No. 752,922. PATENTED FEB. 23, 1904.

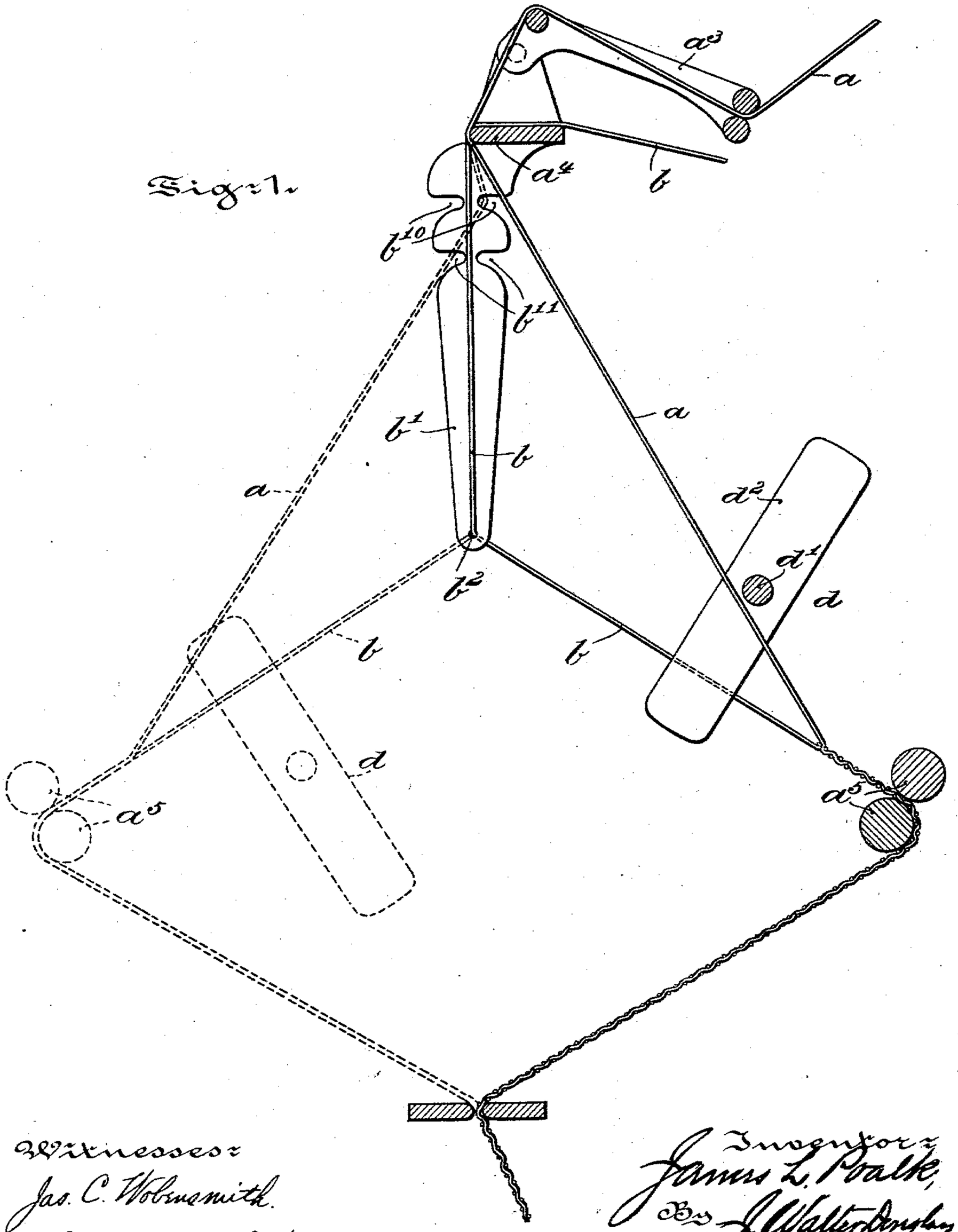
J. L. POALK.

LOOM.

APPLICATION FILED JULY 1, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Jas. C. Wolmsmith.
Wilhelm Voigt

Inventor:
James L. Poalk,
By J. Walter Dayton
Attorney.

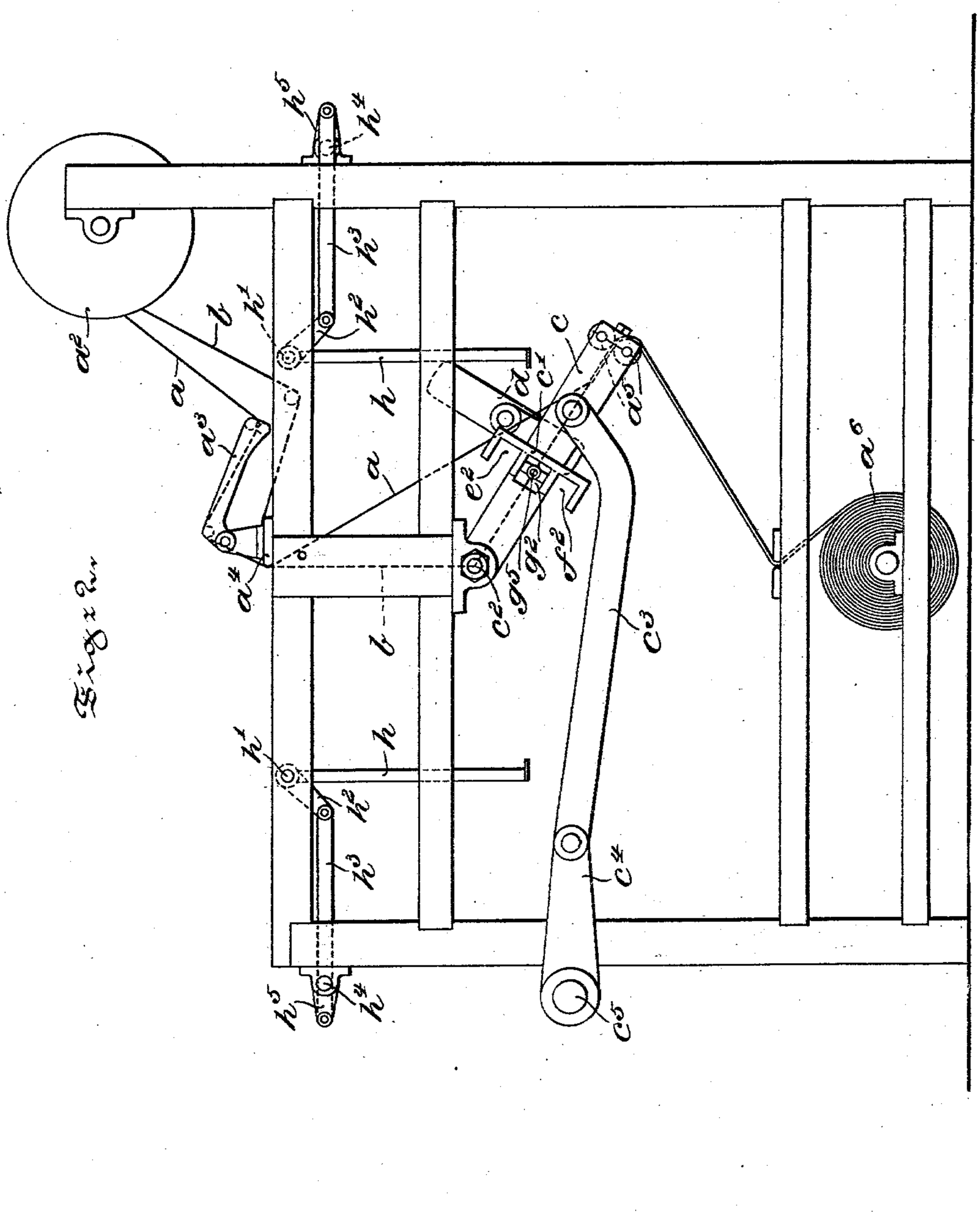
No. 752,922. PATENTED FEB. 23, 1904.

J. L. POALK.

LOOM.

APPLICATION FILED JULY 1, 1903.

NO MODEL. 5 SHEETS—SHEET 2.



Witnesses:
Jas. C. Wolvenith.
Wilhelm Voigt

Inventor:
James L. Poalk,
By J. Walter Bayless
Attorney.

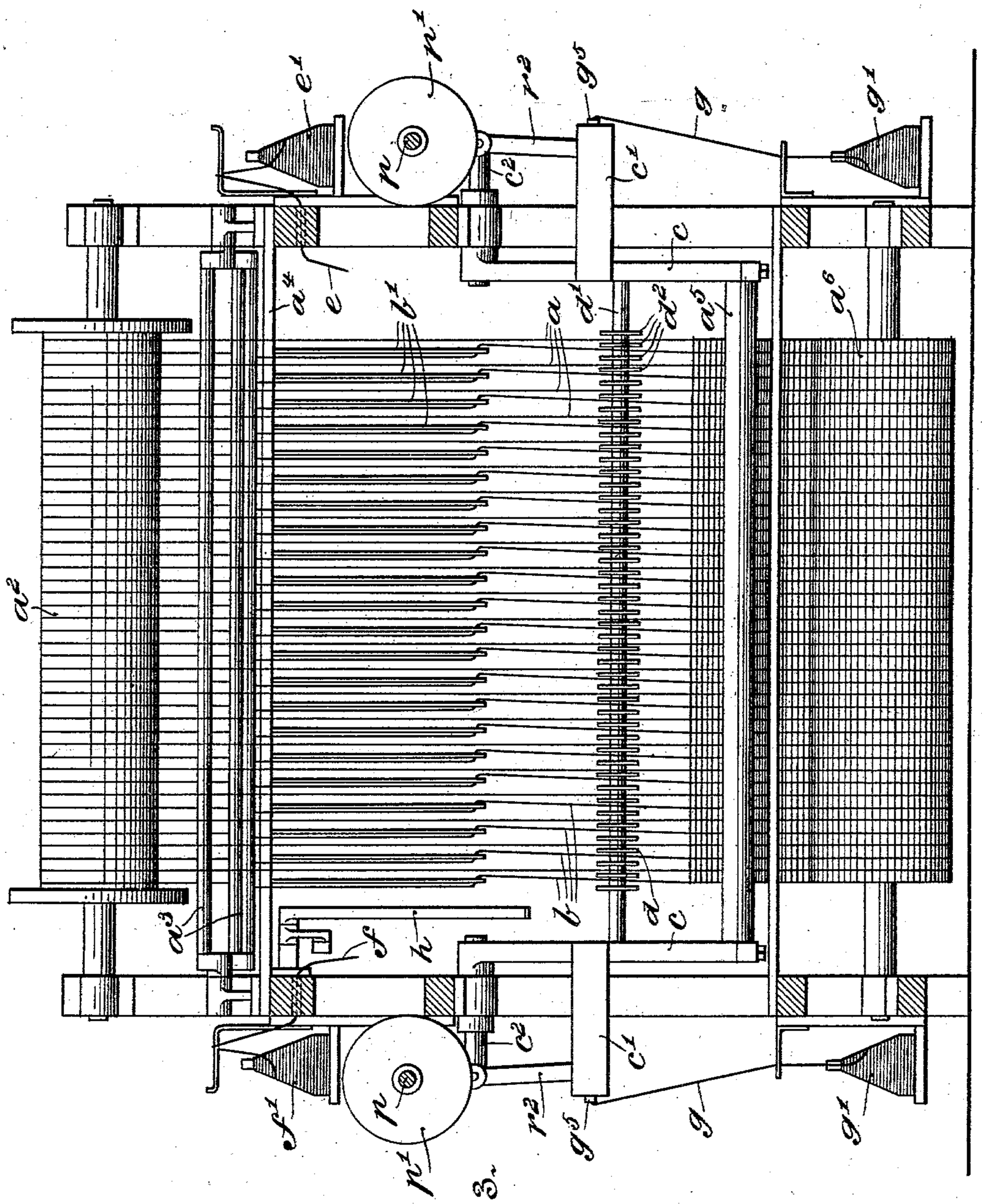
No. 752,922. PATENTED FEB. 23, 1904.

J. L. POALK.

LOOM.

APPLICATION FILED JULY 1, 1903.

NO MODEL. 5 SHEETS—SHEET 3.



Witnesses:
Jas. C. Wobnesmith.
Wilhelm Voigt

Inventor:
James L. Poalk,
By J. Walter Douglas
Attorney.

No. 752,922. PATENTED FEB. 23, 1904.

J. L. POALK.

LOOM.

APPLICATION FILED JULY 1, 1903.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 4.

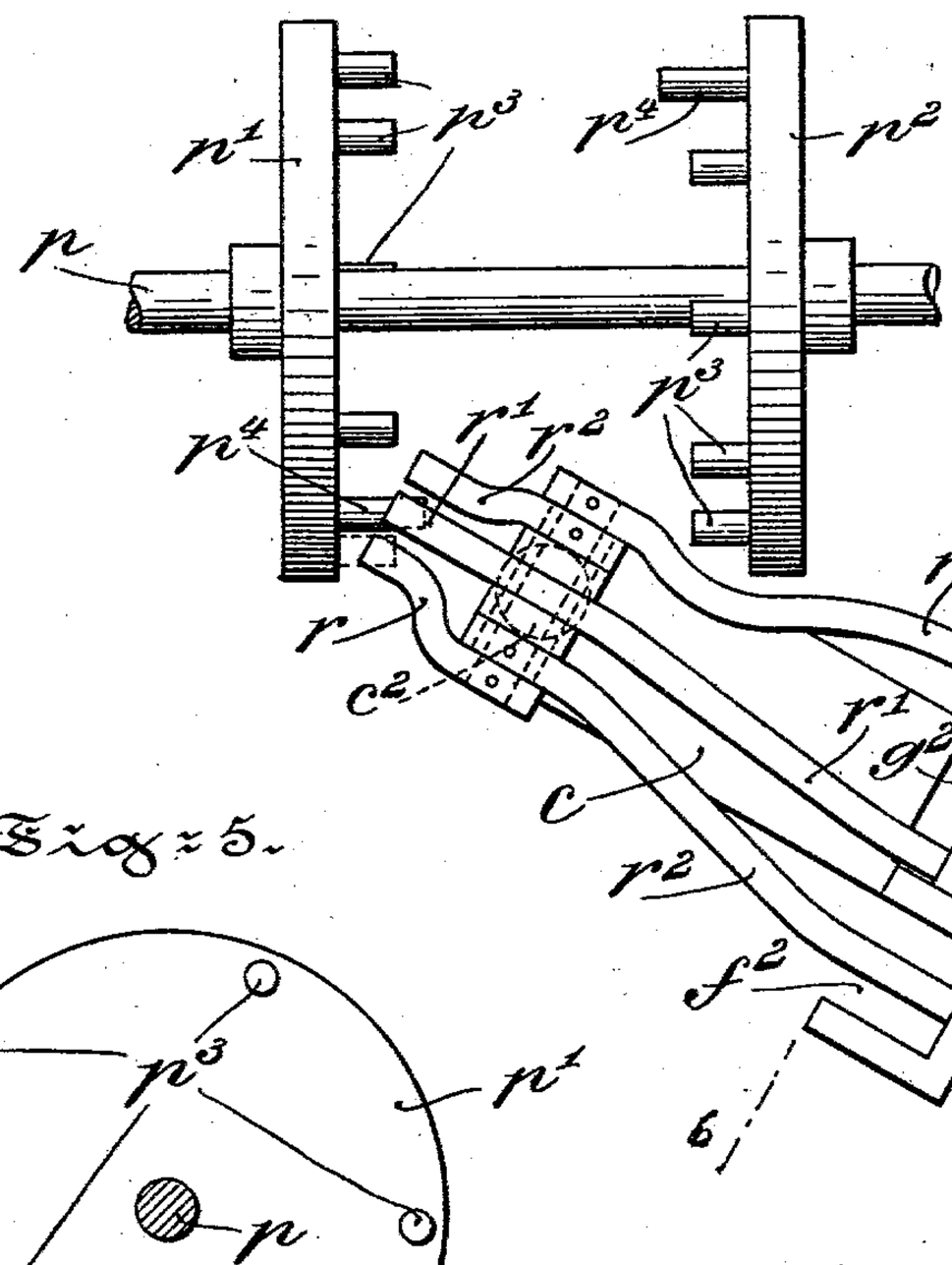


Fig. 5.

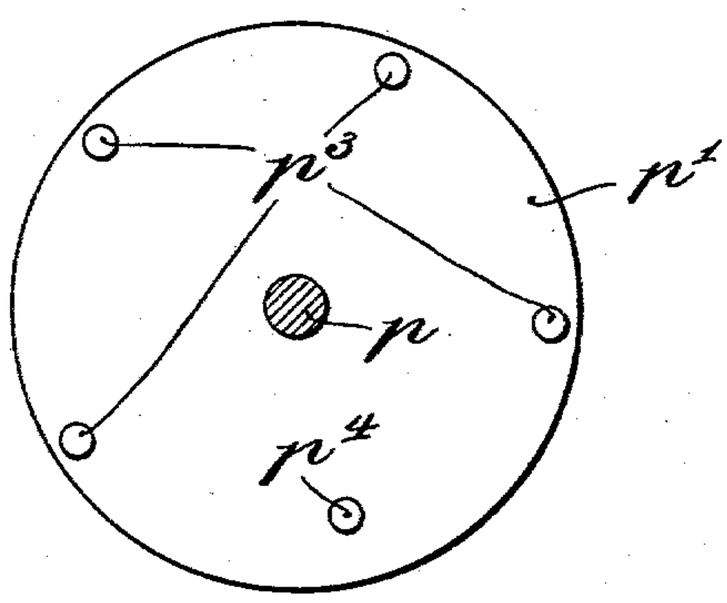


Fig. 6.

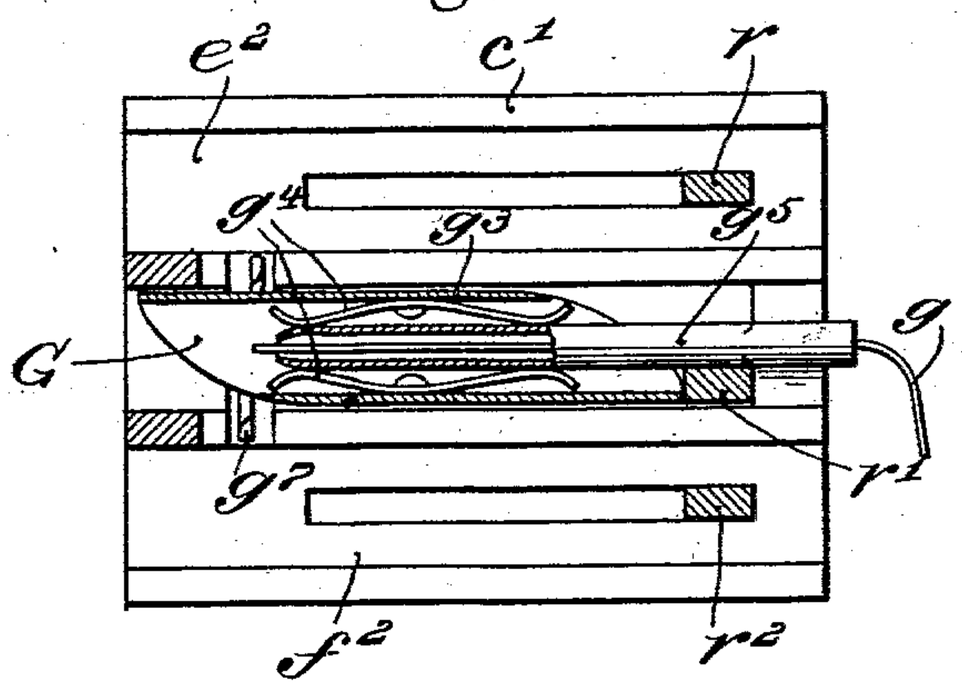
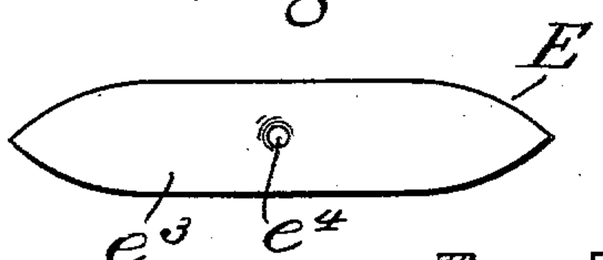


Fig. 8.



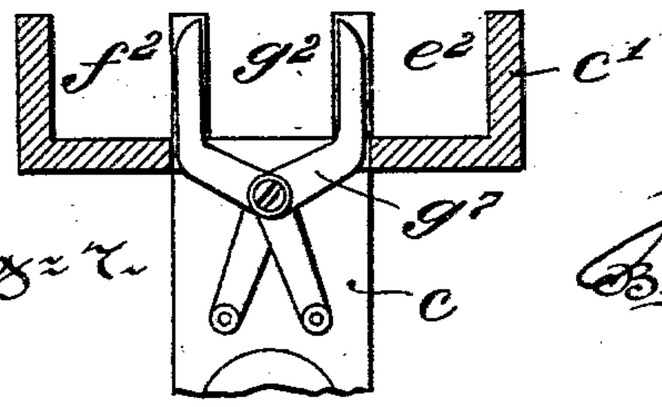


Fig. 7.

Witnesses
Jas. C. Wobensmith
Wilhelm Voigt

Inventor:
James L. Poalk,
By J. Walter Douglas
Attorney.

No. 752,922. PATENTED FEB. 23, 1904.

J. L. POALK.

LOOM.

APPLICATION FILED JULY 1, 1903.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 9.

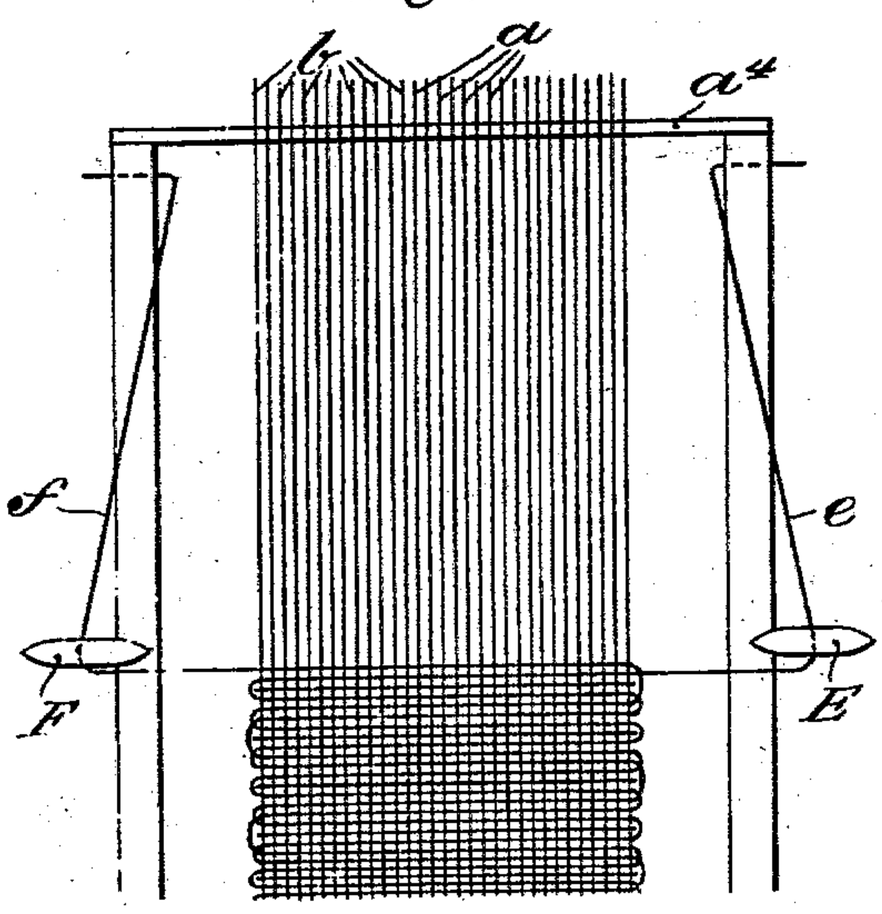


Fig. 10.

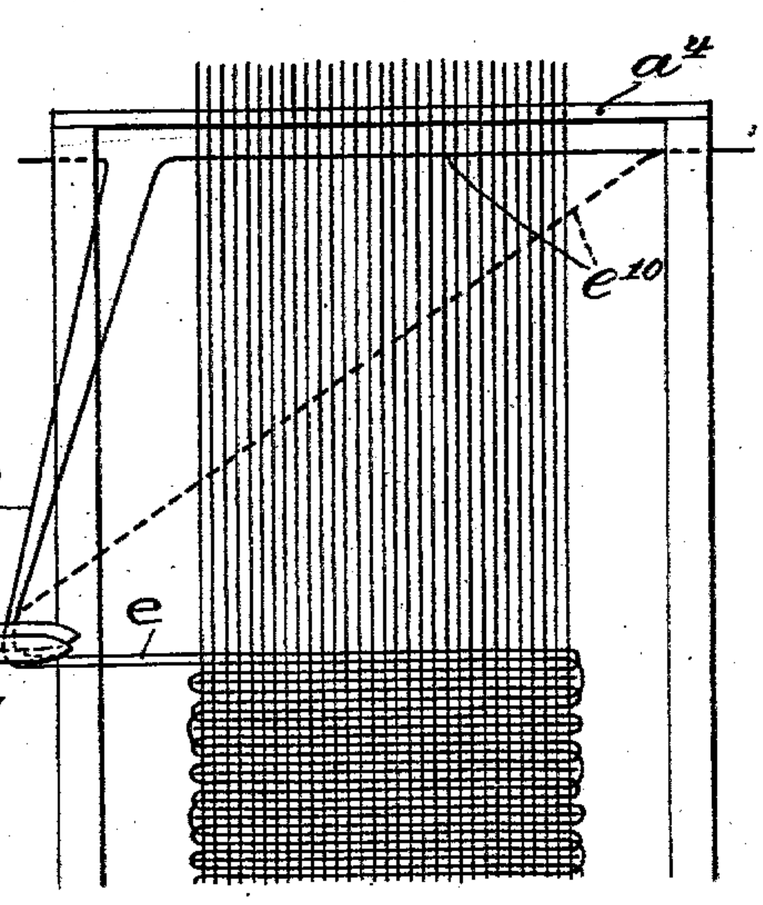


Fig. 11.

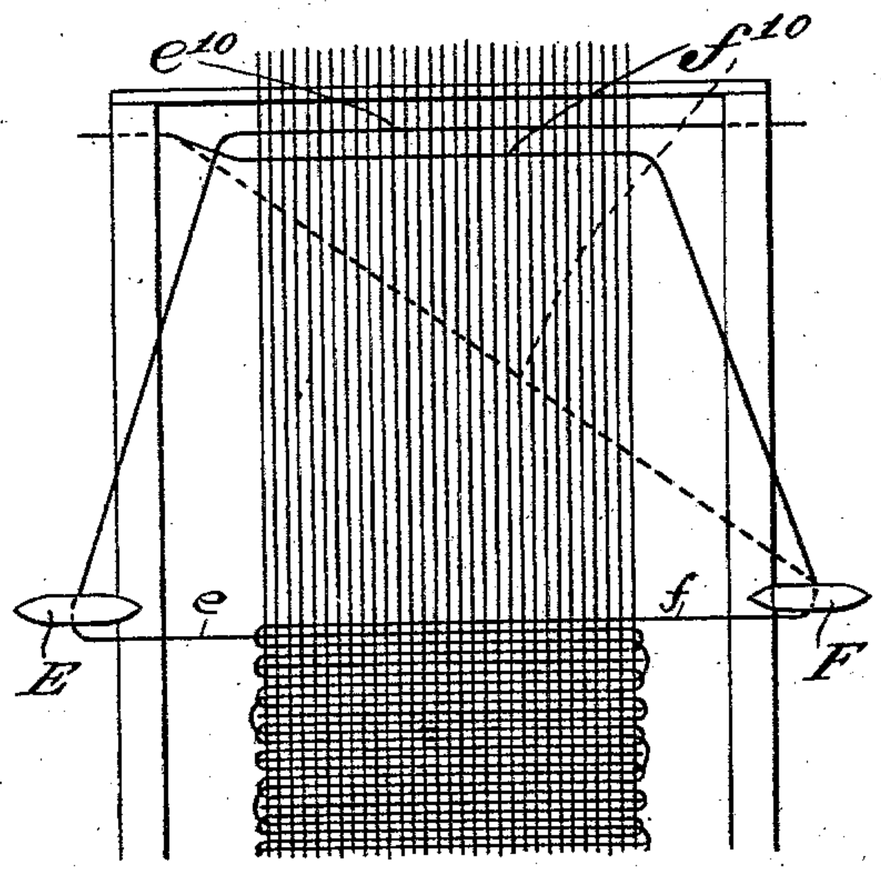
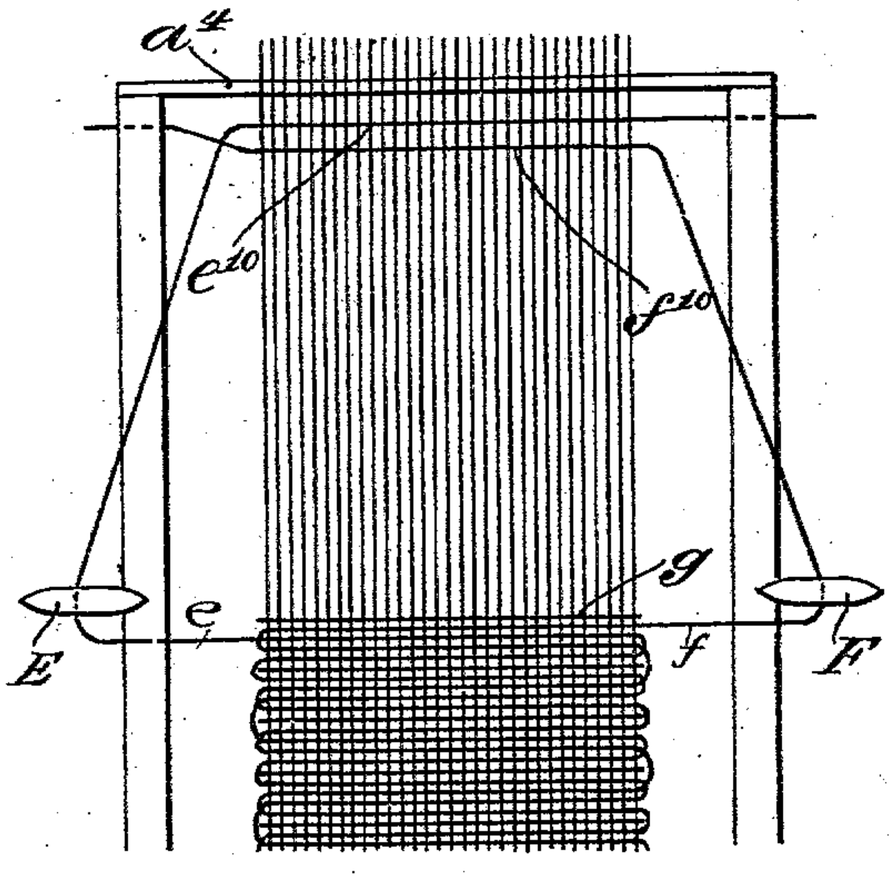


Fig. 12.



Witnesses:
Jas. C. Wobensmith.
Wilhelm Voigt

Inventor:
James L. Poalk,
By J. Walter Douglas
Attorneys.

No. 752,922. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

JAMES L. POALK, OF PHILADELPHIA, PENNSYLVANIA.

LOOM.

SPECIFICATION forming part of Letters Patent No. 752,922, dated February 23, 1904.

Application filed July 1, 1903. Serial No. 163,864. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. POALK, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Looms, of which the following is a specification.

My invention has relation to a loom for weaving cloth or similar fabric, and in such connection it relates to the construction and arrangements of parts of the loom whereby a continuous weft may be woven into the fabric from a spool or spools located outside the shuttle of the loom.

The principal object of my invention is to provide a loom wherein a weft thread or threads may be woven into the fabric from a spool or spools not carried by a shuttle, but connected with the shuttle in such a manner that the shuttle throws two threads, one operatively and one inoperatively, into the shed at one pick and brings the inoperative thread operatively into the shed at the next succeeding pick of said shuttle.

In the carrying out of my invention there is provided in the loom a new mechanism whereby the sheds may be formed without the use of heddles, together with a new means for beating up the weft and other new mechanism for the successful operation of the loom, substantially as hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical sectional view of such parts of the loom embodying main features of my invention as will clearly illustrate the operation of said loom. Fig. 2 is a side elevation of the loom, certain parts thereof being removed. Fig. 3 is a front elevation thereof, partly sectioned. Fig. 4 is an enlarged detail view of the means for effecting the irregular picking in the loom. Fig. 5 is a face view of one of the picker-disks of Fig. 4. Fig. 6 is a transverse sectional view taken on the line 6 6 of Fig. 4. Fig. 7 is a cross-sectional view of one of the shuttle-boxes. Fig. 8 is an enlarged front elevational view of one of the regular shuttles, and Figs. 9, 10, 11, and 12 are diagrammatic views illustrating the weaving operation.

Referring to the drawings, the warp-threads are arranged in two series a and b and are drawn from the warp roll or beam a^2. The threads of one series, a, pass over a bar a^4 and are then drawn down and pass between clamping-rolls a^5, arranged above the cloth-beam a^6. The threads of the other series, b, are passed down alongside the vertical rods b' and then through the eyes b^2 in the lower ends of these rods and are then passed between the clamping-rolls a^5. The rolls a^5 are carried by an oscillating or swinging frame c, and this frame c also carries the shuttle-boxes c' and also the reed d, to be hereinafter more fully described. The frame c oscillates upon a fulcrum c^2, which by preference is in alinement with the eyes b^2, through which the warp-threads b are passed. The means for oscillating the frame c may be varied. In the preferred or simplest form (shown in Fig. 2 of the drawings) a link or links c^3 connect the sides of the frame c to a crank or cranks c^4, secured to and traveling with one of the power-shafts c^5 of the loom. When the frame c oscillates, the series a of warp-threads swing upon the upper bar a^4 as a fulcrum, whereas the series b of warp-threads swing upon the eyes b^2 of the vertical rods b', and there are thus formed two triangular sheds, as clearly illustrated in Fig. 1. Inasmuch as the series of warp-threads a swing in an arc of a larger radius than that in which the warp-threads a' swing, it follows that some take-up mechanism should be used to keep the threads a under proper tension. For this purpose a frame a^3 is hinged at its front to the loom above the bar a^4. The threads a pass through this frame a^3, and the weight of the frame a^3 serves to maintain the threads a under proper tension. When the frame c is swung to the position indicated in full lines in said figure, then the shed extends to the right of the medial line of the loom. When the frame c swings to the left of the medial line of the loom, then the shed is formed as indicated in dotted lines in said figure. In the first instance the warp-threads a are in front or to the right of the

warp-threads *b*, whereas in the other instance the warp-threads *a* are back or to the left of the warp-threads *b*. The formation of these triangular sheds is an important feature of my present invention, inasmuch as at the upper corner of the shed an inoperative weft-thread may be received and retained, as and for the purpose hereinafter set forth, whereas in the lower corner of the shed the cloth may be formed and beaten up by the reed *d*. The center of the shed is also open to offer an unimpeded passage-way for the shuttles carrying the weft. The third corner or angle of the triangle is at b^2, the point on which the warps *b* swing. The weft mechanism is designed to throw into the sheds thus formed one or more continuous weft-threads *e* and *f*, carried by the spools *e'* and *f'*, located, preferably, outside the loom proper. In addition to the continuous wefts *e* and *f* provision is also made for throwing in short wefts *g* for the purpose and in the manner hereinafter described. With respect to the regular wefts *e* and *f* drawn from the spools *e'* and *f'* the preferred mechanism for introducing the same into the sheds is as follows: In each shuttle-box *c'* are arranged three ways e^2, g^2, and f^2, as illustrated in Fig. 2. The way e^2 is operatively arranged to receive and discharge a shuttle E, whereas the way f^2 is similarly arranged to receive and discharge a shuttle F. In Fig. 8 is illustrated the simplest and therefore the preferred form of a shuttle E or F. It consists of a metallic, wooden, or other suitable body e^3, suitably rounded at either end and having an eye or opening e^4 extending transversely through the body intermediate of the ends. Through the eye e^4 of the shuttle E is threaded the weft-thread *e* from the spool *e'*, and through a similar eye of the shuttle F is similarly threaded the weft *f* from the spool *f'*. In the passage of the shuttle E from its box *c'* at the right side of the loom-frame *c* through the shed and into the left-hand box *c'* a double weft *e* is drawn into the shed, and similarly in the passage of the shuttle F from its box at the left side of the loom-frame *c* through the shed into the right-hand box *c'* a double weft *f* is drawn into the shed, as will be hereinafter more fully explained. The third way g^2 is operatively arranged to receive and discharge a shuttle G of ordinary construction or type designed to draw short lengths of the weft *g* into the sheds. In Fig. 6 such a shuttle G is illustrated. It consists of a case g^3 open at both ends and having in its interior the gripping spring-jaws g^4. These jaws are arranged to be opened by a tube g^5 in the way g^2 to receive at one end (the inner end) the thread *g* passed from a spool *g'* through said tube g^5 and to discharge at the other end a thread *g* received from an opposite tube g^5, through which a weft *g* from an opposite spool *g'* has been passed, as clearly illustrated in Figs. 2, 3, and 6. A shearing mechanism g^7 serves to cut off the weft *g* after said weft is laid in a shed.

In the weaving of the fabric the two regular shuttles E and F are first supposed to be in a box at either side of the loom, as illustrated in Fig. 9. One shuttle, E, is then thrown through a triangular shed at one side of the rods *b'* and draws with it a loop comprising a lower or operative thread *e* and an upper or inoperative thread e^{10}. The upper thread e^{10} passes diagonally across the shed, as indicated in dotted lines in Fig. 10. This inoperative thread e^{10} must then be raised to an upper horizontal position (indicated in full lines in Fig. 10) to enable the shuttle F to perform its function. To accomplish this, there is arranged in the loom, as illustrated in Figs. 2 and 3, on either side of the medial line of the loom a lifter-arm *h*, suspended from a crank-shaft *h'*, operated by a crank h^2 and link h^3 from a power-shaft h^4, carrying a crank h^5, to which the link h^3 is pivotally secured. When, therefore, the thread e^{10} has been passed diagonally through the shed, a lifter-arm *h* catches the thread and raises it to a channel-way formed by the notches b^{10}, arranged in the vertical rods *b'*, as clearly illustrated in Fig. 1, and the thread e^{10} is held securely in this notch by the warp-threads *a* when said threads *a* swing from right to left to form a shed to the left of the medial line, into which shed the weft-thread *f* is to be thrown by the shuttle F. The other shuttle, F, when thrown through a shed draws with it a loop comprising a lower operative thread *f* and an upper or inoperative thread f^{10}. The inoperative thread f^{10} passes diagonally through the shed, as indicated in dotted lines in Fig. 11. This inoperative thread is then raised by its lifter-arm *h* to a horizontal elevated position into a channel-way formed by the notches b^{11}, cut into the opposite side of the vertical rods *b'* below the notches b^{10}, as clearly illustrated in Fig. 1. In the swinging of the warp-threads *a* from right to left the upper inoperative weft-thread b^{10} is bound in the notches b^{11} by the warps *a*. A movement of the warp-threads *a* from left to right in forming reverse sheds will serve to release the thread f^{10} from the notches b^{11}, while still confining the thread e^{10} in said notches b^{10}. Before, however, the shuttles E and F continue their picks a short length of the auxiliary weft *g* is drawn into the shed, as illustrated in Fig. 12, to confine the last-thrown weft *f* in the fabric. Upon the next movement of the shuttle F after the weft *g* is introduced the former inoperative thread f^{10} is brought down into operative position and becomes an active weft *f*, as illustrated in Fig. 9, and no inoperative thread will appear in the shed. In a similar manner the return movement of the shuttle E will thereafter bring down the former inoperative thread e^{10}, so that it becomes an active weft *e*, and the

operation continues until the fabric is completed. To beat up the wefts *e*, *f*, and *g*, a rotating reed *d* is preferably used. As illustrated in the drawings, the reed consists of a rotating shaft *d'*, to which are secured a series of flat arms d^2, projecting diametrically across the shaft *d'*. The shaft *d'* is carried by and oscillates with the frame *c*, and the arms d^2 of the reed *d* are arranged so that the thread *e*, *f*, or *g* is first laid above the arms d^2, and then when the arms d^2 are turned the thread rests below the arms d^2 and is beaten up by said arms into the fabric, as clearly illustrated in Fig. 1.

Any suitable picking mechanism may be used for the irregular picking above described. A simple form of means for effecting said irregular picking is illustrated in detail in Figs. 4, 5, and 6 of the drawings. It consists in arranging at each side of the loom a revolving shaft *p*, on which is secured two picker-disks *p'* and p^2, facing each other and having on contiguous faces four pins p^3 effecting the picking of the regular shuttles E and F, and a fifth and larger pin p^4 arranged nearer the center of the disk *p'* or p^2 and effecting the picking of the auxiliary shuttle G. Oscillating on the frame *c* are the three picker-sticks *r*, *r'*, and r^2 for each shuttle-box *c'*. The stick *r* in one position of the boxes *c'* comes in alinement with the pins p^3 of one picker-disk, *p'*, whereas in the other position of the boxes *c'* it clears the pins p^3 of the second disk p^2. The stick r^2 in one position of the boxes *c'* clears the pins of the first disk *p'*; but in the reverse position of the shuttle-boxes it comes into alinement with the pins p^3 of the disk p^2. The picker-stick *r'*, however, is in alinement in both positions of the shuttle-boxes *c'* with either a longer pin p^4 of the disk *p'* or a longer pin p^4 of the disk p^2. The picker-stick *r* effects the picking of the shuttle E, the stick r^2 the picking of the shuttle F, and the stick *r'* the picking of the shuttle G. By regulating the rotation of the disks *p'* and p^2, as well as the positions which the pins p^3 and p^4 of one disk *p'* occupy relatively to the positions of the pins p^3 and p^4 of the other disk, p^2, the picks of the shuttles E, F, and G can readily be obtained. These picks, as illustrated by the diagrams in Figs. 9 to 12, are as follows: first, a pick of the shuttle E through a shed formed when the warps are to the right of the medial line of the loom, as in Fig. 1; second, a pick of the shuttle F through a shed formed when the warps are to the left of the medial line of the loom; third, a pick of the shuttle G through a shed formed on the right of the medial line of the loom; fourth, a pick of the shuttle F through a shed formed on the left of the medial line of the loom, and, fifth, a pick of the shuttle E through the shed on the right of the medial line of the loom. On the next cycle of operations the shuttle F makes the first pick and closes the cycle with the last pick.

The passage of the shuttle G through the shed in either direction without interference with the warp-threads *b* is permitted by reason of the beveling of the ends of the shuttle G in a plane obliquely to the plane of said warp-threads *b*. A beveled end of the shuttle G slides against the warps *b* and glides into the shed with little or no friction. This beveling of the ends of the shuttle G is clearly illustrated in Fig. 6.

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

1. In a loom of the character described, wherein the warp-threads are arranged in two series depending from a medial line in the loom, a means for oscillating one of said series of threads with respect to the other series to form triangular sheds disposed alternately to the right and left of said medial line.

2. In a loom provided with two series of warp-threads depending from varying points in a medial line, a means for oscillating each series from its depending point as a center to thereby form triangular sheds disposed alternately to the right and left of said medial line.

3. In a loom of the character described, in combination with means for forming warp-threads into sheds, means for drawing a continuous weft-thread doubled through each shed at one pick, means for elevating one part of said doubled thread into inoperative position after said pick, and means for drawing said elevated inoperative weft-thread into operative position upon the reverse pick.

4. In a loom of the character described, means for forming a series of warp-threads into sheds alternately upon either side of a medial line of the loom, in combination with means for drawing a doubled continuous weft-thread through each shed at one pick of the loom, means for raising one part of said doubled weft-thread into inoperative position after said pick, and means for drawing said inoperative weft-thread into operative position upon a reverse pick in the same shed.

5. In a loom provided with two series of warp-threads, each series suspended from a center of oscillation, said centers varying in position upon a medial line of the loom, an oscillating frame carrying both series of warp-threads and arranged below their centers of oscillation, and a reed carried by said frame, said reed consisting of a shaft revoluble in the frame, and a series of arms projecting diametrically across said shaft and revolving with said shaft.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JAMES L. POALK.

Witnesses:
J. WALTER DOUGLASS,
THOMAS M. SMITH.