

C. H. PALMER.
Machines for Sewing Books.

Patented Feb. 11, 1873.

No. 135,662.

Fig. 1

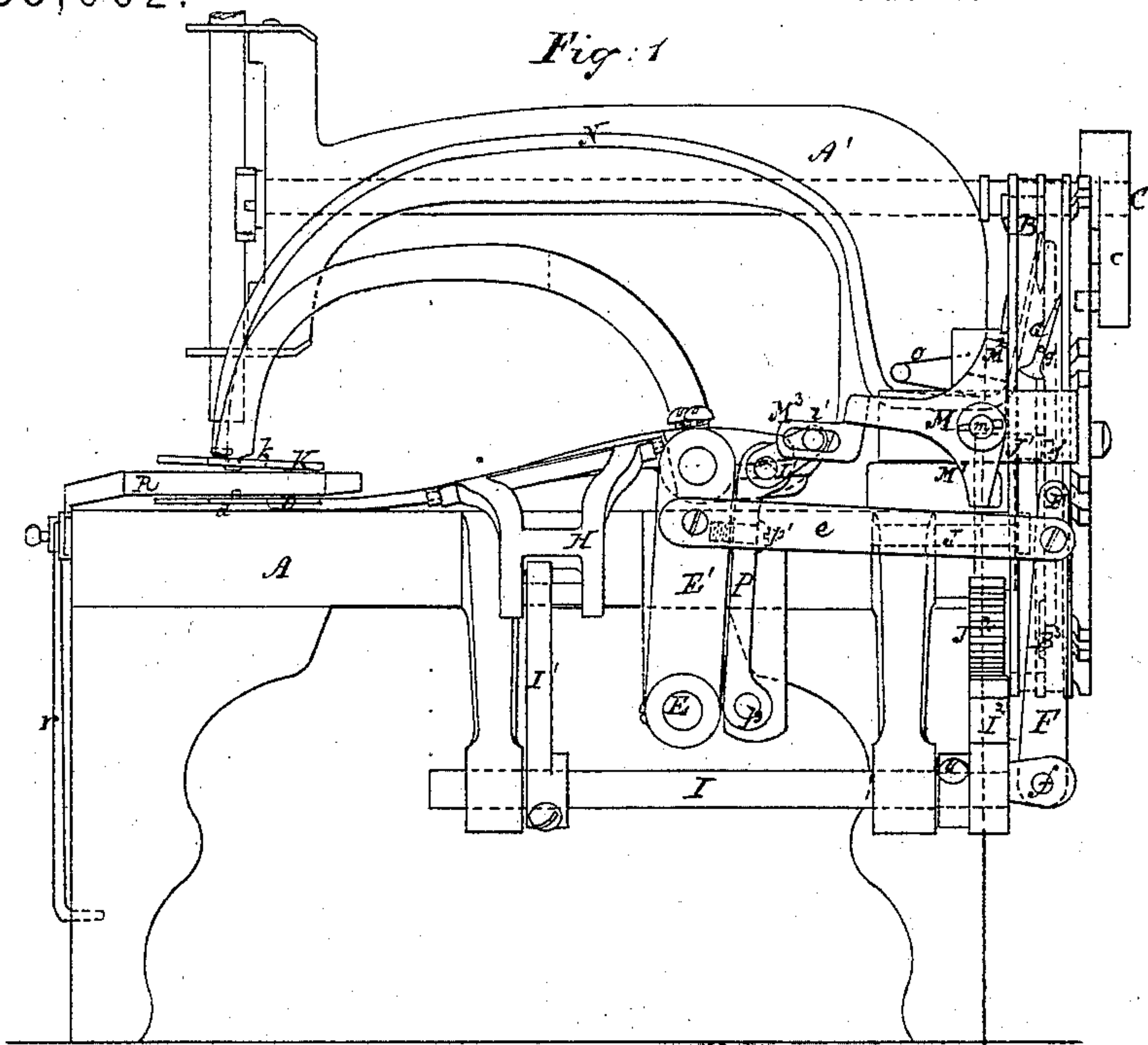
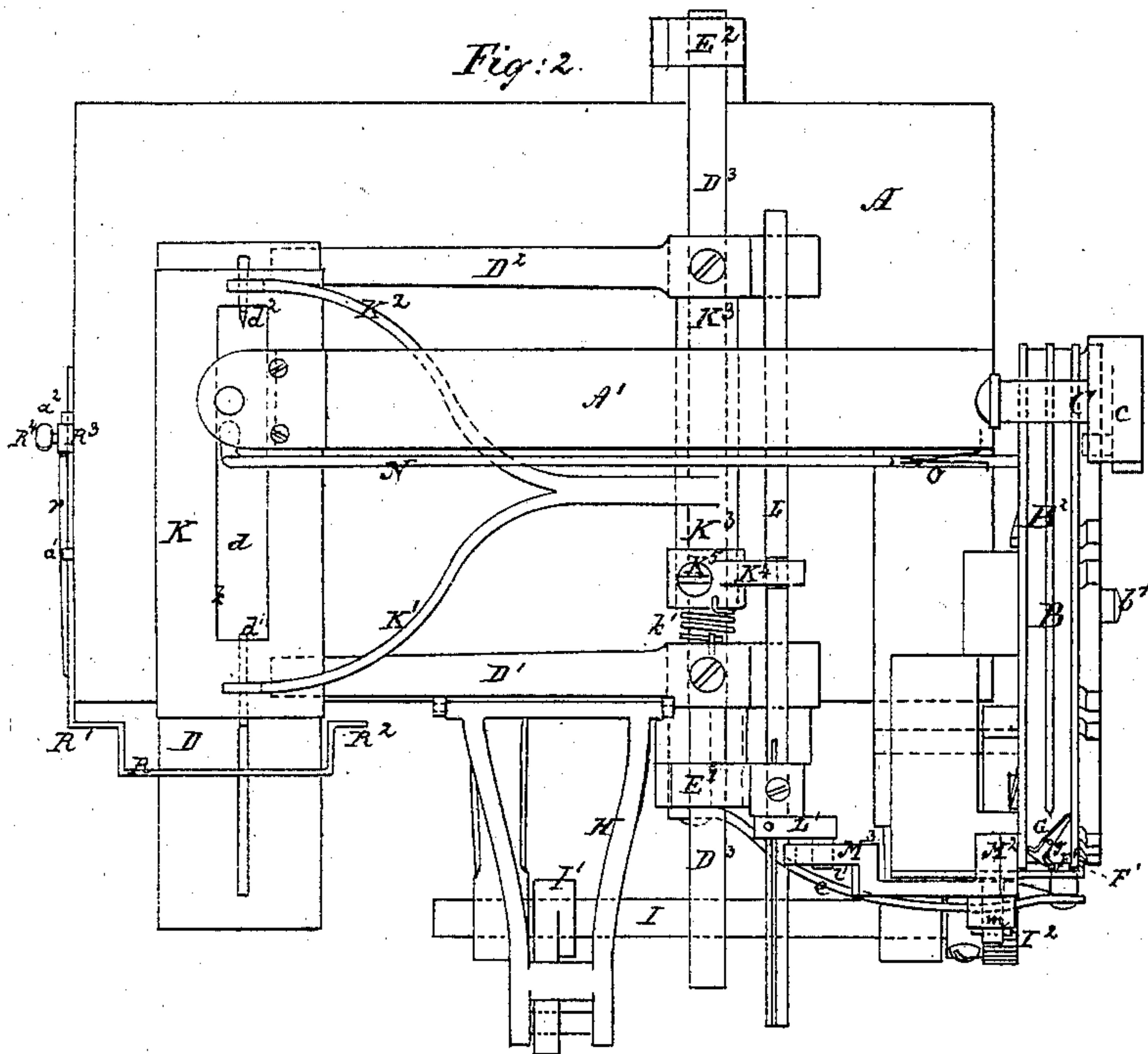


Fig. 2



Inch $\frac{1}{4}$ 3 2 1 0 $\frac{1}{2}$ 1

Witnesses:

C. Raettig

Wm. C. Dey

Inventor:

Charles H. Palmer
 by his Attorney J. L. Stetson

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Fig: 3.

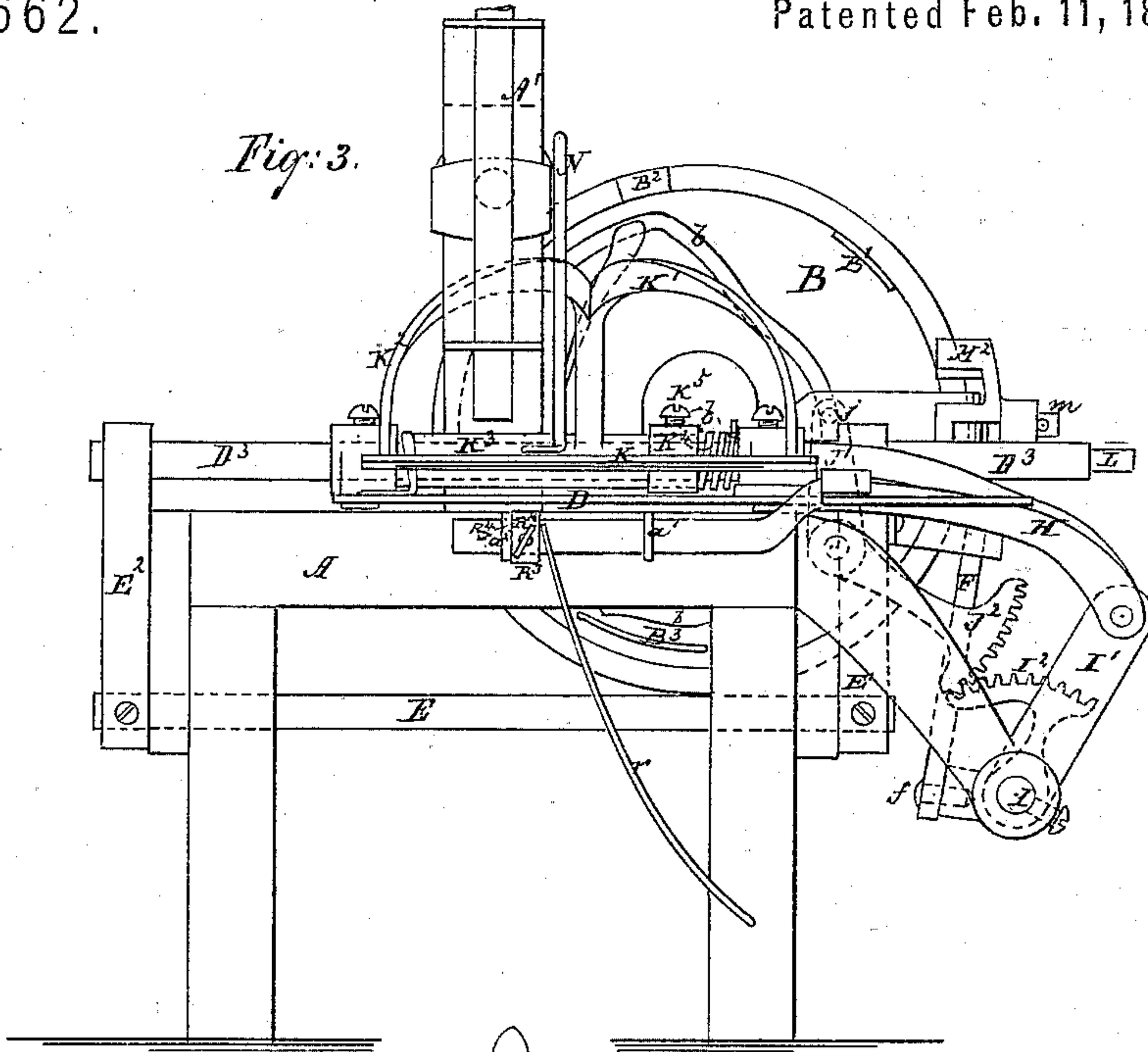
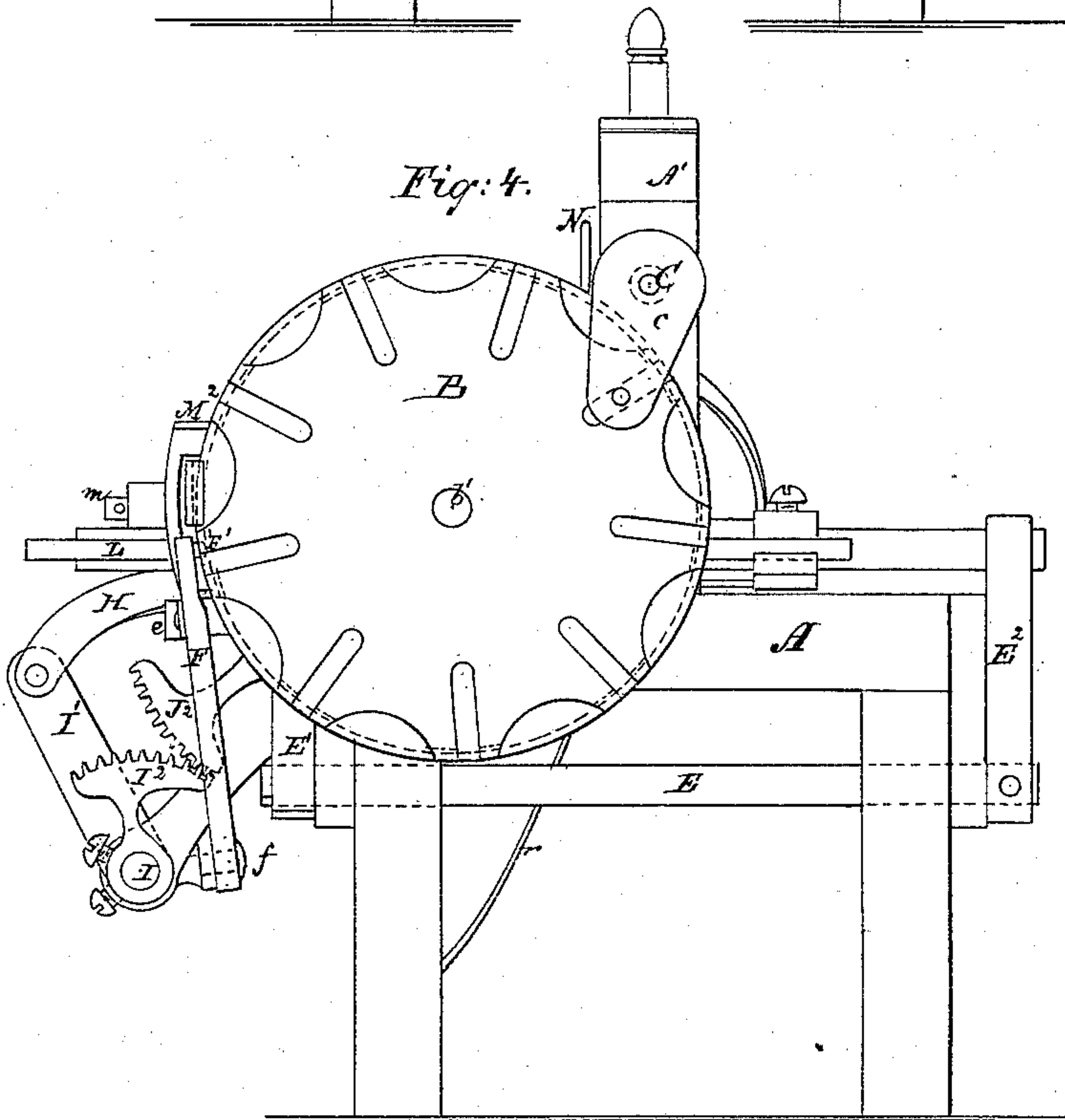


Fig: 4.



7 1/2 0 1 2 3 4 5 Inches.

Witnesses:

C. Haettig.
 Wm C. Day

Inventor:

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 by his atty J. L. Stetson

UNITED STATES PATENT OFFICE.

CHARLES H. PALMER, OF NEW YORK, N. Y., ASSIGNOR TO THE PAMPHLET-STITCHING-MACHINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR SEWING BOOKS.

Specification forming part of Letters Patent No. 135,662, dated February 11, 1873.

To all whom it may concern:

Be it known that I, CHARLES H. PALMER, of New York city, in the State of New York, have invented certain Improvements relating to Machines for Sewing Books, of which the following is a specification:

The invention may be used with any ordinary or approved construction of the sewing mechanism proper. I will describe it as based on the familiar sewing-machine known as Singer's. I attach to the ordinary sewing-machine mechanism additional mechanism, which properly manipulates the book or pamphlet and causes the sewing to be properly effected thereon.

The improvements relate to the arrangement of a large slow-wheel, operated by a crank on the quickly-revolving shaft of the sewing-machine, and constructed with means for insuring its fixity during the period while the crank is not effective thereon, so that it (the large wheel) shall turn intermittently and reliably; the provisions for moving the books inward and outward relatively to the sewing-machine mechanism; the provisions for operating a presser-foot or analogous device to hold one book while another is being moved; the provisions for clamping the work firmly on the table, or, rather, on the feed plate or carrier which slides thereon; in a peculiarly-formed gage, which regulates the position of the foot or one end of the book, and yields by a spring to allow some of the motions; and in a knife, which stands in the path of the books and cuts each clear of its successor as it is pushed out of the machine.

I will proceed to describe what I consider the best means of carrying out the invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a side elevation of the entire machine. Fig. 2 is a plan view. Fig. 3 is a front view, and Fig. 4 is a rear view.

Similar letters of reference indicate like parts in all the figures.

The attendant may sit or stand in various positions relatively to the machine; but I will assume that he sits directly in front of the machine, or with the goose-neck A¹ extending toward him. The edge nearest to the operator in that position will be termed the front of the machine.

A is the rigid frame-work or bed-casting, which I will designate by the single letter A as a whole when necessary, and will designate by A¹, A², &c., any particular parts thereof to which it may be necessary to refer. The ordinary rigid horn or arm supporting the sewing-machine mechanism is marked A¹. It, as also the sewing-machine mechanism which it supports, and the shuttle, with the means for giving the shuttle motion below, may be of the ordinary character.

I have, for convenience, made my machine by additions and alterations of the standard Singer sewing-machine. I take out of the machine the ordinary rough surface and means for operating it which form the ordinary feed-motion of the machine, and substitute radically different means for feeding, holding, and moving the work. I stitch each book or pamphlet separately, perforating it by the needle and producing a lock-stitch with the thread through the perforation; but the distribution of the stitches on a book is very different from that of the stitches in ordinary work. There is required in book-sewing a round of operations repeating itself after every nine or some other number of stitches. One of the first essentials is to provide a means for insuring such repeated round of operations.

B is a large wheel, mounted upon an axis, b', and receiving a slow, intermittent motion from the crank c on the quick-shaft C. The form of the crank and its action on the wheel are analogous to that sometimes known as the Geneva stop in watch-work. The large wheel B is held by the crank incapable of motion in either direction during a large part of the revolution, and then, during the remainder of the revolution of the crank, it takes effect on the large wheel and gives the large wheel B a movement one step forward. All the motions which are to be repeated in a round are derived from this wheel. As I have adjusted and proportioned the parts the wheel B revolves once to each nine revolutions of the shaft C, and, consequently, to each nine descents and ascents of the needle-bar. D is a plate, which I term the carrier, resting on the table or bed A, and capable of being moved horizontally thereon in any direction. The carrier D has a long and wide hole through it, which allows the needle to descend

and produce stitches through it and through any book or pamphlet lying thereon. This hole is marked d . It being understood that when I say "book" I mean a single signature of a book or a pamphlet of moderate thickness, so that it can be perforated at one stroke by a suitable needle, the books are laid successively upon the carrier D, with their backs nearly abutting against each other along the central line of the hole or opening d . A low partition-piece, d^1 , is mounted on the carrier D, in line with the center line of the hole d , and a corresponding upright piece, d^2 , which serves both as a partition and as a knife, is mounted at the opposite end of the carrier. The books are laid with their backs against these pieces d^1 d^2 , a book being first applied on the outside or front, and the next being applied on the inside or back. Then, the first having been sewed and removed, the third is laid on the front, in the place previously occupied by the first, and so on successively.

I will first describe the several trains of the machine separately or independently of each other.

In order to place the stitching properly in succession in books thus introduced, the carrier D and its adjuncts, after completing the stitching of one book, move forward or backward a half inch, more or less, to properly place the stitches on the next book. The carrier D is connected by rigid arms D^1 D^2 to a shaft, D^3 , which is supported in bearings or levers E^1 E^2 , which are fixed on a shaft, E, mounted in fixed bearings below. The lever E^1 is connected by a rigid arm, e , to a lever, F, turning on a fixed pivot, f , below, and carrying a pin, F' , which stands in one or the other of two parallel circumferential grooves in the periphery of the wheel B. When the pin F' is in one groove the carrier D and its connections are forward, and the sewing is effected on the rearward book. When the pin F' is transferred to the other groove the carrier D and its connections are suddenly shifted backward, and the next round of sewing operations is performed with the parts in the new position, which puts the stitches in the forward book. The pin F' is changed automatically from the one groove to the other by means of the switch-lever G, which turns on a pivot, g , and is mounted in a break between the two grooves, as shown. At each revolution of the wheel B the pin F' is received properly by the switch-tongue G and transferred into the other groove, and by a little further movement of the wheel B the pin F' acts in such a manner on the switch-lever as to shift it and place it in the proper position to receive and transfer the pin F' again back; at the next revolution, to the same groove which it previously occupied. Fig. 1 shows this part of the mechanism. There is a spring and catch just within the rim of the wheel B, which tends to hold the switch-lever G with gentle firmness in its extreme positions one way or the other. When it has been swung over to one side it is held

there until it has performed its function of transferring the pin F' from the one groove over into the other, and feels the pin F' properly acting on the widened short end of the switch-lever. In this condition the force of the pin F' is sufficient to overcome the spring-catch, and the switch-lever snaps over rapidly into the opposite extreme position. The action of this switch-lever, by thus inducing the round of operations to be performed alternately with the carrier and its adjuncts in one position and the other, compels the needle to really descend in sewing eighteen times instead of nine before all the parts are again in precisely the same condition as at first.

I have now described a slight outward and inward or forward and backward motion of the books. The irregular right-and-left motion necessary to properly distribute the stitches for book-sewing along the line near the backs of the books comes through another train of mechanism.

The shaft D^3 is free to slide axially in its bearings in the levers E^1 E^2 . A link, H, hinged to the side of the arm D^1 , is connected to an arm, I^1 , on a rocking-shaft, I, which is supported in fixed bearings below, and receives a peculiar motion through the segment I^2 . This segment gears into a segment, J^2 , which is on one arm of a lever turning on a fixed center, J. The other arm J^1 carries a pin, j , which runs in a peculiarly-formed groove, b , in the face of the wheel B. The pin J may be provided with a roller, to reduce friction, if desired. The groove b has such a contour that the segments J^1 I^1 are rocked on the carrier D, and its connections are moved right and left, so as to properly distribute the stitches.

I have arranged the machine to sew books with three stitches close together, then a long interval, and a single stitch, another long interval and three more stitches close together, with a repetition of the descent of the needle in some of the holes to fasten the stitches, or, as I term it, properly, tie a knot. This is all controlled by the form of the cam b , and may be varied by applying a new wheel, differently grooved, as the necessity of any peculiar work or the fancy of the book-binder may require.

K is a holding-plate, which is pressed down upon the books while the sewing is being effected, and is lifted at proper intervals sufficiently to allow the removal of one book and the insertion of another. It may be of less size than the carrier D, but the hole k within it should be of about the same size as the hole d in the carrier D, and should come directly over it. The plate K is raised and lowered by means of rigid arms K^1 K^2 , which are fixed on a sleeve, K^3 , which is mounted on the movable shaft D^3 , and is subject to all the motions thereof, with the slight independent motion necessary to raise and lower the holding-plate K to a proper extent. One end of the sleeve K^3 bears against the hub or boss of the arm D^2 , while the other end is

pressed against by the coiled spring k' , which is coiled around the shaft D^3 , taking a proper hold in a proper recess in the boss of the arm D^1 , and presses the sleeve K^3 and its connections toward the boss D^2 , and also exerts a tendency to uncoil itself and thereby lift the holding-plate K .

This latter tendency of the spring k' is important. It results that the holding-plate K is always supported out of contact with the books, except as it is pressed down by the mechanism now to be described.

K^4 is an arm, fixed adjustably on the sleeve K^3 by means of the set-screw K^5 . It rests on a peculiar rocking-shaft, L , which is supported in semi-cylindrical cavities or bearings in extensions of the arms $D^1 D^2$, and has a flat place adjacent to the arm K^4 . The shaft L is carried with the shaft D^3 and its connections in its forward-and-backward, and also in its right-and-left motions, and is capable of being turned so that its flattened place may act camwise on the arm K^4 , and by elevating it depress the holding-plate K . An overhanging end of the shaft L is splined, as represented, and carries an arm or lever, L' , which has a sleeve reaching into and properly confined against end motion by means of a lever, P , which turns on a center, p , just level with the center E of the adjacent lever E^1 . The levers P and E^1 are fastened together by a screw, p' , so that they are compelled to move together. The same screw also stiffens the arm P against any tendency to motion in a direction endwise to the shaft L . This arrangement supports the overhanging end of the splined shaft L , and also the lever L' , which is to give it motion, and holds the lever L' against any endwise motion, while the shaft L may move endwise to any extent required. A pin, l' , fixed in the arm or lever L' , is embraced in a slot in an arm, M^3 , of the triplex lever $M^1 M^2 M^3$. This lever, which I may designate when required by the single letter M , is mounted on a fixed pin, m , fixed in the frame-work A , and receives motion from the cams $B^1 B^2$, fixed on the side of the rim of the wheel B . The intermittent rotation of the wheel B first causes the side cam B^2 to strike the upper arm M^2 , and, turning the lever M , depresses the lever L' , and liberates the arm K^4 by allowing it to rest on the flat face which is sunk in the shaft L . This allows the force of the spring k to elevate the holding-plate K . A further motion of the wheel B brings another side cam, B^1 , in contact with the lower arm M^1 , and this turns the lever M back again to its ordinary position, elevating the arm M^3 and the lever L' , and, raising the arm K^4 by its cam-like action, depresses the holding-plate K , and holds it firmly down on the books during a nearly complete revolution of the wheel B , when the same round of operations is repeated. The plate K should be a little loose on the arms $K^1 K^2$.

It is important, at the completion of the sewing operation on any given book, when

the carrier D is near its extreme left position, and, the holding-plate K having been lifted, the carrier D commences, in obedience to the form of the cam b , to run back to the right to assume its original position in commencing to sew the next book, that the book already sewed shall be not only liberated by the raising of the holder-plate, and thus not necessarily drawn back by the carrier, but that it shall be firmly held against such a motion. I accomplish this by means of a peculiar presser-foot, N , which descends at that moment, and pressing firmly on the book tends to hold it between itself and the fixed table A , allowing the carrier D to slide freely back without moving the book with it. The presser-foot N may be carried on a sliding rod operated by a lever, or it may be, as here represented, a part of the lever itself. In either case I prefer to operate it by means of the cam B^3 on the side of the wheel B , holding the presser-foot up by the force of the spring O , except when it is pressed down by the action of the cam, as will be obvious. When the carrier comes back to its first position on the right-hand side of the machine, and, having received a new book, clamps it by the holder-plate K and carrier D , and commences to move it forward, the thread stands stretched across from the last book to the new book. This thread thus stretched is, by the succeeding movements of the carrier and clamp, carried directly against the sharp edge of the fixed knife d^2 and severed. The next time the clamps open, the book, finished by the succeeding movement, is delivered, and allowed to fall on the left-hand side of the machine.

There may be various modifications in the form of various details of the machine without materially interfering with the usefulness of the invention. So, also, there may be various additions, not shown or described, in order to effect the purposes more completely. One, not above described, is the brace A , which extends out from the main frame A , across the rim of the wheel B , and is there provided with a loop, which, resting constantly against a suitable bearing turned on the outside of the wheel B , supports the latter against the side strain which is induced by the action against the lever M . There is a spring, not represented, which tends to hold the lever M alternately in one extreme and the other of its motion. R is a light gage-plate, bent as represented, and adapted to allow the right-hand end of the holder-plate K to pass beyond its working-surface, as represented. Its working-surface or useful part is in the shoulders $R^1 R^2$, which receive the edges of the book, R^1 receiving the book when applied on the outside and gaging its position, and R^2 receiving the book and gaging its position when applied on the inside of the machine. This gage is movable, being held within keepers $a^1 a^2$ on the front edge of the machine, and is adjustable in position by means of an adjustable strip or block, R^3 , which is

secured in the desired position by means of the set-screw R^4 . The spring r tends to hold the block R^3 firmly against the keeper a^2 . The spring r yields and allows the whole gage to slide a little to the right when required. This capacity of the gage R to yield a little to the right is important in effecting the proper motions. The cam b is so formed as to give a feeding motion forward or to the left during most of the time while the sewing is being effected on a given book; but there is one movement which goes backward or to the right further than its original position. This the yielding of the gage R by means of the spring r very perfectly allows for.

The importance of the bent form of the gage will be understood. It is important to set the gage so far to the left in sewing small books that the working-surfaces $R^1 R^2$ will come within the end of the holder-plate K .

Although I have described this machine as sewing books, it will be understood that it may be useful in sewing various other articles of analogous form and character. Its chief use, however, is likely to be in sewing books, pamphlets, and other moderately-thick masses of paper.

I claim as my invention—

1. In combination with a sewing-machine and suitable devices for holding the books, the slow and intermittently moving wheel B , controlled by the crank c and Geneva stop formed by the relation of the crank and its attachments to the wheel, as herein specified.

2. The two parallel grooves in the periphery of the slow-wheel B , with the switch G , pin F , and connected shaft D^3 and carrier D , arranged for joint operation to move the carrier and the supported books outward and inward at each operation, as specified.

3. In combination with a sewing-machine and a carrier, D , operated as specified, the holding-plate K , raised at intervals and pressed down firmly upon the books during the sewing operation, substantially as herein specified.

4. The presser-foot N , in combination with mechanism, substantially as shown, by which it is pressed downward by a positive motion during the return motion of the carrier D , so as to hold the book between itself and the bed A , and cause it to be clamped by the next action of the clamping-plate K in a new position ready to present the thread to the knife, and by the succeeding movement free it from the machine, as specified.

5. The knife d^2 , in combination with clamp D and K , as specified, so as to perform the double functions of a partition-piece to adjust the position of the books on each side, and of a knife to divide the thread which connects them, substantially as herein specified.

6. In combination with a sewing-machine having a holder-plate, K , operated as shown, and adapted to hold and present books to the sewing-machine mechanism, as specified, the gage R with its shoulders $R^1 R^2$ and bend between them, provided with a yielding spring, r , to allow a slight backward motion of the carrier and of the books carried thereon, all as herein specified.

In testimony whereof I have hereunto set my hand this 11th day of September, 1872, in the presence of two subscribing witnesses.

CHARLES H. PALMER.

Witnesses:

DON A. CUSHMAN,
A. R. CUSHMAN.