

**No. 665,753.**

**Patented Jan. 8, 1901.**

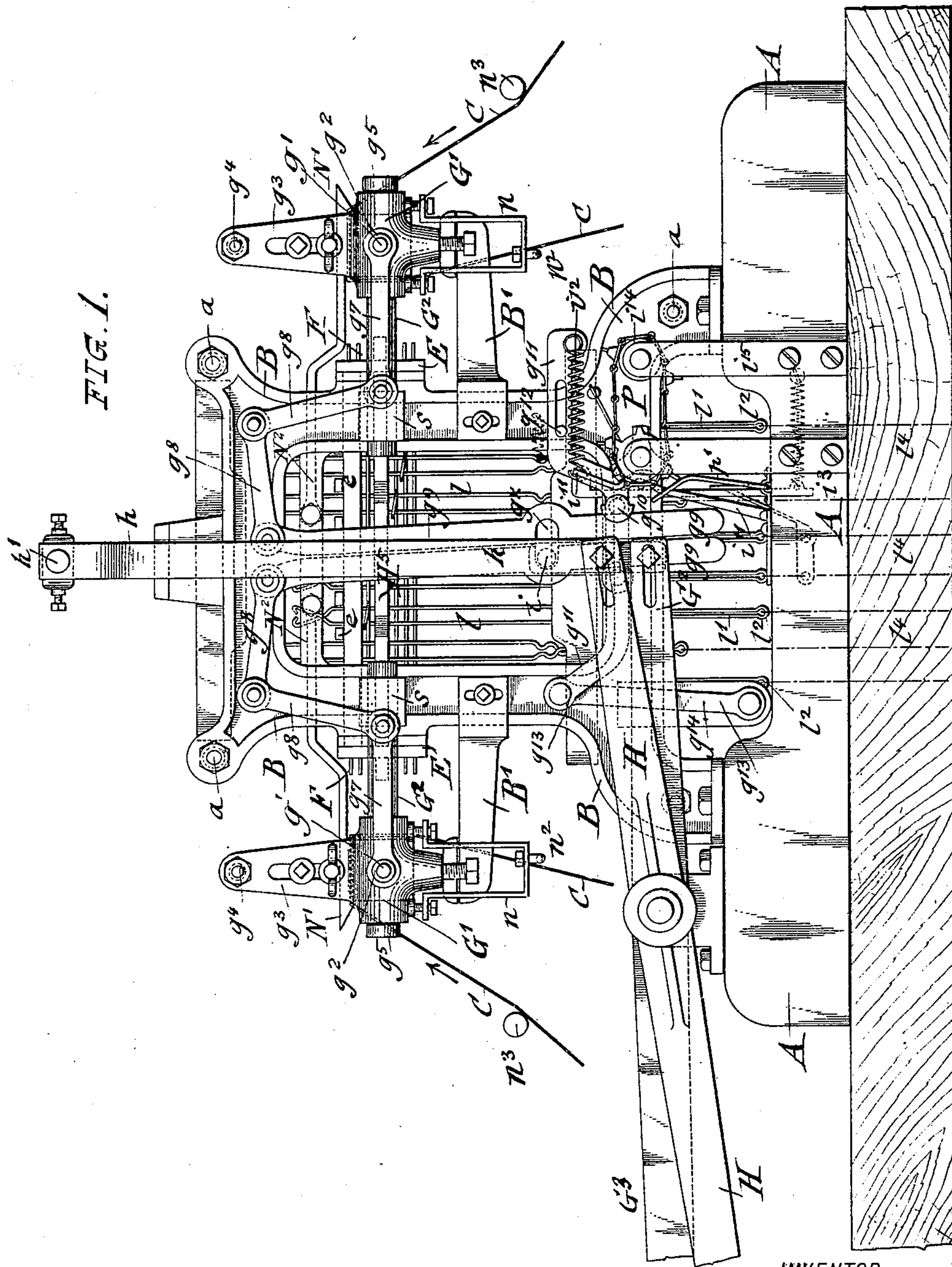
**A. PIVETZ.**

**JACQUARD ATTACHMENT FOR LOOMS.**

(Application filed Oct. 30, 1899.)

(No Model.)

**6 Sheets—Sheet 1.**



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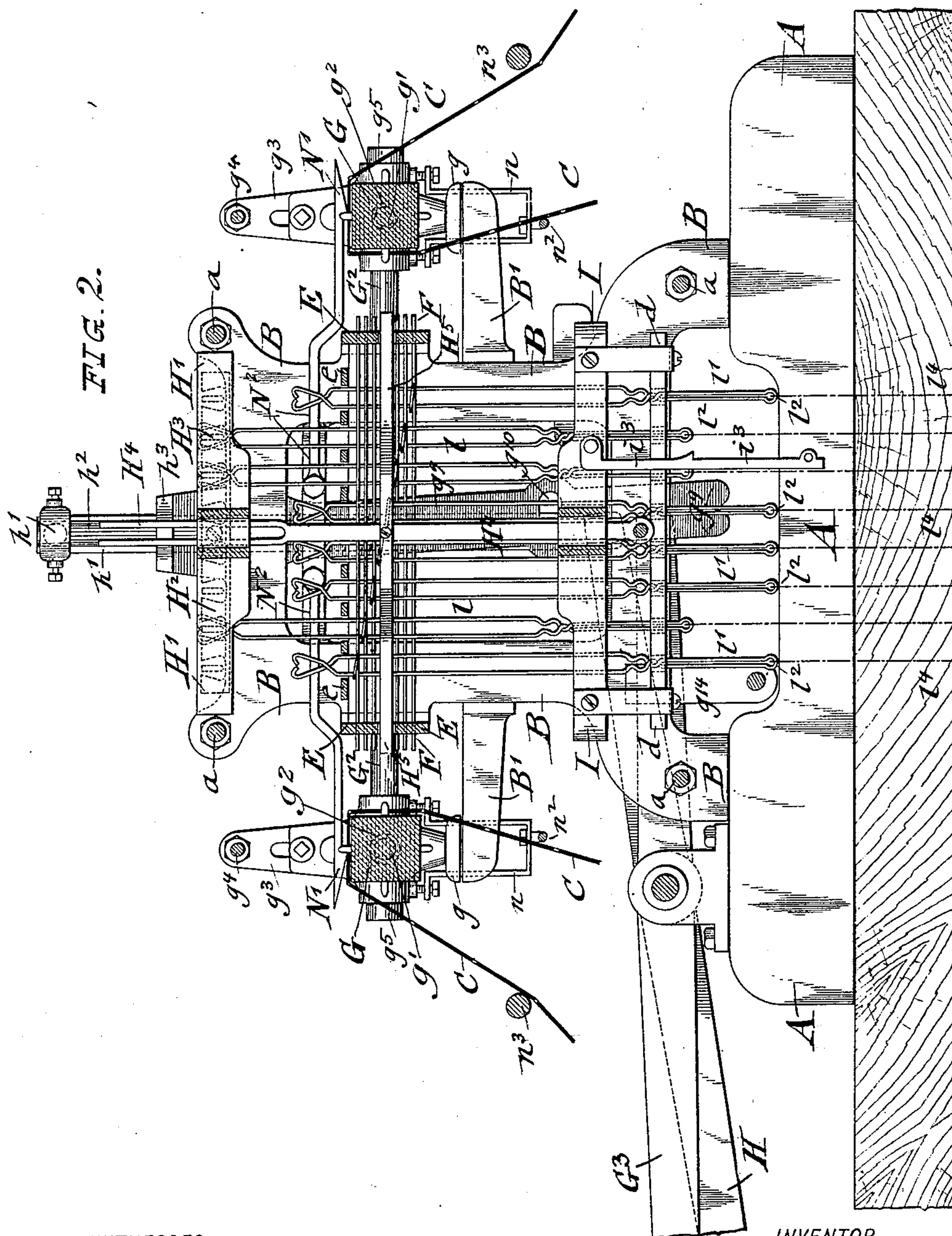
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A. PIVETZ.  
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(No Model.)

6 Sheets—Sheet 2.



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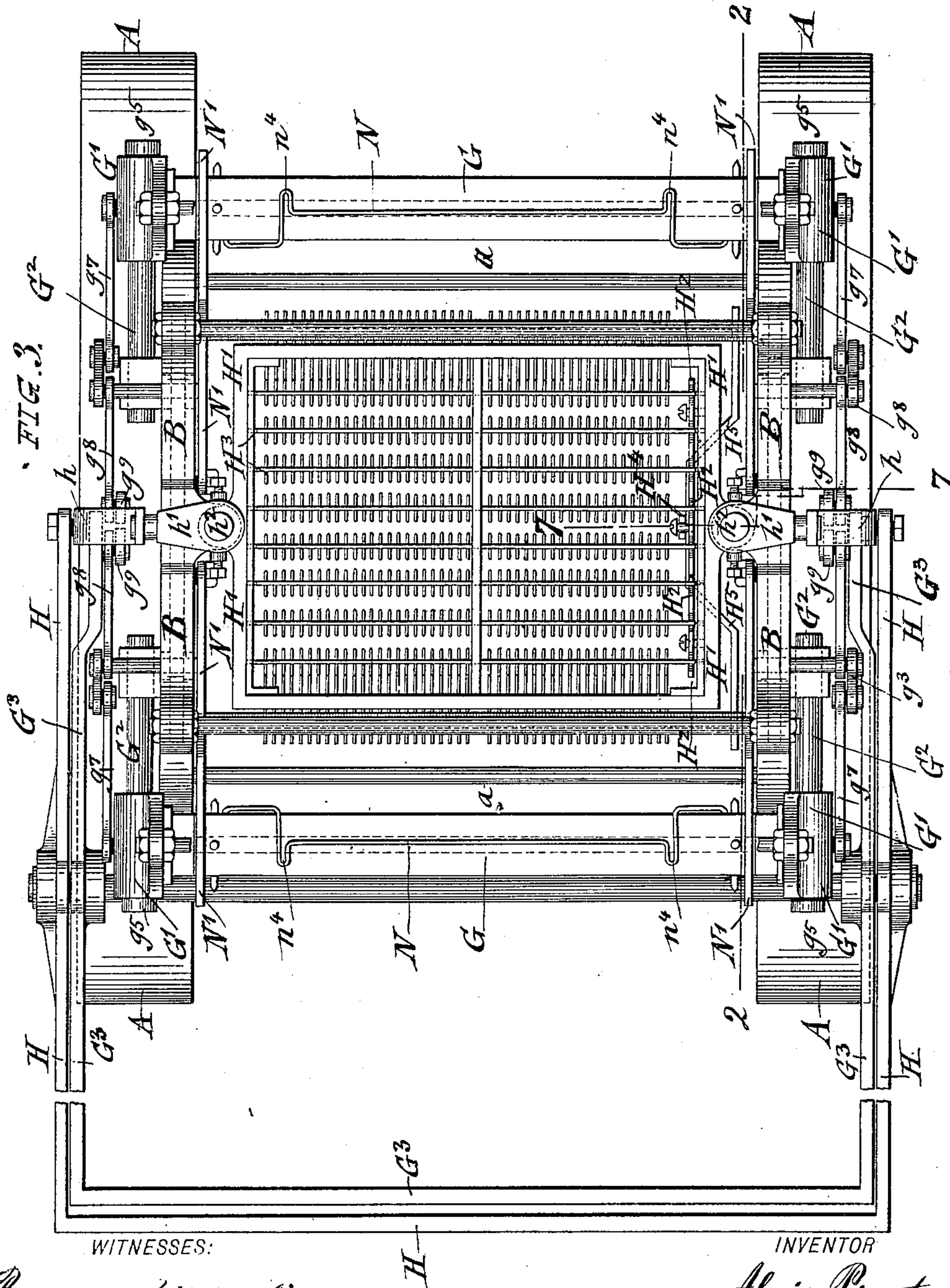
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JACQUARD ATTACHMENT FOR LOOMS.

(Application filed Oct. 30, 1899.)

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6 Sheets—Sheet 3.



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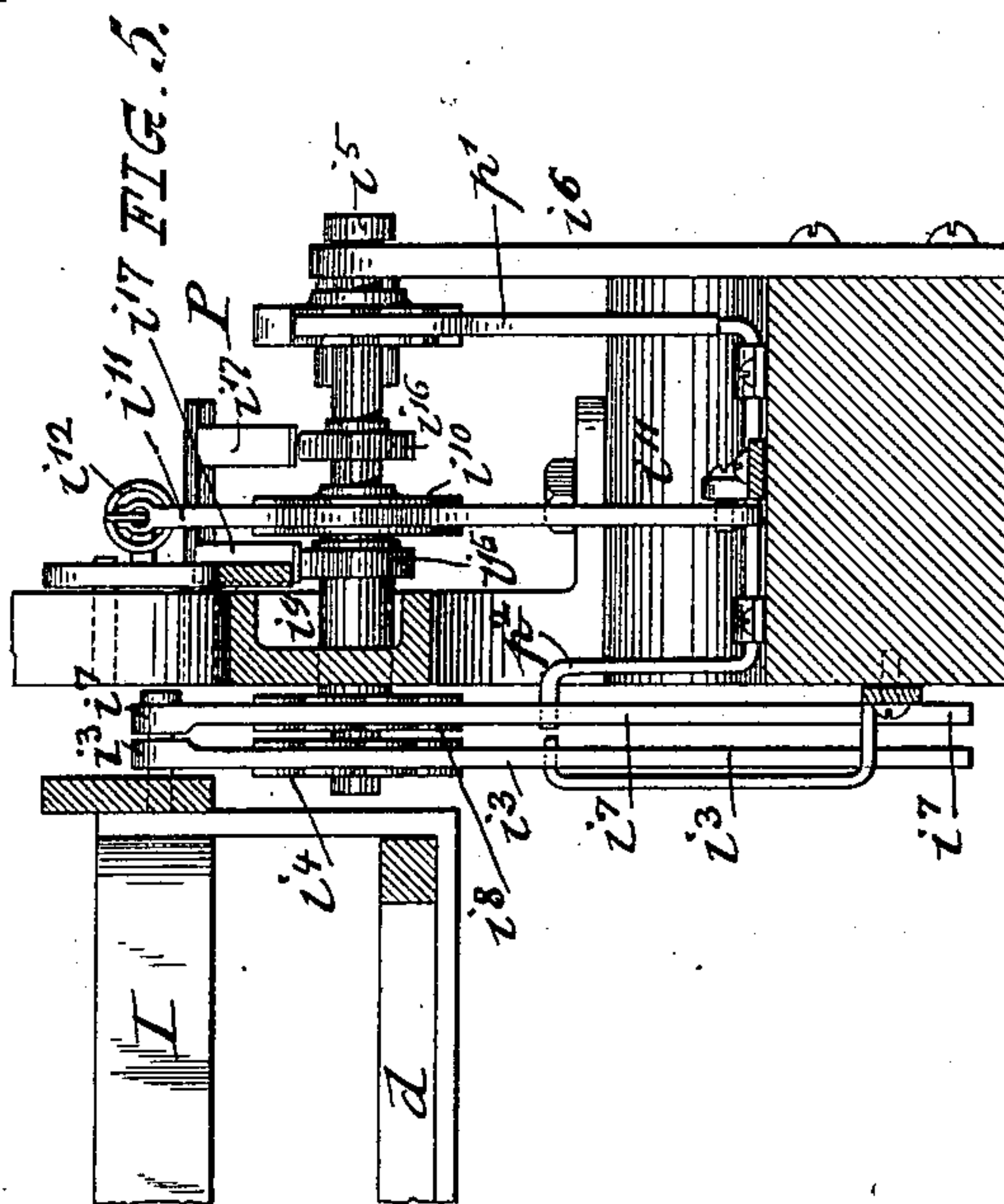
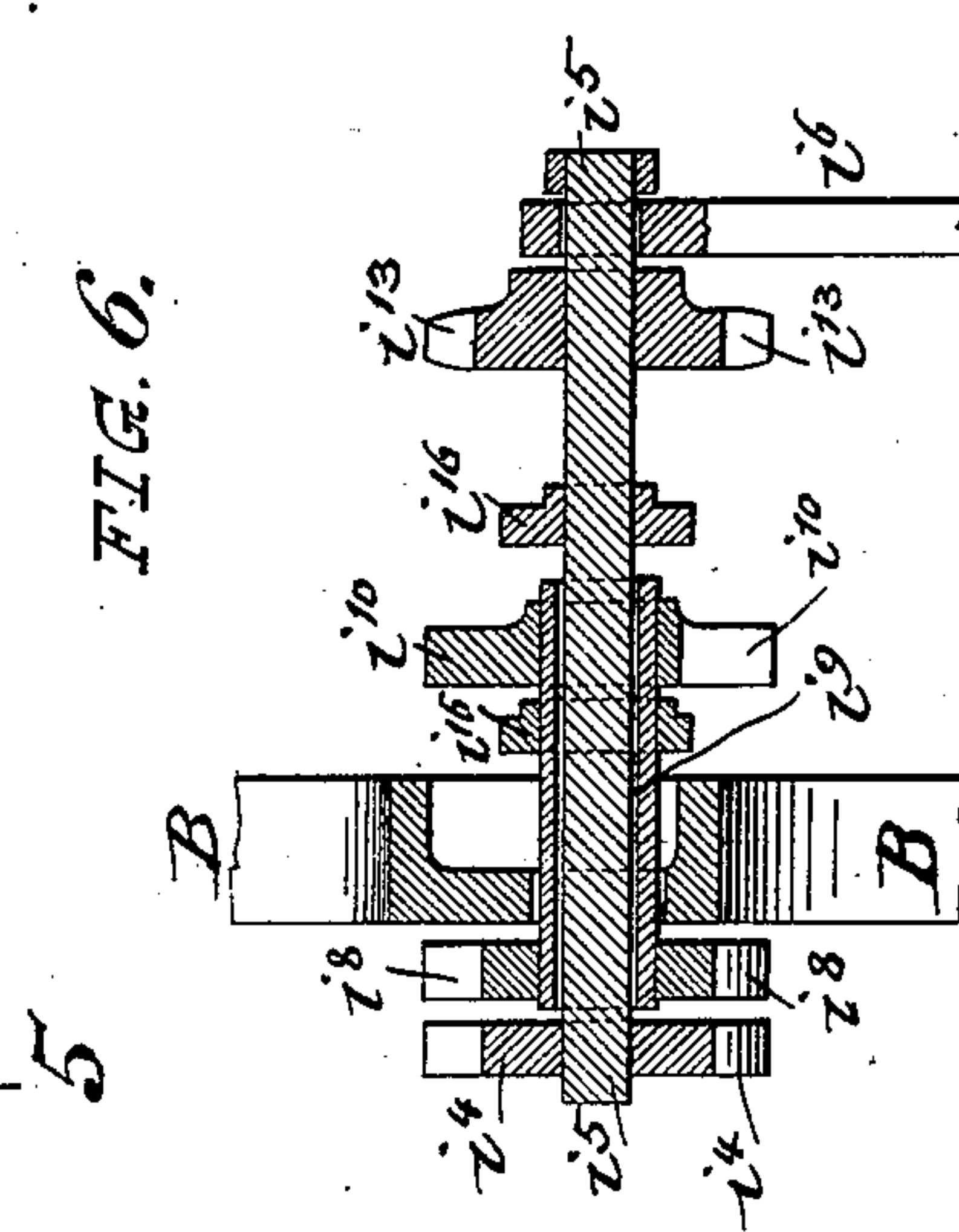
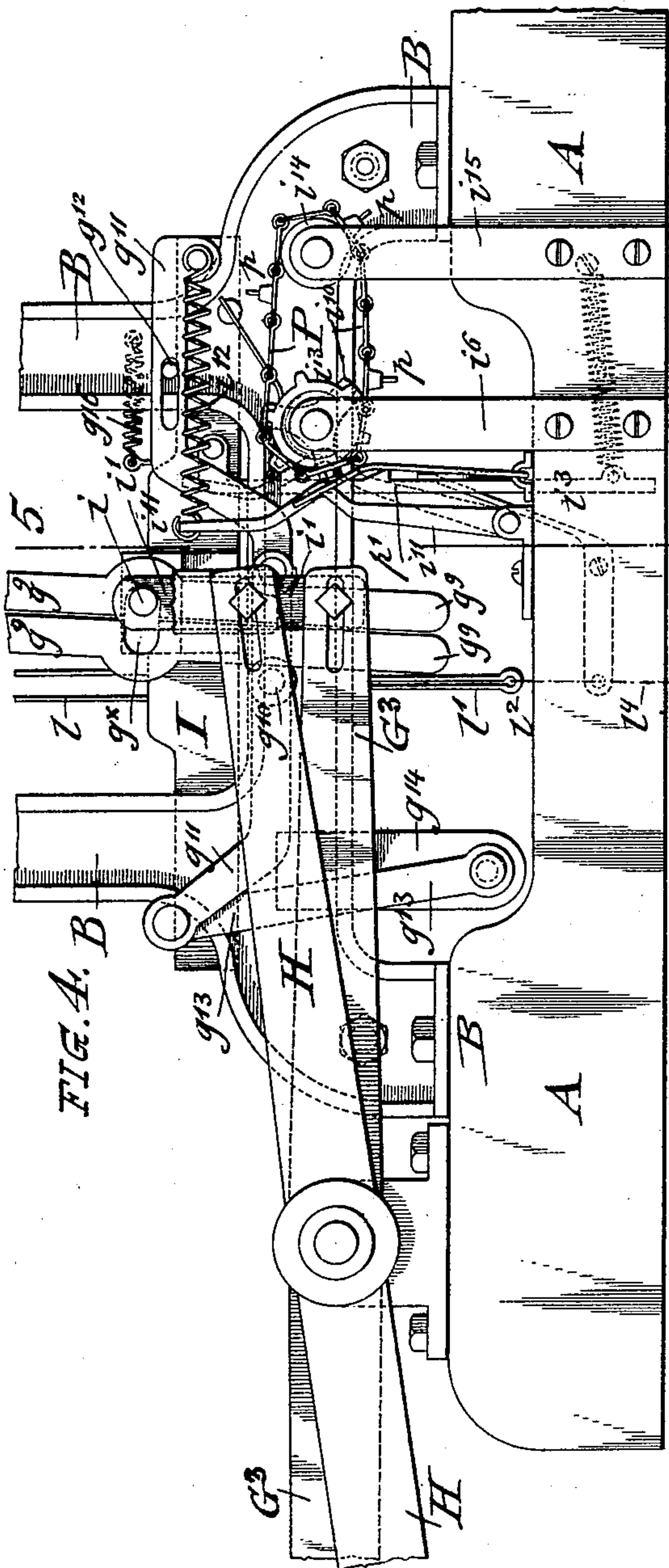
A. PIVETZ.

JACQUARD ATTACHMENT FOR LOOMS.

(Application filed Oct. 30, 1899.)

(No Model.)

6 Sheets—Sheet 4.



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**No. 665,753**

**Patented Jan. 8, 1901.**

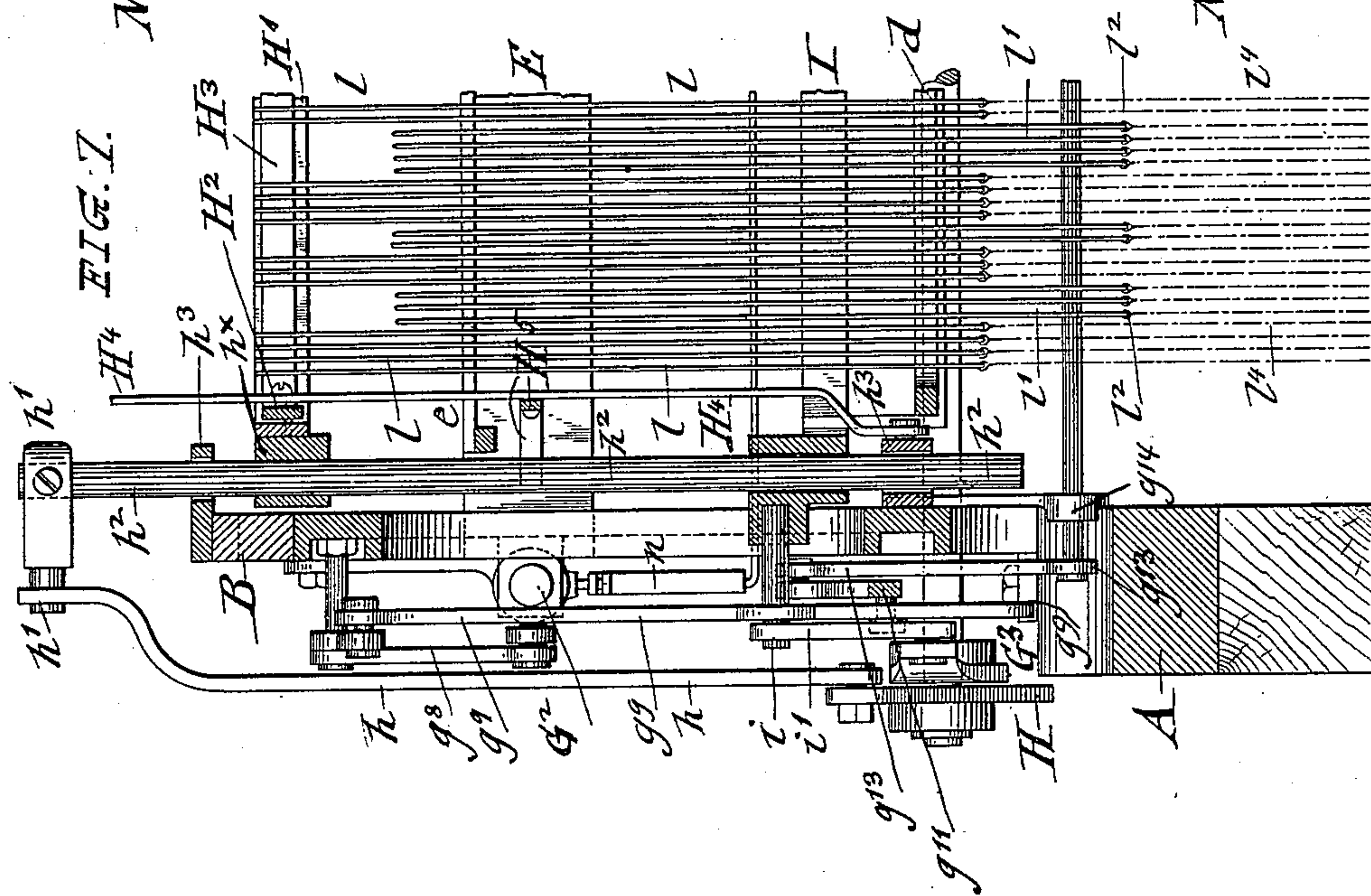
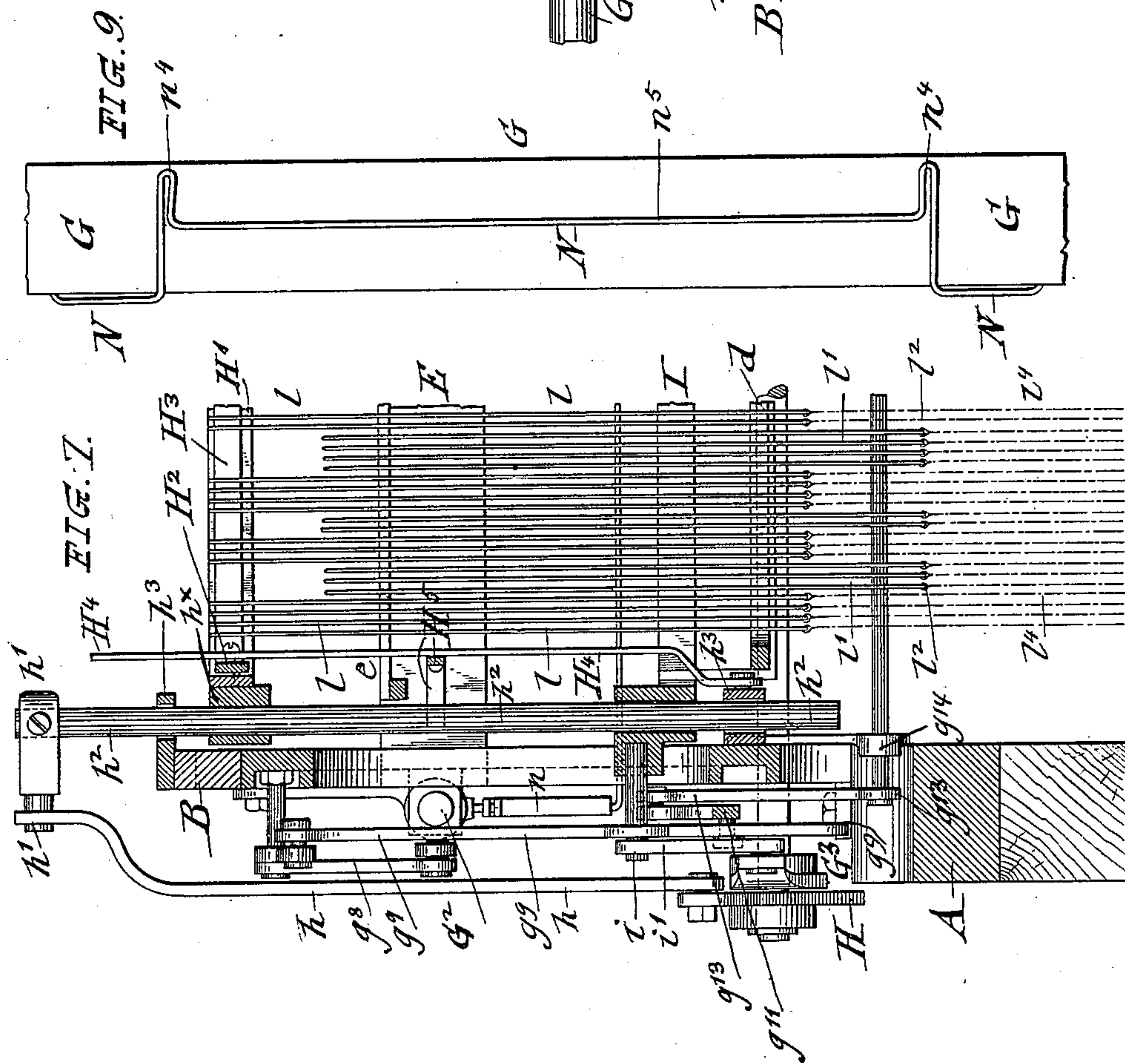
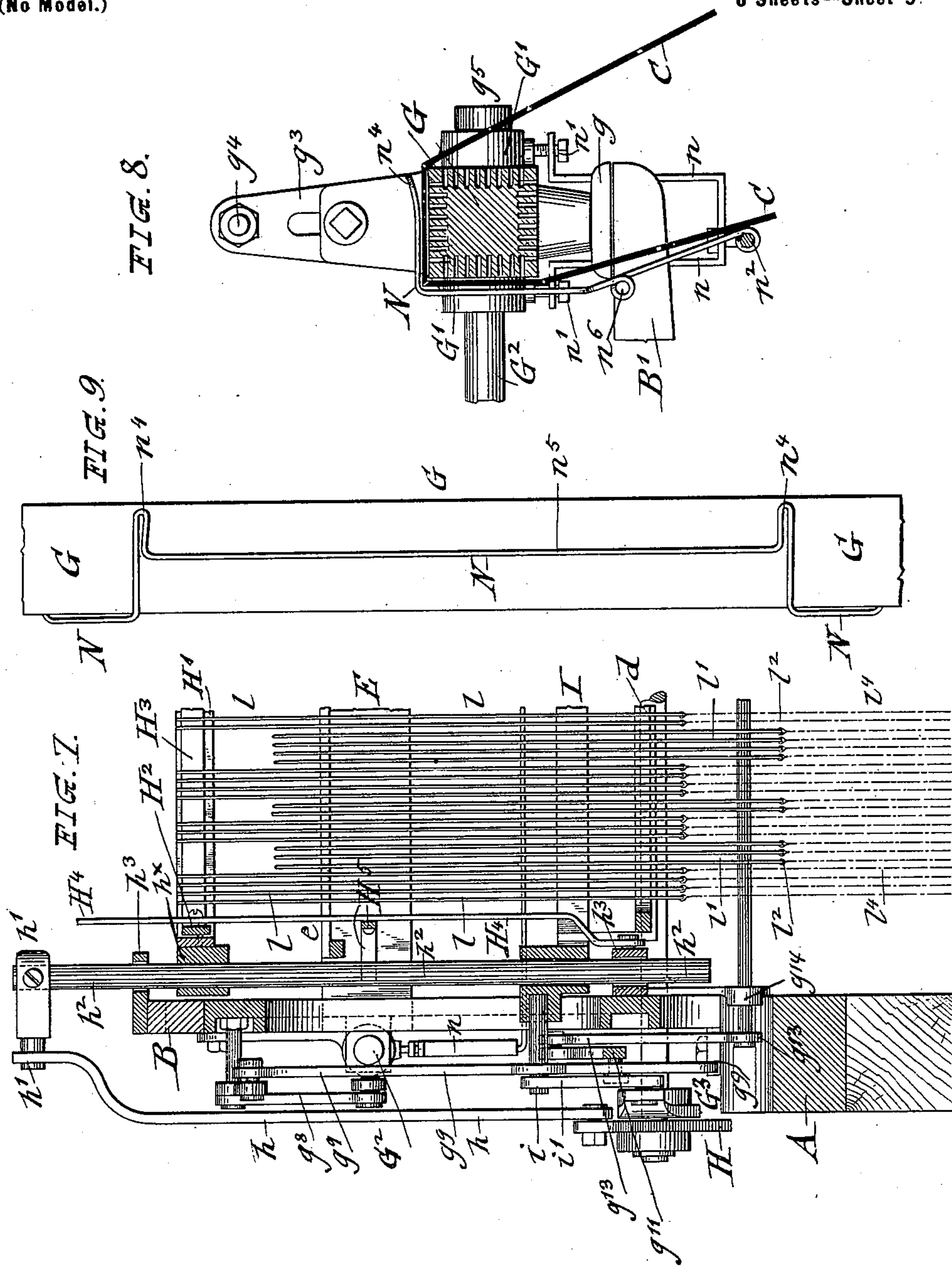
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**JACQUARD ATTACHMENT FOR LOOMS.**

(Application filed Oct. 30, 1899.)

(No Model.)

**6 Sheets—Sheet 5.**



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(Application filed Oct. 30, 1899.)

(No Model.)

6 Sheets—Sheet 6.

FIG. 14.



FIG. 10.

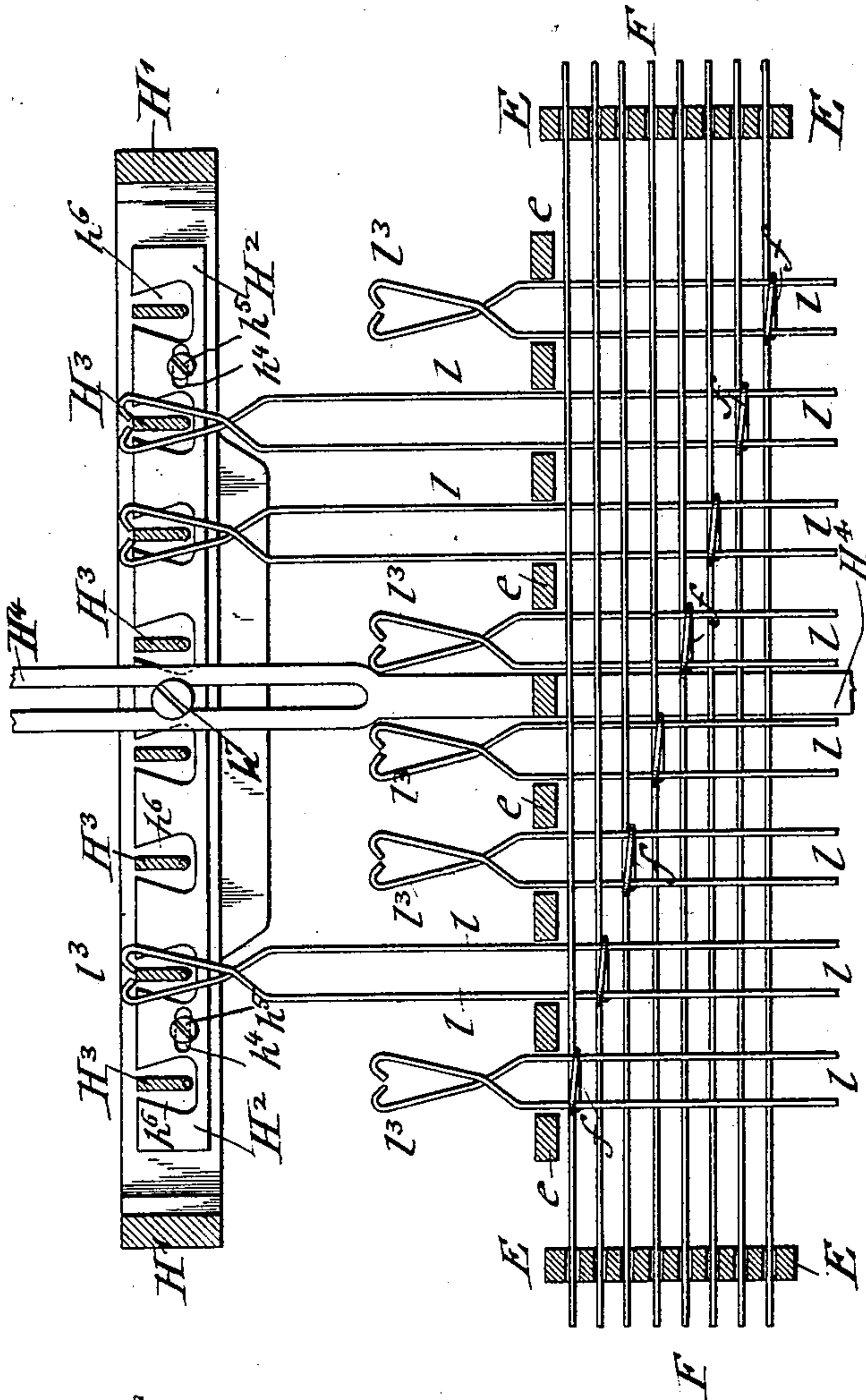


FIG. 11.

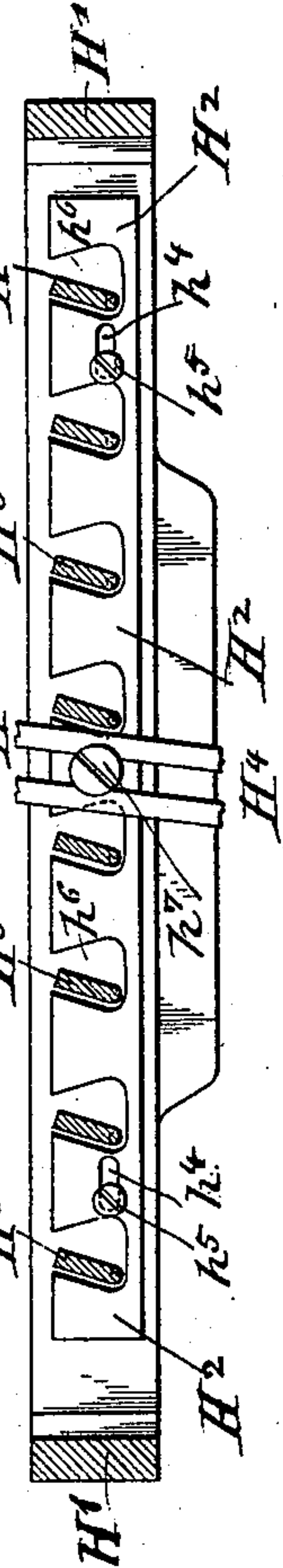
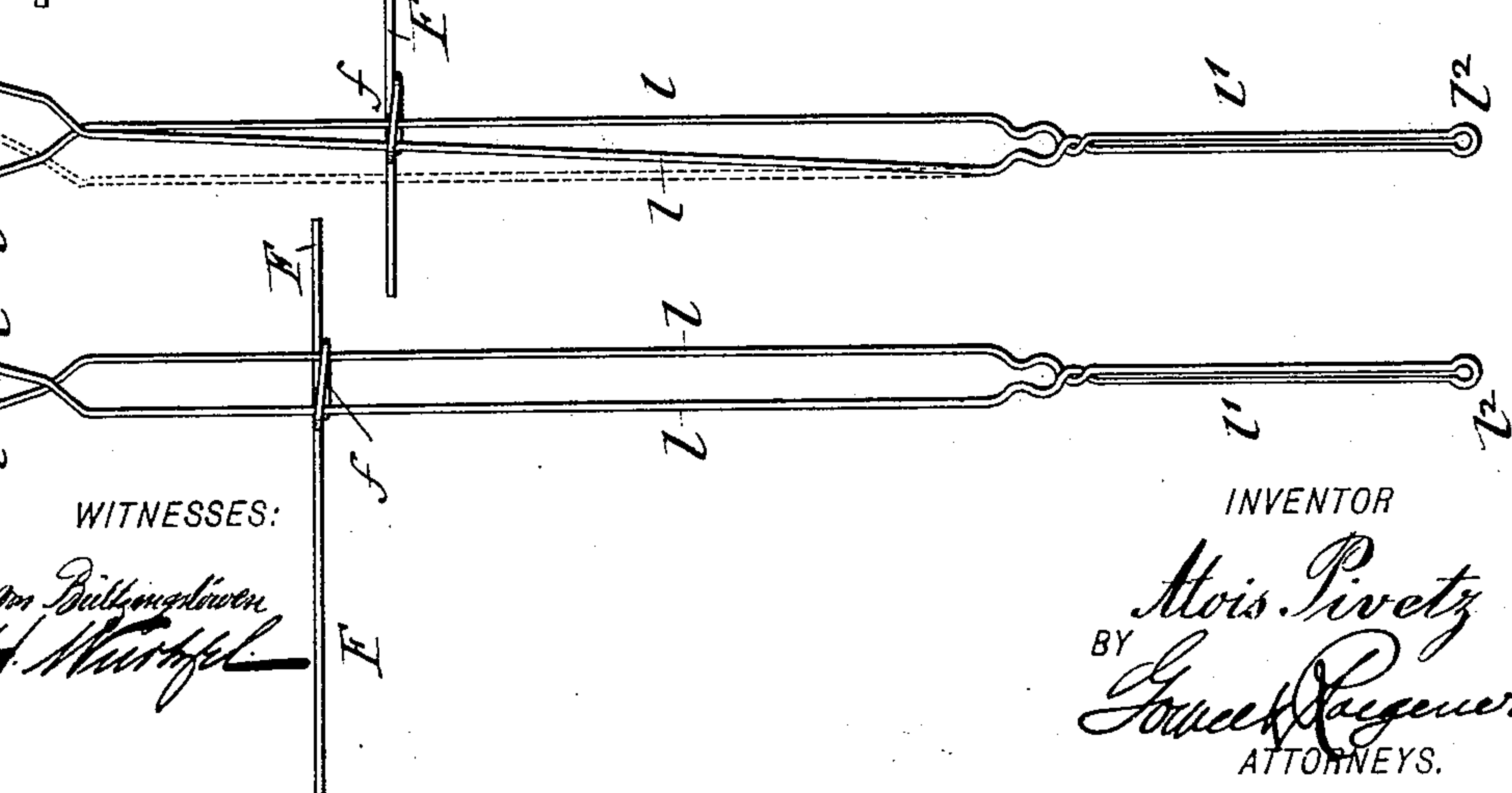


FIG. 12.

FIG. 13.



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# UNITED STATES PATENT OFFICE.

ALOIS PIVETZ, OF WEEHAWKEN, NEW JERSEY, ASSIGNOR OF TWO-THIRDS TO ANTON GUENDEL, OF NEW YORK, N. Y., (LIZZIE GUENDEL ADMINISTRATRIX OF SAID ANTON GUENDEL, DECEASED,) AND ALPHONSE THOUROT, OF WEST NEW YORK, NEW JERSEY.

## JACQUARD ATTACHMENT FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 665,753, dated January 8, 1901.

Application filed October 30, 1899. Serial No. 735,237. (No model.)

*To all whom it may concern:*

Be it known that I, ALOIS PIVETZ, a subject of the Emperor of Austria-Hungary, residing at Weehawken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Jacquard Attachments for Looms, of which the following is a specification.

This invention relates to certain improvements in jacquard attachments for looms, in which two card-carriers are employed, one for the ground and the other for the design to be produced on the fabric, said card-carriers and the heddle-operating devices being so arranged that a greatly-reduced number of cards is required, while the operation of the heddle-operating devices is made positive and reliable and their construction simplified to such an extent that a more durable and less expensive jacquard attachment for looms is obtained.

For these purposes the invention consists of a Jacquard attachment for looms which comprises a needle-guide frame, double-ended needles projecting from both ends of the same, horizontally-reciprocating card-carriers, one for the ground-cards, the other for the pattern-cards, means for turning said card-carriers at the proper time, a plurality of heddle-lifts, one for each of the needles, said heddle-lifts being formed of spring-wires having hooked spring-arms at their upper ends, a heddle-lifting wire connecting each heddle-lift with its heddle, oscillating lifting-knives for engaging the hooked ends of the heddle-lifts, said knives being operated by the reciprocating motion of the card-carriers, and an endless pattern-chain and coacting mechanism for operating the card-carriers and their cards and placing them into contact with the projecting ends of the needles.

The invention consists, further, in certain details of construction by which the parts referred to are operated at the proper time, and, lastly, in the special construction of the needles and heddle-lifts, as will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of my improved jacquard attachment for looms. Fig. 2 is a vertical longitudinal section of the same on line 2 2, Fig. 3. Fig. 3 is a plan view of the attachment. Fig. 4 is a side elevation of the mechanism for actuating the card-carrier at the proper time, drawn on a larger scale. Fig. 5 is a vertical transverse section on line 5 5, Fig. 4. Fig. 6 is a detail vertical longitudinal section of the main shaft of the pattern-chain and the wheels on the same. Fig. 7 is a vertical transverse section on line 7 7, Fig. 3, showing the actuating mechanism for the heddle-lifts, also drawn on a larger scale. Fig. 8 is a detail vertical transverse section through one of the card-carriers, showing the card-chain and the guard-wire for holding the same on the carrier. Fig. 9 is a detail top view of one of the card-carriers with its guard-wire. Fig. 10 is a rear elevation, partly in section, on line 10 10, Fig. 3, showing the lifting-knives for the heddle-lifts. Fig. 11 is also a sectional rear view of the heddle-lifting knives, showing them in inclined or tilted position for engaging the hook ends of the heddle-lifts. Figs. 12 and 13 are detail side views of one of the heddle-lifts, showing it in connection with its needle and respectively in normal position and in shifted position; and Fig. 14 is a plan view of one of the needles, drawn on a larger scale.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a metallic frame of rectangular shape, which is supported on the top part of the frame of the loom. On the rectangular frame A are supported upright front and rear standards B B, which are connected by transverse brace-bolts *a a*. Between the standards B is located a guide-plate *d*, which is provided with perforations for the straight lower ends or shanks *l'* of a plurality of upright heddle-lifts *l*, each of which is formed, preferably, of a doubled-up spring-wire, that is twisted at its lower portion so as to form the straight shank *l'*, an eye *l<sup>2</sup>* being arranged at the lower end



of said shank, while the upper ends are bent so as to cross each other and formed with inwardly and downwardly curved hooks  $l^3$ , as shown clearly in Figs. 12 and 13.

- 5 To the sides of the standards B B are attached transverse vertical guide-plates E, which are provided with rows of perforations for guiding as many horizontal double-ended needles F as there are heddle-lifts, each needle being made long enough so as to project at both ends beyond the perforated guide-plates E. Each of the needles F is provided with an elongated loop  $f$ , which is bent up from the wire of the needle, as shown in Fig. 14, and which is arranged at relatively different points in the needles, so that each needle engages its respective heddle-lifts  $l$ , as shown in Fig. 10. The heddle-lifts are so arranged and connected with their needles that there is no interference of one lift with the other, so that when the heddle-lifts are lifted, as shown in Fig. 10, they move easily up and down in the loops of the needles, but remain always in engagement with the same.
- 25 The upper ends of the heddle-lifts  $l$  are guided by stationary cross-bars  $e e$ , that extend parallel with the guide-plates E from the front to the rear standards B B, as shown clearly in Fig. 10. The cross-bars  $e e$  correspond in number with the transverse rows of heddle-lifts, so that the heddle-lifts are guided during their vertical motion by their lower ends or shanks in the lower guide-plate  $d$  and by their upper ends in the loops of the needles and by the cross-bars  $e e$ , so that they are reliably guided during the up-and-down motion imparted to them. To the eyes  $l^3$  at the lower ends of the shanks  $l'$  of the heddle-lifts  $l$  are attached a corresponding number of heddle-lifting cords or wires  $l^4$ , by which the connection with the individual heddles of the loom is made in the usual manner. From each side of the upright standards B B extend, about midway of the same, horizontal bracket-arms B', on which are guided by slide-plates  $g g$  two card-carriers G G, that are arranged parallel with the needle-guide plates E and on a level therewith, one on each side of the upright standards. The card-carriers G G are made of square cross-section and provided in their faces with a plurality of perforations or holes, which correspond in number and are adapted to register with the projecting ends of the horizontal needles F.
- 55 The card-carriers G G are also provided at the ends of each of their faces with projecting studs for engaging corresponding holes in the ends of the cards and imparting a positive feed to the same.
- 60 The card-carriers G G are supported at their ends by means of suitable gudgeons  $g'$  in socket-shaped bearings  $g^2$  of sleeve-shaped supports G', which are supported at their lower ends by the slide-plates  $g$  on the horizontal brackets B' and provided at their upper ends with upwardly-extending adjustable guide-lugs  $g^3$ , that are connected by trans-

verse brace-rods  $g^4$ . The sleeve-shaped supports G' are guided on horizontal rods  $G^2$ , which are permanently secured to sockets  $s$  on the upright standards B B and provided at their outer ends with enlarged heads  $g^5$ . To the outside of each sleeve-shaped frame-carrying support G' is pivoted a link  $g^7$ , which is pivotally connected at its inner end to the lower arm of a bell-crank lever  $g^8$ , that is fulcrumed to the upper part of the standard B, and to the upper arm of which is pivoted a pendent lever-rod  $g^9$ , that is recessed at its lower part so as to engage a pin  $i$ , projecting from a frame I, from which the guide-plate  $d$  for the shanks of the heddle-lifts is suspended, as shown in Fig. 7. The pendent lever-rods  $g^9$  of the lever mechanisms of both card-carriers G G are located sidewise of each other and engaged at their outer edges by anti-friction-rollers  $g^{10}$ , applied to a shifting bar  $g^{11}$ , which is guided at one end along a fixed pin  $g^{12}$  on the upright standard B, while its opposite end is pivoted to the upper end of an oscillating link  $g^{13}$ , the lower end of which is pivoted to a stationary hanger  $g^{14}$  of the standard B, as shown in Figs. 2 and 3. The horizontally-shifting bar  $g^{11}$  is intermittently actuated by a pattern-chain mechanism, so as to move either one of the pendent lever-rods  $g^9$  into engagement with the pin  $i$  by their recesses  $g^x$ , which are located adjacent to each other, as shown in Figs. 1 and 4. The parts described are duplicated on each standard B, the pins  $i$  of the frame I being connected by links  $i'$  with the ends of an actuating lever-frame  $G^3$ , which is fulcrumed to the rectangular base-frame A, and which is operated in the usual manner from the driving cam-shaft of the loom. By the oscillating motion of the lever-frame  $G^3$  the links  $i'$  raise or lower the pins  $i$  and frame I and simultaneously therewith the lever-rods  $g^9$  which are at the time in engagement with the pins  $i$ , so as to operate by the intermediate lever mechanism the sleeve-shaped supports of one of the card-carriers and move it with its card-chain C on the same toward the adjacent ends of the needles F, so as to produce the entering of the ends of some of the needles into the holes of the card and card-carrier registering therewith and the shifting of the remaining non-registering needles by the action of the non-perforated portions of the card in the needle guide-plates.

From the under side of the sliding supports G' of the card-carriers G are suspended, by means of screws  $n'$ , U-shaped hangers  $n$ , which carry at their lower ends a transverse rod  $n^2$ , along which the card-chain C is guided away from the card-carrier. A second rod  $n^3$ , parallel with the rod  $n^2$ , serves to guide the card-chain C toward the card-carrier. The individual cards of each card-chain C are retained on the top face of each card-carrier G by means of a wire guard N, which is attached at its lower ends to the transverse rod  $n^2$ , extended in upward direction along the inner



face of the card-carrier, and then bent at right angles thereto over the top face, forming upwardly-curved lips  $n^4$  at the ends of the angular portion, that are connected by a transverse portion  $n^5$ , as shown in Figs. 8 and 9. The ends of the rotary card-carriers G are engaged by catch-hooks  $N'$ , which are pivoted to braces  $N^2$  of the standards B B slightly above the level of the top faces of the card-carriers G and which engage during the outward motion of the card-carriers the corners of the same, so as to turn them against the tension of the wire guards N for a quarter of a rotation, the overturning being prevented by the binding action of the angularly-bent top portion on the corners of the card-carriers. The wire guard N serves to retain the card-carrier in position and to bind on the cards on the inner and top faces thereof, while the studs at the ends of each card-carrier serve to hold the cards in proper register with the holes in the faces of the card-carrier and with the needles. The lower portions or shanks of the wire guards N are preferably bent in the form of a coil  $n^6$ , as shown in Fig. 8, by which the spring action of the upper angular portion is increased, and thereby the turning of the card-carrier and its locking in position when a quarter-turn is made is effectively and reliably accomplished.

A second U-shaped lever-frame H is fulcrumed to the same fulcrum as the lever-frame  $G^3$  and oscillated by the driving mechanism of the loom. Its inner slotted ends are connected by upwardly-extending pivot-links  $h$  with studs  $h'$ , that are clamped to the upper ends of guide-rods  $h^2$ , which are guided in stationary guide-sleeves  $h^3$  at the inner faces of the standards B, so as to follow the oscillating motion of the lever-frame H. To the upper part of the guide-rods  $h^2$  is rigidly attached by sleeves  $h^x$  a knife-carrying frame  $H'$  of oblong shape, which moves up and down with the guide-rods  $h^2$ . At one end of the frame  $H'$  is arranged a laterally-shiftable bar  $H^2$ , which is guided by means of slots  $h^4$  on screws  $h^5$ , as shown in Figs. 10 and 11, said shifting bar being provided with dovetailed recesses  $h^6$ , that are made larger at their lower portions. The rectangular frame  $H'$  supports a number of parallel lifting-knives  $H^3$ , which are pivoted at their ends to the frame  $H'$  and which are located in the dovetailed recesses  $h^6$  of the bar  $H^2$ . The laterally-shiftable bar  $H^2$  serves for the purpose of tilting the lifting-knives, so that they assume either an inclination to one side or the other of a vertical line passing through their pivots for the purpose of engaging either one hook or the other at the upper ends of the heddle-lifts, and produce thereby the raising of a number of heddle-lifts corresponding to the number of needles that have entered into the holes of the card at the time on the inner face of one card-carrier or the other. A headed stud  $h^7$  is located at the center of the shifting bar  $H^2$  and engaged by the forked upper end of an oscillating lever

$H^4$ , which is pivoted at its lower end to the lower stationary guide-sleeve  $h^3$  of the guide-rod  $h^2$ , and which is connected at its middle portion by a pivot  $h^8$  with a horizontal push-rod  $H^5$ , that is guided at its ends like the needles in holes of the perforated needle guide-plates E, as shown in Fig. 2 and in plan view in Fig. 3. When either card-carrier G is moved against the ends of the projecting needles and the end of the push-bar  $H^5$ , this rod is shifted by the pressure of the card-carrier, so that it oscillates thereby the lever  $H^4$ , which by its forked end produces the horizontal shifting of the bar  $H^2$  and by the inclined faces of the recesses of the latter the oscillating of the pivoted lifting-knives  $H^3$  into inclined position, as shown in Fig. 11, so that they engage during the ascending motion of the frame  $H'$  as imparted by the guide-rods  $h^2$  the hooked upper ends of all the heddle-lifts the needles of which are in the holes of the card and lift them in the loops of the needles, as shown in Fig. 10. When the opposite card-carrier is acting by its card on the needles and knife-governing rod  $H^5$ , the lifting-knives are tilted in the opposite direction. Simultaneously the needles which do not register with the holes of the card press one of the hooks of their heddle-lifts sidewise and out of engagement with the lifting-knives, so that only the heddle-lifts of those needles which are in the perforations of the card and whose hooks are not shifted are engaged by the lifting-knives and lifted, and thereby the heddles connected therewith. The recessed bar  $H^2$  and the lifting-knives  $H^3$  and the push-rod  $H^5$ , by which the shifting of the bar  $H^2$  and the tilting of the knives are accomplished, produce the reliable selection of the proper heddle-lifts, so that they are lifted under the influence of the ascending motion of the lever-frame H. The lifting-knives, in connection with the construction of the heddle-lifts and the loops of the needles, form the essential feature of novelty of this jacquard attachment for the reason that this construction permits the ready removal of any one of the heddle-lifts or any one of the needles and the replacing by a new one and its connection with the heddle by the proper wire or cord without necessitating the stopping of the loom for any great length of time, as was required heretofore when repairing any one of the needles or heddle-lifts in the jacquard attachments heretofore in use.

The oscillating motion of the lever-frame  $G^3$  serves for the purpose of actuating the lever mechanisms by which one or the other of the card-carriers is reciprocated toward or away from the needle system in connection with the recessed pendent rods  $g^9$ , which engage the pins  $i$  of the frame I. The oscillations of the pendent rods  $g^9$  and the engagement of either one with the pins  $i$  is accomplished by the horizontally-shifting bar  $g^{11}$  under the influence of a pattern-chain P, which is shown in Fig. 1 and in detail in Figs.



4, 5, and 6. The pattern-chain P is operated at each up-and-down motion of the frame I by a spring-actuated pawl  $i^3$ , that is pivoted to said frame and held in engagement with a ratchet-wheel  $i^4$ , that is keyed to a shaft  $i^5$ , which is supported in suitable bearings of the front standard B and a second shorter standard  $i^6$ . Alongside of the pawl  $i^3$  is hung to the pivot of the pawl a second spring-actuated pawl  $i^7$ . This pawl is placed in engagement with a second ratchet-wheel  $i^8$ , that is not keyed to the shaft  $i^5$  but to a sleeve  $i^9$ , which turns loosely on the same and which carries at its opposite end a triangular stud-wheel  $i^{10}$  of triangular shape, that serves to engage a spring-pressed lever-rod  $i^{11}$ , the upper end of which is connected with one end of a helical spring  $i^{12}$ , that is applied at its opposite end to a pin on the horizontal shifting bar  $g^{11}$ , as shown in Fig. 4. To the shaft  $i^5$  is keyed a sprocket-wheel  $i^{13}$ , around which and a guide-wheel  $i^{14}$ , the shaft of which is supported by bearings of the standard B and a second short standard  $i^{15}$  at some distance from the shaft  $i^5$ , the pattern-chain is guided, as shown in Fig. 4. The pattern-chain P is composed of a number of open and closed links, the latter carrying projecting studs or pins  $p$ , as shown in Fig. 4. The sprocket-wheel of the pattern-chain P is moved under the influence of the pawl  $i^3$  and ratchet-wheel  $i^4$  at each up-and-down motion of the frame I. The projecting studs or pins  $p$  of the closed links of the pattern-chain P act on a spring-actuated lever-arm  $p'$ , that is pivoted to sleeves on the supporting-frame A, it being connected by an upwardly-bent arm  $p^2$  with the pawl  $i^7$ , so as to release the same from its ratchet-wheel  $i^8$  whenever one of the pins  $p$  moves the lever-arm  $p'$  sidewise. The sidewise motion of the lever-arm  $p'$  produces instantly the release of the pawl  $i^7$  from the ratchet-wheel  $i^8$ , so that the intermittent rotary motion imparted to the triangular stud-wheel  $i^{10}$  produces the dropping of the angular middle portion of the lever-arm  $i^{11}$  into the depression of the stud-wheel  $i^{10}$ , so that the shiftable bar  $g^{11}$  is returned under the influence of a second helical spring  $g^{16}$ , attached to it and the front standard B, from the position shown in Fig. 4 to the position shown in Fig. 1 until the bar  $g^{11}$  is arrested by the pin  $g^{12}$ . When the lever-rods  $g^9$  are in the position shown in Fig. 4, the right-hand card-carrier G is operated and moved against the right-hand cards of the needles, while when the lever-rods  $g^9$  are in the position shown in Fig. 1 the left-hand card-carrier is actuated and moved against the left-hand ends of the needles. In the former case this returns the helical spring  $i^{12}$  in its contracted position ready for the next oscillating motion of the lever-arm  $i^{11}$  when the next shifting action of the bar toward the left is required. During the return motion of the shifting bar  $g^{11}$  by the action of the pin  $p$  on the pattern-chain and the lever-arm  $p'$  the oscillating lever-rods  $g^9$ ,

which are under the influence of antifriction-rollers on the bar  $g^{11}$ , are shifted into the position shown in Fig. 1, so that the pin  $i$  enters into the recess of the left-hand lever  $g^9$  and that by the next downward motion of the lever-arm  $G^3$ , under the influence of the pin  $i'$ , the left-hand lever  $g^8$  is actuated, and thereby by the intermediate mechanism the left-hand card-carrier moved forward with its card-chain toward the needles. As this card-chain controls the cards that produce the ground between the figures of the fabric, while the opposite card-chain produces the figures one of the ground-cards is placed in position for the system of needles and heddle-lifts. When the ordinary links of the pattern-chain pass over the lever-rod  $p'$ , they exert no action on the same, and consequently do not release the pawl  $i^7$  from the ratchet-wheel  $i^8$ , and the same is thereby operated by the vertically-reciprocating frame I, so as to impart a rotary motion to the triangular stud-wheel  $i^{10}$ , which by its projecting stud operates the lever-rod  $i^{11}$  and produces thereby the shifting of the bar  $g^{11}$ , whereby the recess of the right-hand lever-rod  $g^9$  is placed in connection with the pin  $i'$ , so that by the downward motion of the card-carrier frame  $G^3$  and the intermediate lever mechanism connected with the right-hand lever  $g^8$  the right-hand card-carrier carrying the figure-cards is moved up against the right-hand ends of needles so as to operate the needles and heddle-lifts and produce thereby the proper lifting action on the figure-controlling heddles.

The shaft  $i^5$ , as well as the sleeve  $i^9$ , are each provided with a disk  $i^{16}$ , which are acted upon by the free ends of flat friction-springs  $i^{17}$ , that exert the required friction thereon, so as to prevent the irregular turning of the shaft  $i^5$  or of the sleeve  $i^9$ , and secure the regular movement of the pattern-chain under the influence of its actuating mechanisms.

The operation of my improved jacquard attachment is as follows: When the parts are in the position shown in Figs. 1 and 2, the pattern-chain and the shifting mechanism operated thereby have placed the pendent lever-rods  $g^9$  in such position that the left-hand lever-rod is engaged by the pin  $i$  of the frame I. The upward motion of the inner lever-frame  $G^3$  by the action of the loom produces then, by the intermediate lever mechanism connecting it with the left-hand or ground card-carrier, the horizontal inward motion of said carrier on its guide-brackets  $B'$  toward the left-hand ends of the needles. Simultaneously therewith the frame I is lifted, together with the guide-plate  $d$ , suspended therefrom, the guide-plate  $d$  raising all the heddle-lifts which are supported thereon, so that their hook-shaped upper ends pass beyond the lifting-knives. By the action of the card on the ends of the needles those needles which do not enter into the perforations of the card and card-carrier are moved toward the right,



also the horizontal push-rod  $H^5$ , by which the lever-rod  $H^4$  and the shifting bar  $H^2$  of the lifting-knives are operated. The heddle-lifts of those needles the ends of which enter into the holes of the card and card-carrier are not changed, but remain in their normal position; but the heddle-lifts of those needles which are shifted laterally are acted upon by the loops of their needles in such a manner that their right-hand hooks<sup>7</sup> are moved toward the right into the position shown in Fig. 13. Simultaneously the lifting-knives are tilted toward the right by the shifting bar  $H^2$ , as shown in Fig. 11. As soon as the shifting motion of the needles and the tilting of the lifting-knives are accomplished an upward motion is imparted to the lifting-knives by the frame  $H'$  under the influence of the fulcrumed lever-frame  $H$ , so that the lifting-knives engage the hooks of all those heddle-lifts the needles of which have entered into the holes of the card and card-carrier, while the hooks of the heddle-lifts that were acted upon by the shifted needles are moved sidewise clear of the lifting-knives, so that they cannot be engaged by the same. Consequently the heddles that are suspended from the raised heddle-lifts are lifted and the shuttles forming the ground are thrown on the downward motion of the frame  $I$  under the influence of the lever-frame  $G^3$ , while the pattern-chain is operated by the pawl-and-ratchet mechanism actuated by said frame, so that the next link of the pattern-chain is presented to and placed in contact with the oscillating arm by which the shifting bar  $g^{11}$  of the pendent lever-rods  $g^9$  is operated. When the next link of the pattern-chain is again a link which controls a ground-card, the left-hand card-carrier which has been moved in outward direction again by the downward motion of the lever-frame  $G^3$  is again moved in toward the left-hand end of the needles and the heddle-lifting operation repeated. During its outward motion of the card-carrier it is turned on its axis by the hooks  $N'$  through an angle of ninety degrees, and thereby a new card presented to the ends of the needles, the heddle-lifts of which are returned to their normal position by the downward motion of the frame  $I$  and guide-plate  $d$  under the action of the lever-frame  $G^3$ , while the lifting-knives are returned by the downward motion of the frame  $H'$  and lever-frame  $H$ . The new card acts then again on the left-hand ends of those needles in the same manner as before, so that the ground-forming heddles are again lifted and another pick of the ground-forming shuttles made, and so on as long as links controlling the ground-cards are moved forward by the pattern-chain. When, however, a link with a projecting pin or stud is placed by the pattern-chain into contact with the shifting mechanism by which the pendent lever-rods  $g^9$  are operated, they are moved toward the left, so that the recess of the right-hand lever-rod  $g^9$  is placed in en-

gagement with the pin  $i$ , and thereby by the upward motion of the inner lever-frame  $G^3$  and the intermediate lever mechanism the right-hand card-carrier moved inwardly toward the right-hand ends of the needles and the knife-shifting push-rod. The lever-frame  $G^3$  lifts at the same time, by the frame  $I$  and guide-plate  $d$ , all the heddle-lifts supported by the latter. The card on the card-carrier receives the ends of all those needles that are in register with the holes in the same, while those needles which are not in register are shifted toward the left, so that the left-hand hooks of the heddle-lifts are moved by the shifting needles toward the left. Simultaneously the lifting-knives are tilted toward the left and placed into engagement with the left-hand hooks of the unshifted heddle-lifts, whereby the latter and their heddles are lifted and the shuttles thrown for forming a portion of the figure of the fabric. By the downward motion of the lever-frames  $G^3$  and  $H$  the right-hand carrier is moved again in outward direction, and the needles, lifting-knives, heddle-lifts, and heddles are returned into their normal position. By the next actuation of the pattern-chain, due to the downward motion of the frame  $I$  and the pawl-and-ratchet mechanism operated thereby, the pin  $i$  is placed again into engagement with one or the other lever-rods  $g^9$ , so that the operation before described is repeated, and so on, according as the links of the pattern-chain actuate either the card-carrier carrying the ground-cards or the card-carrier carrying the figure-card and bring them up to the needles for producing the throw of the corresponding shuttles.

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

1. In a jacquard attachment for looms, the combination, with a plurality of double-ended needles and a like number of heddle-lifts in operative connection therewith, of two independent card-carriers, means for guiding the same, independent vertically-movable lever-rods for each card-carrier, mechanism connecting each lever-rod with its card-carrier for reciprocating the latter, means for vertically moving either lever-rod independently of the other, shifting mechanism adapted to shift either lever-rod into engagement with said actuating means, and a pattern-chain mechanism controlling said shifting mechanism, substantially as set forth.

2. In a jacquard attachment for looms, the combination, with a plurality of double-ended needles and a like number of heddle-lifts in actuating connection with the same, of two card-carriers, pendent lever-rods provided with adjacent recesses, mechanism for connecting the upper ends of said rods with said card-carriers so as to impart reciprocating motion thereto, a pin adapted to engage either one of said lever-rods, mechanism for shifting said lever-rods so that either one engages



said pin, and a pattern-chain mechanism adapted to operate said shifting mechanism, substantially as set forth.

3. In a jacquard attachment for looms, the  
5 combination, with a plurality of double-ended  
needles and a like number of heddle-lifts in  
actuating connection therewith, of two inde-  
pendent card-carriers, pendent lever-rods  
provided with adjacent recesses, mechanism  
10 for connecting the upper ends of said rods  
with said card-carriers so as to impart recip-  
rocating motion thereto, a pin adapted to en-  
gage either one of said lever-rods, a verti-  
cally-reciprocating guide-frame for said hed-  
15 dle-lifts actuated simultaneously with one or  
the other of the reciprocating mechanisms of  
the card-carriers, mechanism for shifting the  
lever-rods so that either one engages said pin,  
and a pattern-chain mechanism adapted to  
20 operate said shifting mechanism, substan-  
tially as set forth.

4. In a jacquard attachment for looms, the  
combination, with a plurality of double-ended  
needles and a like number of heddle-lifts in  
25 operative connection therewith, of two recip-  
rocating card-carriers, a vertically-recipro-  
cating guide-frame for raising said heddle-  
lifts, a vertically-reciprocating knife-sup-  
porting frame, a plurality of heddle-lifting  
30 knives pivoted to said frame, a tilting bar  
supported shiftably on said frame in engage-  
ment with the knives, a vertical lever pivoted  
at its lower end and having a slotted upper  
end movably connected with said tilting bar,  
35 and a push-rod connected with said lever and  
extended into the paths of each of the recip-

rocating card-carriers, substantially as set  
forth.

5. In a jacquard attachment for looms, the  
combination, with the card-carrier and its 40  
card-chain, of means for imparting intermit-  
tent axial motion to said card-carrier, and a  
spring-actuated angularly-bent guard-frame  
extending over the inner end and top faces of  
said card-carrier for limiting the axial motion 45  
of said card-carrier and retaining the cards in  
position thereon, substantially as set forth.

6. In a jacquard attachment for looms, the  
combination, with a card-carrier and its card-  
chain, of means for imparting intermittent 50  
axial motion to said card-carrier, and a spring-  
actuated angularly-bent guard-frame extend-  
ing over the inner and top faces of said card-  
carrier and provided with lips extending over  
the top face for limiting the rotary motion of 55  
said card-carrier and retaining the cards in  
position thereon, substantially as set forth.

7. In a jacquard attachment for looms, a  
heddle-lift, consisting of a single integral U-  
shaped spring-wire having a shank, an eye 60  
at the lower end of said shank, parallel main  
portions intercrossing at their upper ends,  
and outwardly-inclined upper ends having  
inwardly-bent hooks, substantially as set  
forth. 65

In testimony that I claim the foregoing as  
my invention I have signed my name in pres-  
ence of two subscribing witnesses.

ALOIS PIVETZ.

Witnesses:

PAUL GOEPEL,  
M. H. WURTZEL.