inventor.
J. H. Tanner
per Munn & Co
Attorneys

UNITED STATES PATENT OFFICE.

JOHANN HEINRICH TANNER, OF FRAUENFELD, THURGAU, SWITZERLAND.

MACHINE FOR FOLDING AND STITCHING PAPER.

Specification forming part of Letters Patent No. **36,428**, dated September 9, 1862.

To all whom it may concern:

Be it known that I, JOHANN HEINRICH TANNER, of Frauenfeld, in the canton of Thurgau and Republic of Switzerland, have invented a new and Improved Machine for Folding and Stitching Sheets of Paper; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which--

Figure 1 represents a front elevation of my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a plan or top view of the same, the top or folding table having been removed to expose the working parts of the machine. Fig. 4 is a detached elevation of the mechanism for drawing in and cutting the thread.

Similar letters of reference in the several figures denote corresponding parts.

This invention consists in the arrangement of a stitching device and pressing or smoothing rollers and of a series of folding-blades in such a manner that a piece of thread is drawn through each sheet of paper before the last fold is completed, and that when completely folded each sheet is passed by the action of a pair of take-off rollers through the smoothing or pressing rollers, from which it is discharged ready for the binder.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation with reference to the drawings.

The sheets of paper to be folded are placed on a table that is to be supported by the bracket *a*, (see Figs. 2 and 3,) and from this table one sheet after the other is fed on the folding-table A, which forms the top of my machine. This table is supported by the standards B, which rise from the horizontal supporting-plate B and form a portion of the frame C, to which the several parts of my machine are attached.

Two several devices are applied for the purpose of holding the sheet of paper in the proper position—the pointed dogs *b* above and the vibrating needles *c* below the table A. The dogs *b* are guided by sleeves b', which are secured by means of set-screws b^2 to a lever, b^3, which receives a rising and falling vibrating motion by means of an arm, b^4, cam b^5, connection-rod b^6, and bell-crank lever b^7, which has its fulcrum on a pivot, b^8, and to the vertical slotted arm of which the lever b^3 is secured by a nut, b^{10}. The dogs *b* act upon the sheet of paper entirely by their own weight and retain it in the proper position until the first folding-blade, D, begins to act upon it. The vibrating needles *c* are attached to arms c', which extend from the rock-shaft c^2, to which an oscillating motion is imparted through the action of the cam *d* on the double-armed lever c^3 d^3, the arm c^3 of which connects by a rod, c^4, with a lever, c^5, that is firmly attached to the rock-shaft c^2. By this arrangement the needles *c* are caused to penetrate the sheet of paper that may be placed on it at proper intervals, and retain said sheet until the first folding-blade, D, begins to act.

The folding-blade D is secured to a carriage, D′, to which a reciprocating vertical motion on the slide D^2 is imparted by the action of the cam *d* on the double-armed lever c^3 d^3. This lever is fulcrated on a pivot, d', inserted into a standard, d^2, that is firmly secured to the frame C, and its long arm d^3 forms a toothed segment, which gears into a pinion, d^4, which is secured to the outer end of a rock-shaft, d^5, and which connects, by means of a lever, d^6, and rod d^7, with the carriage D′. An oscillating balance-weight, d^8, which is secured to the inner end of the rock-shaft d^5, facilitates the upward motion of the carriage D′ and folding-blade D. Said folding-blade passes down through a gap, a', in the table A, where the sheet of paper receives its first fold, and it leaves the sheet thus folded between the elastic bands a^2, the lower ends of which are compressed by suitable clasps, so that they retain the folded sheet while the blade D ascends.

Before the first folding-blade, D, has entirely completed its upward motion the second folding-blade, E, commences to act on the sheet of paper, imparting to the same the second fold. This blade moves in a vertical plane at right angles to the plane of motion of the first blade, D, and its foot is guided in a dovetailed slot, E′, in the supporting-blade B′, motion being imparted to the same through the action of the cam *e* and series of levers e', e^2, and e^3, the upper end of the lever e^3 being connected with the foot of the folding-blade E. By the action of this blade the sheet of paper is carried through between two standards, e^4, where the same receives its second fold, and it

is forced in between the horizontal bars f^* and the elastic bands e^5, the extreme ends of which are compressed by clasps e^6, (see Fig. 3,) so that they retain the sheet while the folding-blade recedes. The third and last fold is imparted to the sheet of paper by the folding-blade F, to which a reciprocating motion in a horizontal plane is imparted by the action of the cam f on the vibrating lever f', the upper end of which is provided with a toothed segment, that gears into a pinion, f^2, on the lower end of a vertical arbor, f^3, the upper end of which bears a crank, f^4, that connects by a link, f^5, with a pivot, f^6, at the extreme end of the slide f^7, to which the folding-blade F is rigidly attached. The arbor f^3 has its bearing in a vertical standard, f^8, which supports the dovetailed ways f^9, that form the guide for the slide f^7, and as said arbor receives an oscillating motion through the action of the lever f' on the pinion f^2 a reciprocating motion is imparted to the folding-blade F. Before this blade acts on the paper, however, the stitching is effected by means of two hooked needles, g, which are secured to the ends of a forked arm, g', to which a vibrating motion is imparted by means of an oscillating lever, g^3, that receives its motion from a cam, g^5, through the action of a lever, g^6, and link g^7. By these means the needles receive an oscillating motion in vertical planes, and on being driven through the doubly-folded sheet of paper they receive a piece of thread and carry the ends of the same back through the paper before the folding-blade F commences to act.

The thread is taken from a spool that is placed on the hooked pin h underneath the table A, and it is carried in through the eye i, that is inserted into a plate, j, to which the shears k are secured. In passing through the eye the end of the thread is caught between the nippers l, which draw in a piece of the desired length, when the thread is cut and dropped on the needles g, which at this moment stand ready to receive it. A certain tension is exerted on the thread by a spring, i', the loose end of which passes through a slot in the top of the eye and presses upon the thread, and the shears k, as well as the nippers l, are operated by a slide, m, which moves in V-shaped ways m', that are firmly screwed in a vertical direction to the inner ends of the dovetailed ways f^9, forming the guides of the folding-blade F. Motion is imparted to the slide m by a crank, m^*, which is firmly attached to the upper end of the vertical arbor m^2, which also carries the cam g^5, and which connects by means of a link, m^3, with a wrist-pin, m^4, on the end of the slide m. From the slide m a bracket, l', extends, to which the nippers l are secured, and the two jaws of said nippers are so arranged that they open spontaneously. Their points are tapering and provided with a recess that forms the guide for a sliding clasp, l^2. When this clasp is moved toward the point of the nippers, the jaws are open, and if the nippers are now moved toward the eye i the ends of the thread pass between the jaws, and now the clasp l^2, by striking the cross-bar l^3, is pushed back, causing the nippers to close and to catch hold of the thread. As the nippers recede, and if a sufficient length of thread has been drawn in, the clasp l^2, by coming in contact with the cross-bar l^4, is thrown forward, the nippers open, and the thread is released; but just previous to being released the shears cut the thread, so that as soon as the nippers open a piece of thread of the desired length drops down upon the hooked needles, which draw the same back through the paper, as previously described.

The shears k are operated by notched lever k', which is fulcrated on a pivot, k^2, and to which a vibrating motion is imparted by the action of a curved slotted plate, k^3, that is firmly attached to and moves with the slide m. Two notches in the lever k' catch over the shanks or handles of the shears in such a manner that by depressing the notched end of the said lever the shears are opened, and by raising said end of the lever the shears are closed. The inner end of the lever k' is rounded and runs in the slot k^4 in the curved plate k^3, so that by the action of said plate as it moves backward and forward with the slide m the lever k' is alternately raised and depressed and the shears are opened and closed. After the needles have carried the thread through the paper, the folding-blade F produces the last fold by carrying the sheet through between the bars f^* and delivering to the take-off rollers G, to which the folded sheet is conducted over the stationary segmental guides H. The surface of the take-off rollers is fluted or made rough, so that the same readily carry in the paper and deliver it to the smoothing-rollers I. The take-off rollers act on the sheet of paper simply by their own gravity, whereas the smoothing-rollers are forced together by set-screws O. By the action of the last pair of rollers I the folded sheet is rendered smooth and the folds are completed, so that the sheets on being discharged from the machine are ready for being bound without requiring any further labor.

The cams d, e, and f are secured to a horizontal shaft, p, to which motion is imparted through the gear-wheels q r s from the driving-shaft J. A bevel-wheel on the shaft p, by gearing into a similar bevel-wheel, t', transmits the motion to the vertical arbor m^2, and a bevel-gear, u u', and cog-wheels v v' transmits the motion from the driving-shaft J to the take-off rollers G and smoothing-rollers I. By this arrangement a simple and compact machine is produced, and the quantity of sheets that can be folded by the same depends entirely upon the dexterity of the person feeding the paper to the machine.

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

1. The arrangement of the elastic bands a^3

e^5 and clasps e^6, or their equivalents, in combination with the folding-blades, as and for the purpose specified.

2. The combination of a stitching device with the folding mechanism.

3. The arrangement of the shears k and nippers l, in combination with the stitching and folding mechanism, substantially as and for the purpose specified.

4. The employment of the vibrating notched lever k' and curved slotted plate k^3, as described, for the purpose of operating the shears.

5. The arrangement of the sliding clasp l^2, in combination with the spring-jaws of the nippers l, bracket l', and cross-bar l^3, substantially as specified, for the purpose of opening and closing the nippers at the desired intervals.

JOHANN HEINRICH TANNER.

Witnesses:
BERNHARD GRUNER,
FRIEDRICH MARTINI.