(No Model.)

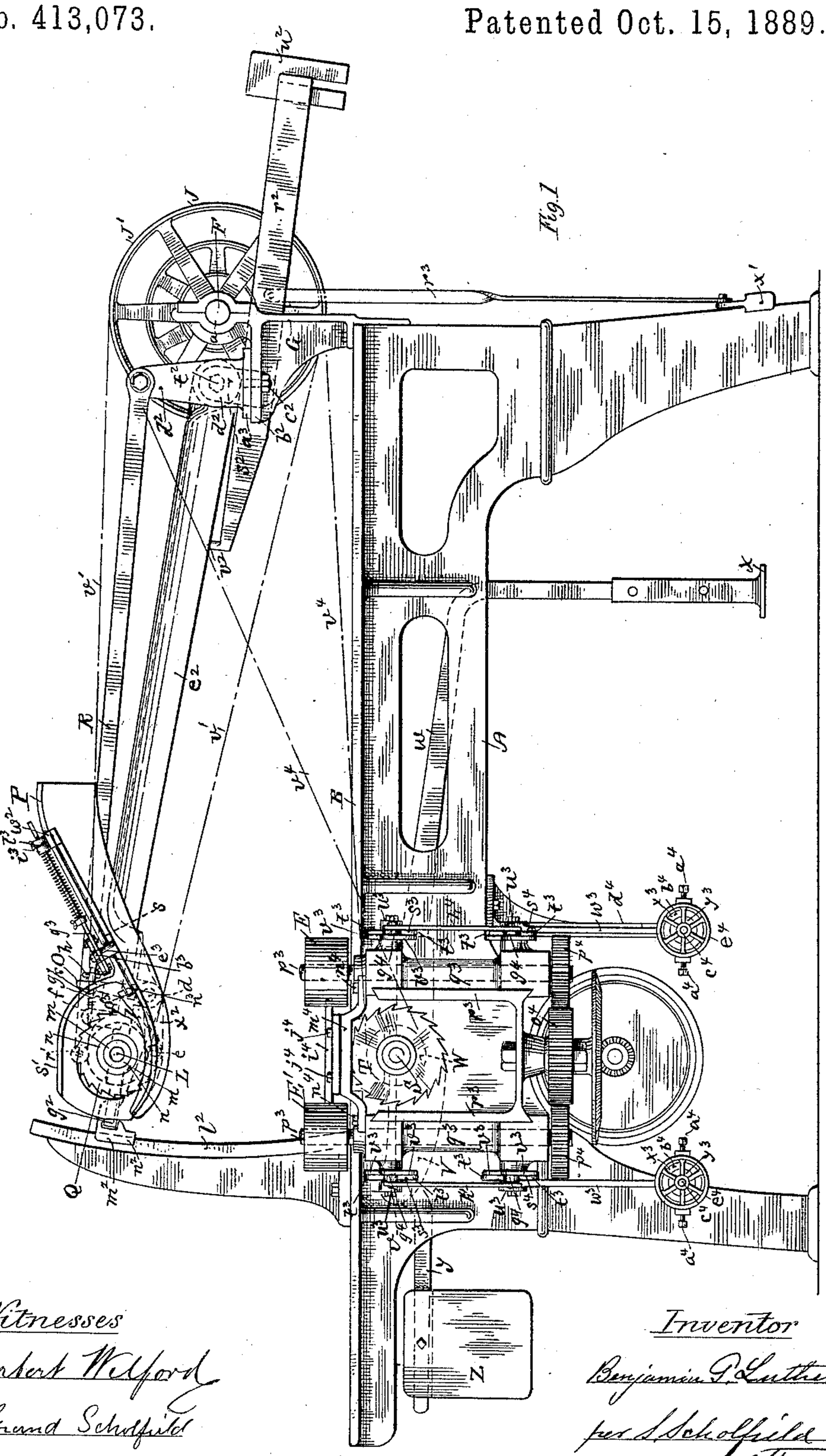
5 Sheets—Sheet 1.

B. G. LUTHER.

MATCHING MACHINE.

No. 413,073. Patented Oct. 15, 1889.

Fig. 1



Witnesses
Herbert Welford
Le Grand Schofield

Inventor
Benjamin G. Luther
per L. Schofield
Attorney

(No Model.)

5 Sheets—Sheet 2.

B. G. LUTHER.

MATCHING MACHINE.

No. 413,073. Patented Oct. 15, 1889.

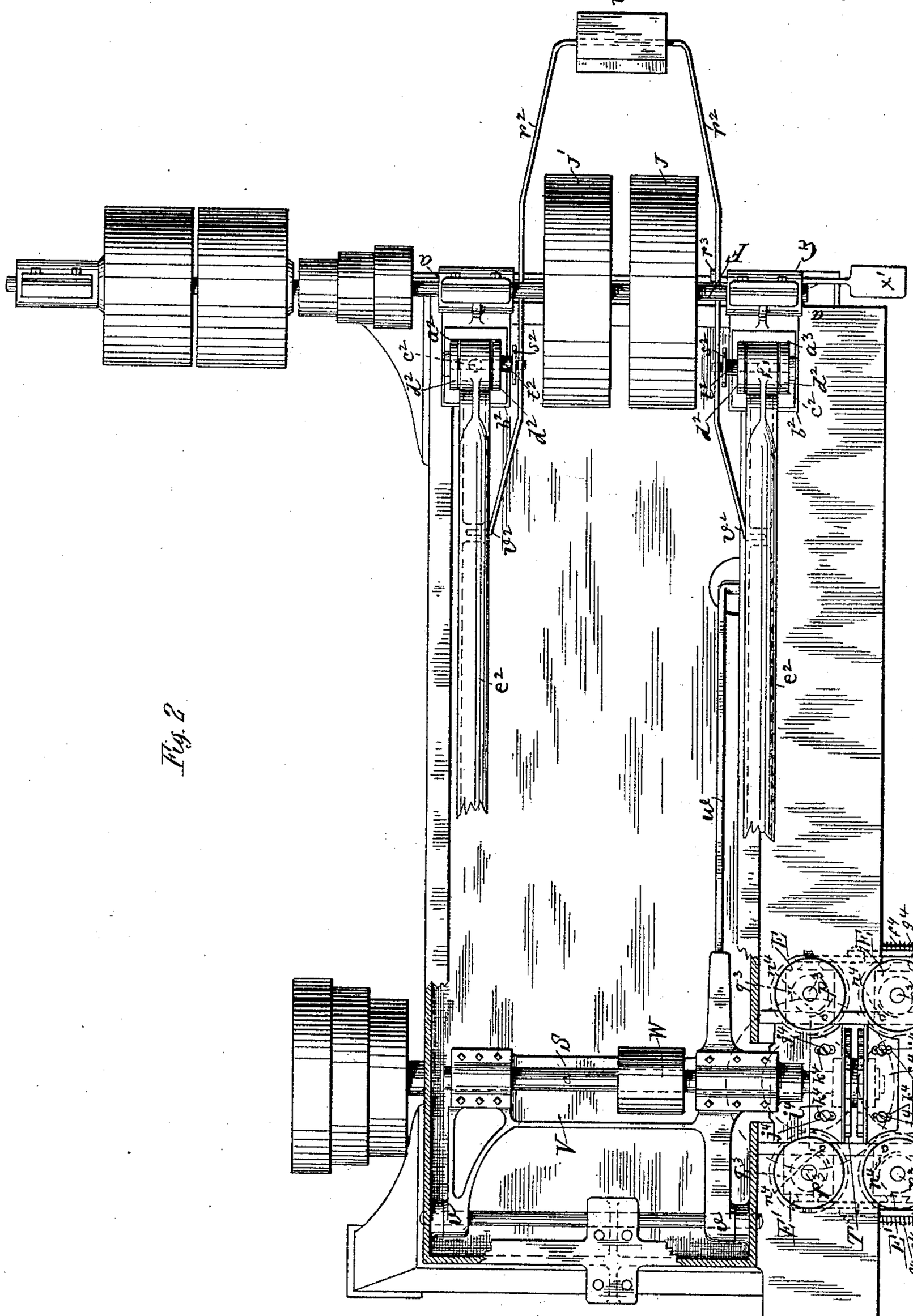


Fig. 2

Witnesses
Herbert Wilford
Leland Scholfield

Inventor
Benjamin G. Luther
per S. Scholfield
attorney

(No Model.) 5 Sheets—Sheet 3.

B. G. LUTHER.

MATCHING MACHINE.

No. 413,073. Patented Oct. 15, 1889.

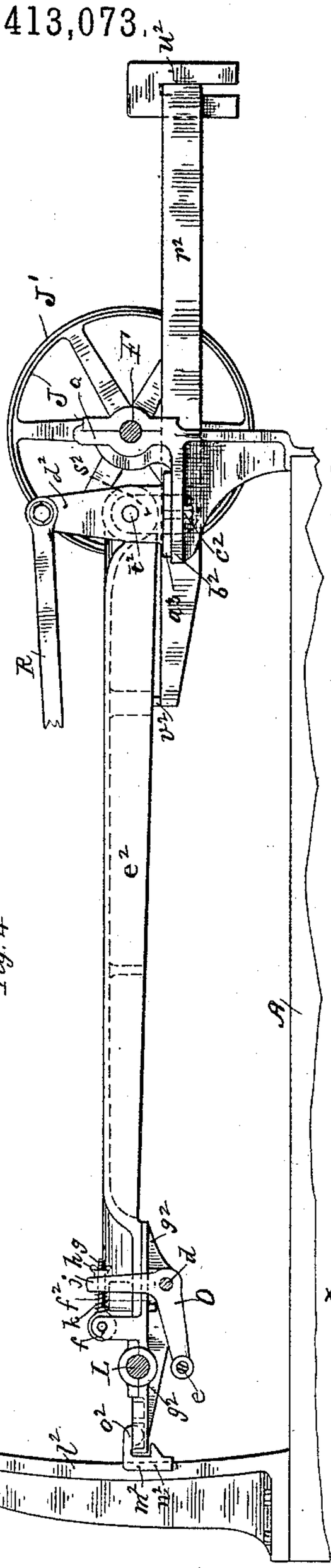


Fig. 4

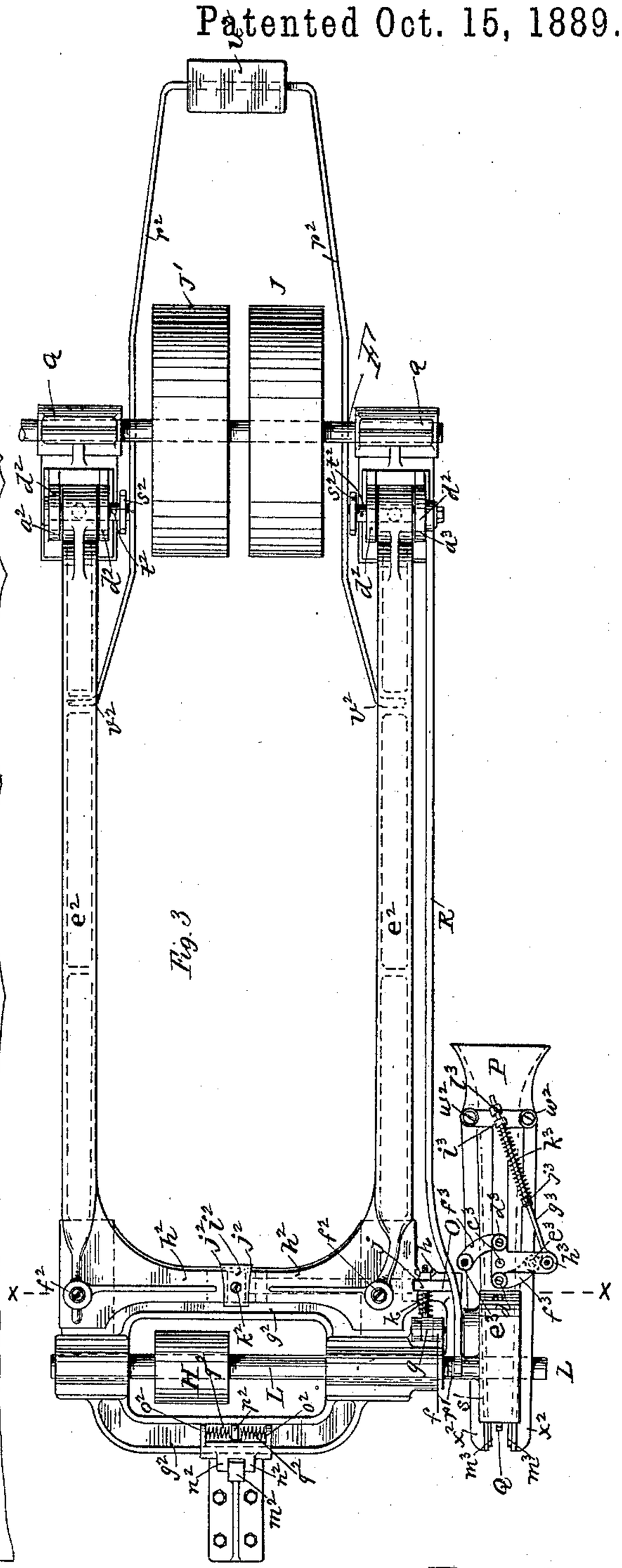


Fig. 3

Witnesses.

Herbert. Wilford

Le Grand Scholfield

Inventor:

Benjamin G. Luther

per S. Scholfield

attorney

(No Model.) 5 Sheets—Sheet 4.

B. G. LUTHER.

MATCHING MACHINE.

No. 413,073. Patented Oct. 15, 1889.

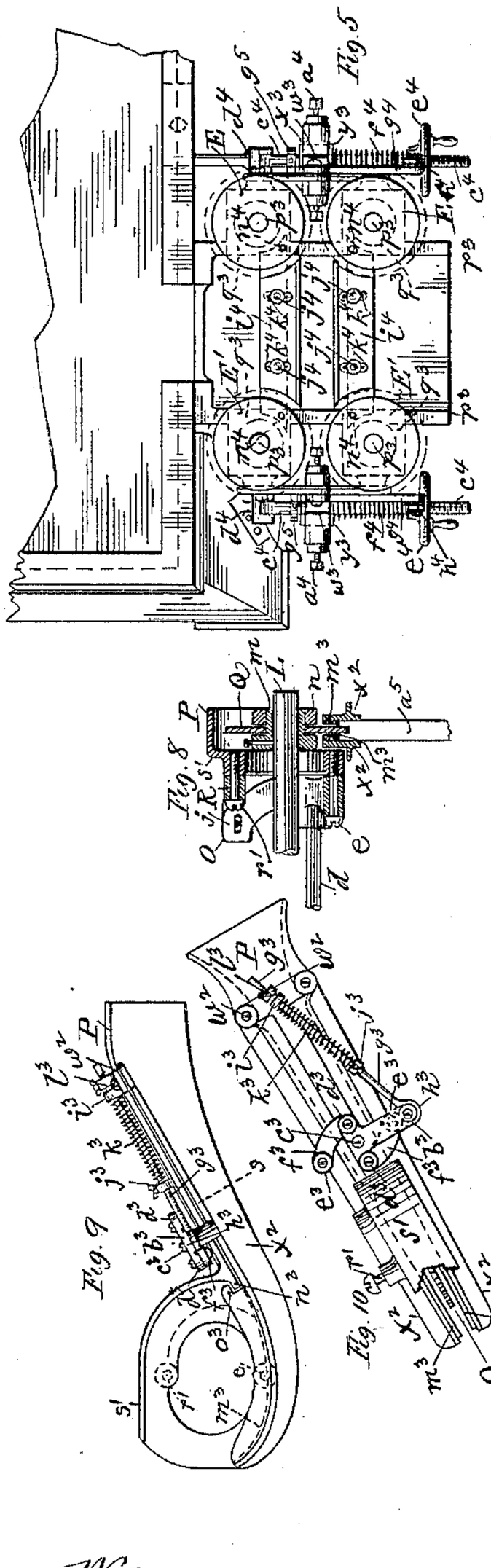


Fig. 5

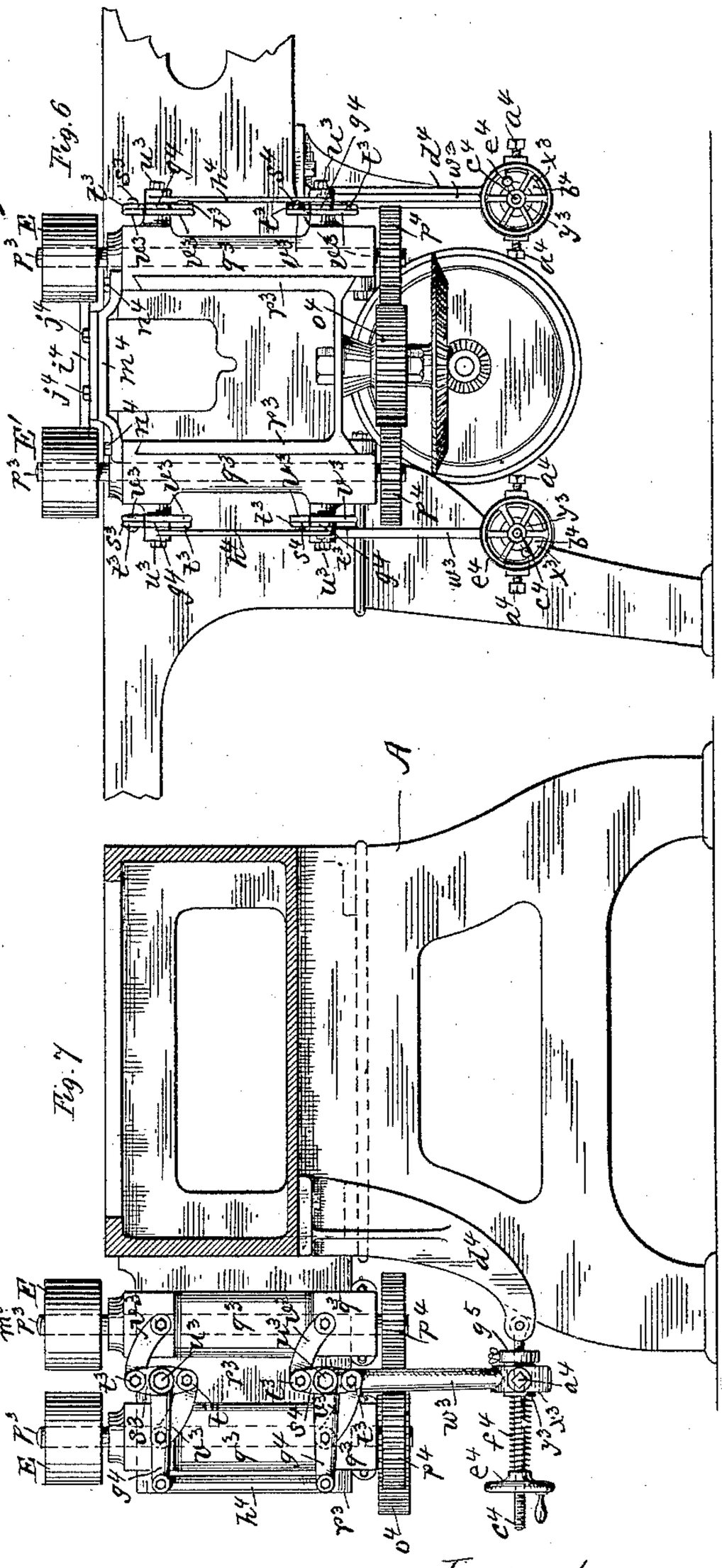


Fig. 6

Fig. 8

Fig. 9

Fig. 10

Fig. 7

Witnesses

Herbert Wolford

Le Grand Schofield

Inventor

Benjamin G. Luther

per S. Schofield

attorney

(No Model.)

5 Sheets—Sheet 5.

B. G. LUTHER.

MATCHING MACHINE.

No. 413,073. Patented Oct. 15, 1889.

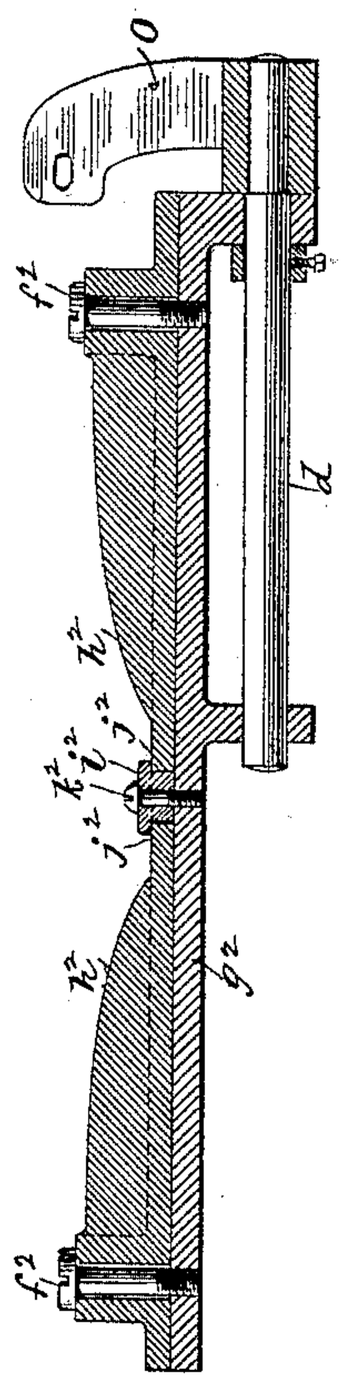


Fig. 11

Witnesses:
Herbert Wilford
Leland Scholfield

Inventor:
Benjamin G. Luther
per L. Scholfield
attorney

UNITED STATES PATENT OFFICE.

BENJAMIN G. LUTHER, OF WORCESTER, MASSACHUSETTS.

MATCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 413,073, dated October 15, 1889.

Application filed May 3, 1889. Serial No. 309,477. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN G. LUTHER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Matching-Machines, of which the following is a specification.

The object of my invention is to provide suitable means for guiding a board centrally to the cutters in a machine for making a tongue and groove simultaneously at the opposite edges of a board, and also for varying the lateral position of one of the cutters with reference to the plane of the other to provide for the proper matching of a warped board; and my invention consists in so connecting the carriers of the shafts of the feed-rollers with each other that when one of the said carriers is moved in either direction from the plane of the cutter the carrier of the shaft of the opposite feed-roller will be moved equally and simultaneously in the opposite direction, so as to preserve the centrality of the cutter with the feed-rollers.

It also consists in so connecting the pivoted guides for the opposite edge of the board that when the end of one of the said pivoted guides is moved in either direction from the plane of the cutter the end of the opposite pivoted guide will be moved equally and simultaneously in the opposite direction, so as to preserve the centrality of the cutter with the said guides; and it also consists in pivoting the holding-frame for the shaft of one of the cutters so that the said holding-frame and shaft may have a limited endwise movement to provide for the wind or twist in a warped board.

Figure 1 represents a side elevation of a matching-machine provided with my improvement. Fig. 2 represents a top view of the same with the upper cutter removed, its pivoted holding-frame and a portion of the bed-frame of the machine being broken away to show the pivoted frame of the lower cutter. Fig. 3 is a top view of the pivoted holding-frame of the upper cutter. Fig. 4 is a corresponding side elevation of the same. Fig. 5 is a detail top view showing the feeding-rollers. Fig. 6 is a detail elevation showing a portion of the side of the machine and the feeding-rollers. Fig. 7 is a detail elevation and transverse section showing an elevation of the feeding-rollers from the feeding end of the machine. Fig. 8 represents a detail vertical section taken in a line with the axis of the shaft of the upper cutter. Figs. 9 and 10 are views illustrating the mechanism of the pivoted guides for the upper edge of the board. Fig. 11 represents a section taken in the line $x\,x$ of Fig. 3.

In the accompanying drawings, A is the frame of the machine, and B the feeding-table. The driving-shaft F is supported in the bearings $a\,a$ of the bracket G, which is attached to one end of the frame A, and upon the shaft F are placed the pulleys J and J′ for driving the cutters. The bracket G is provided with the inwardly-directed ears $b^2\,b^2$, to which are pivoted the swivel-joint pieces $a^2\,a^3$, which are adapted for a limited horizontal vibrating movement upon the axes of the pivot-bolts c^2, which serve to hold the said joint-pieces to a plane seat upon the top of the ears b^2. Between the ears $d^2\,d^2$ of the pivoted joint-pieces $a^2\,a^3$ are pivoted the bars $e^2\,e^2$, which are made of equal length and are pivoted by means of the bolts f^2 to the bearing-frame g^2, which carries the shaft L of the upper cutter Q.

Upon the shaft L is placed the pulley H, from which connection is made by open belt v' with the pulley J′ upon the shaft F, as shown by the broken lines in Fig. 1; and in order to hold the pivoted bars $e^2\,e^2$ in line with each other without twisting, I carry from their outer ends inwardly an arm h^2, which bears upon the frame g^2, the ends j^2 of the said arms being held under the cap-piece i^2, so that the said ends may have a limited horizontal movement under the said cap, which is held in proper position by means of a screw k^2, as shown in Fig. 11.

Upon the bed-frame A of the machine, near the forward edge of the frame g^2, is bolted the curved upwardly-projecting guide l^2, and upon the forward edge of the frame g^2 is placed the spring-guide m^2, provided with the lips $n^2\,n^2$, which loosely embrace the edge of the guide l^2, and with the ears $o^2\,o^2$. Upon the frame g^2 is formed an ear p^2, and between the

ear p^2 and the ears o^2 o^2 are placed the open spiral springs q^2 q^2. The frame g^2 being loosely held by the spring-guide m^2, the action of the springs q^2 q^2 will be such as to return the frame g^2 to the central position, when the frame has been forcibly moved in either direction from said position. The frame g^2 and its attachments are counterbalanced by means of the bent bar r^2, which is suspended by means of the links s^2 s^2 from the pivot-bolts t^2 of the swivel-joint pieces a^2 a^3, and which supports the balancing-weight u^2. The ends v^2 of the bent bar r^2 are turned outwardly under the pivoted bars e^2 e^2 and serve to exert a balancing upward pressure upon the under side of the said bars, and the frame g^2 can be raised to its proper working position by means of the pedal x', which is connected with the bar r^2 by means of the rod r^3.

To the bell-crank lever O, attached to a short shaft d, which is held in suitable bearings at the under side of the frame g^2, is pivoted the guide P by means of the screw-stud e, which stud is located a short distance below the shaft L, and upon the frame g^2 is formed an ear f, to the upper end of which is pivoted the bolt g, provided with the thumb-nut h, the said bolt g passing through a slot in the upwardly-extending arm j of the bell-crank lever O, and upon the bolt g, between the ear f and the arm j, is placed the spiral spring k, whereby upon screwing up the thumb-nut h the bearing-surface of the guide P will be carried downward from the cutter L, and upon reversing the said nut the bearing-surface will be carried upward toward the cutter-shaft; and by this means the depth of the groove made by the cutter Q in the edge of the board can be properly regulated. The cutter Q is held upon a sleeve m, which is secured by a set-screw to the shaft L, and provided with a nut n, adapted to screw up against the side of the cutter.

In order that the guide P shall be held in the same parallel position with the feed-table B at all required positions of the pivoted frame g^2, I pivot one end of the rod R to an elongated ear d^2 of the pivoted joint-piece a^3 and the other end of the same to the side of the main plate s' of the guide P at the screw-stud r' above the shaft L, so that the rod R will form a portion of a parallel movement to preserve the proper relative position of the guide P through the extreme limit of the vertical working movement of the frame g^2. The guide-plate s' is provided with an inclined under surface s, which is adapted to engage with the forward end of the board, so that the continued forward movement of the board after the first contact with the incline s, caused by the forward feeding movement of the rollers E E, will serve to raise the frame g^2 and the cutter Q to the proper elevation to operate upon the edge of the board, and the cutter will thereafter be automatically varied in height according to the width of the board, thus providing for any required taper in the same. To the main plate s' of the guide P at the opposite ears w^2 w^2 are pivoted the side guides x^2 x^2, which are inclined toward each other in a forward direction, so that when the end of the board strikes the incline s of the guide P at near the pivoting-point of the side guides x^2 x^2 they will be gradually forced apart at their free ends; and in order to allow such lateral movement of the guides x^2 x^2 to accommodate boards of varying thickness, and still maintain the cutter in a central position between the guides, I pivot the T-shaped lever b^3 to the top of the main plate s' of the guide P at the pivot-stud c^3, and make connection from the opposite arms d^3 d^3 of the lever b^3 to the ears e^3 e^3 of the pivoted side guides x^2 x^2 by means of the connecting-links f^3 f^3, so that when movement is imparted to one of the side guides in either lateral direction a corresponding opposite movement will be imparted to the opposite side guide; and when the cutter Q is once placed centrally between the inner faces of the side guides, then for any required variation in the opening between the said guides the central position of the cutter will be maintained, so that the groove will always be made in the center of the board without requiring special adjustment of the guides, as heretofore.

In order to have the side guides x^2 x^2 press properly against the side of the board to hold the same firmly and, when necessary, cause a lateral movement of the cutter-holding frame g^2, I pivot a rod g^3 to the outer end h^3 of the lever b^3, and pass the screw-threaded outer end of the said rod loosely through an eye i^3 at the upper side of the plate s', and between the eye i^3 and a collar j^3 upon the said rod I place the spiral spring k^3, the tension of which can be adjusted, as desired, by moving the said collar, and upon the outer end of the rod g^3, I place the adjustable collar l^3. The side guides x^2 x^2 are each provided at their inner sides with an attached shoe m^3, which rests upon the edge of the board a^5, as shown in the section, Fig. 8, the forward portion of the main plate s' of the guide P being broken away in Fig. 10 in order to show the upper edge of the said shoes and the edge of the centrally-arranged cutter Q, the curve of the lower face of the shoe m^3 being shown by the dotted line in the side elevation of the guide P, Fig. 9.

In order to properly support the forward end of the side guides x^2 x^2, I provide a flange n^3 upon the inner side of the curved end portion of the main plate s' of the guide P, and form a hook o^3 upon the guide x^2, which hook catches over the edge of the said flange and allows the proper lateral movement of the guide.

The shaft S, which carries the lower cutter T to form the tongue in the edge of the board, is held in a frame V, which is pivoted to the bed-frame A at the point v v, the said frame V being provided with the attached downwardly-

turned arm w, the lower end of which is provided with the pedal x, and to an arm y, extending forward from a line joining the pivoting-points of the frame V, is secured the counterbalancing-weight Z, which is to be so proportioned that the pedal x will be held in its elevated position by means of the said weight. The shaft S is provided with a pulley W, which is driven from the pulley J by means of the cross-belt v^4. (Shown by the broken lines in Fig. 1.)

The feeding-rollers E E E′ E′ are held upon the projecting ends of the upright shafts p^3, which are held in suitable bearings in the separate carriers q^3 q^3 q^3 q^3, the said carriers being arranged parallel to each other at opposite sides of the vertical slide-bed r^3, and in order that the feeding-rollers may separate from each other equally from a center line coincident with the plane of the cutter T upon the entrance of a board between them, I pivot the levers s^3 s^4 to each side of the slide-bed r^3, and from the ends t^3 t^3, equidistant from the pivot-stud u^3, a pivoted connection is made to the carriers q^3 q^3 by means of the equal connecting-rods v^3 v^3, so that when either an outward or inward movement is imparted to one of the carriers q^3 a corresponding outward or inward movement will be imparted to the opposite carrier. The levers s^3 s^4 are each provided with an equal horizontal arm g^4, the said arms being connected at their outer ends by means of a pivoted connecting-rod h^4, so that the angular movement of one of the levers will be directly imparted to the other. The lower lever s^4 is also provided with the downwardly-extending arm w^3, having at its lower end an eye x^3, within which is held the sleeve y^3 by means of the pointed pivot-screws a^4 a^4, sufficient space b^4 being allowed for vertically tilting the sleeve y^3 in the eye x^3. Within the bore of the sleeve y^3, and loosely fitting the same, is placed the rod c^4, which at its inner end is pivoted to the downwardly-extending arm d^4 attached to the frame A of the machine, and at its outer end is provided with a screw-thread and the wheel-nut e^4, and between the wheel-nut e^4 and the tilting sleeve y^3 is placed the spiral spring f^4, by means of which the pressure of the feeding-rollers upon the sides of the board can be regulated. At the inner side of the lever s^4 upon the pivoted rod c^4 is placed the adjustable collar g^5, the location of which serves to determine the space between the peripheries of the feeding-rollers when the carriers q^3 q^3 are forced together by the action of the spring f^4 upon the sleeve y^3 and lever s^4, which distance should be slightly less than the thickness of the board to be operated upon, so that upon the entrance of the board between the feed-rollers the said rollers will be pressed slightly apart, and thus the full pressure of the spring f^4 will be exerted to hold the peripheries of the feeding-rollers against the sides of the board.

The guide-plates i^4 i^4 are made adjustable upon the guide-bars m^4 m^4 by means of the screws j^4 and slots k^4, the said guide-bars being pivoted at each end to the carriers q^3 q^3 of the corresponding feeding-rollers E and E′ at opposite sides of the slide-bed r^3 by means of the screw-studs n^4 n^4, so that when the board first enters between the peripheries of the first pair of feeding-rollers E E, thus forcing the same apart, the opposite side guide-plates i^4 i^4 will serve to guide the end of the board centrally over the cutter T until the feeding-rollers E′ E′ are made to receive and act upon the forwardly-progressing end of the board. The end of the board will thus be kept steady in its transit from one set of feeding-rollers to the other over the cutter T.

The feeding-rollers E E E′ E′ are driven by means of a system of gears o^4 p^4 p^4, as usual in such machines.

The inventions shown and described in this specification, which are also shown, described, and claimed in Patent No. 403,201, dated May 14, 1889, are herein disclaimed.

I claim as my invention—

1. In a matching-machine, the combination, with the cutter and the cutter-shaft, of a cutter-holding frame pivoted for movement in both a vertical and a horizontal plane, substantially as and for the purpose specified.

2. In a matching-machine, the combination, with the feeding-rollers, of the cutter-holding frame pivoted for movement in both a vertical and a horizontal plane, the cutter-shaft held in the pivoted frame, the cutter, and the vertically-adjustable gage for adjusting the depths of the cut to be made in the edge of the board, substantially as described.

3. In a matching-machine, the combination, with the feeding-rollers, of the cutter-holding frame pivoted for vertical movement, the cutter-shaft held in the pivoted frame, the cutter, the gage for adjusting the depth of the cut to be made in the edge of the board, and the spring-operated side guides adapted for equal movement toward or from the plane of the cutter, substantially as described.

4. In a matching-machine, the combination, with the feeding-rollers, of the cutter-holding frame pivoted for movement in both a vertical and a horizontal plane, the spring-guide for limiting the horizontal movement of the frame, the cutter-shaft held in the pivoted frame, the gage for adjusting the depth of the cut to be made in the edge of the board, and the spring-operated side guides adapted for equal movement toward or from the plane of the cutter, substantially as described.

5. In a matching-machine, the combination, with the feeding-rollers, of the cutter-holding frame pivoted for movement in a vertical plane, the cutter-shaft held in the pivoted frame, the gage for adjusting the depth of the cut to be made in the edge of the board, and the spring-operated side guides provided with the shoes for resting upon the edge of the

board and adapted for equal movement toward or from the plane of the cutter, substantially as described.

6. In a matching-machine, the combination, with the intervening cutter, of the opposite feeding-rollers, each held on a separate carrier, and the levers connected to the opposite carriers and adapted to cause the equal movement of the feeding-rollers toward or from the plane of the cutter, substantially as described.

7. In a matching-machine, the combination, with the intervening cutter, of the duplicate sets of opposite feeding-rollers, each roller being held on a separate carrier, the levers connected to the carriers of the opposite feeding-rollers and adapted to cause the equal movement of the feeding-rollers toward or from the plane of the cutter, and the opposite intermediate guides pivoted at each end to the corresponding carriers of each set of opposite feeding-rollers, substantially as described.

8. The combination, in a matching-machine provided with a cutter and duplicate sets of opposite feeding-rollers, each roller being held on a separate carrier, of an intermediate guide pivoted at each end to the corresponding carriers of each set of opposite feeding-rollers, substantially as described.

BENJAMIN G. LUTHER.

Witnesses:
W. G. B. HOPKINS,
FREDK. J. BARNARD.