

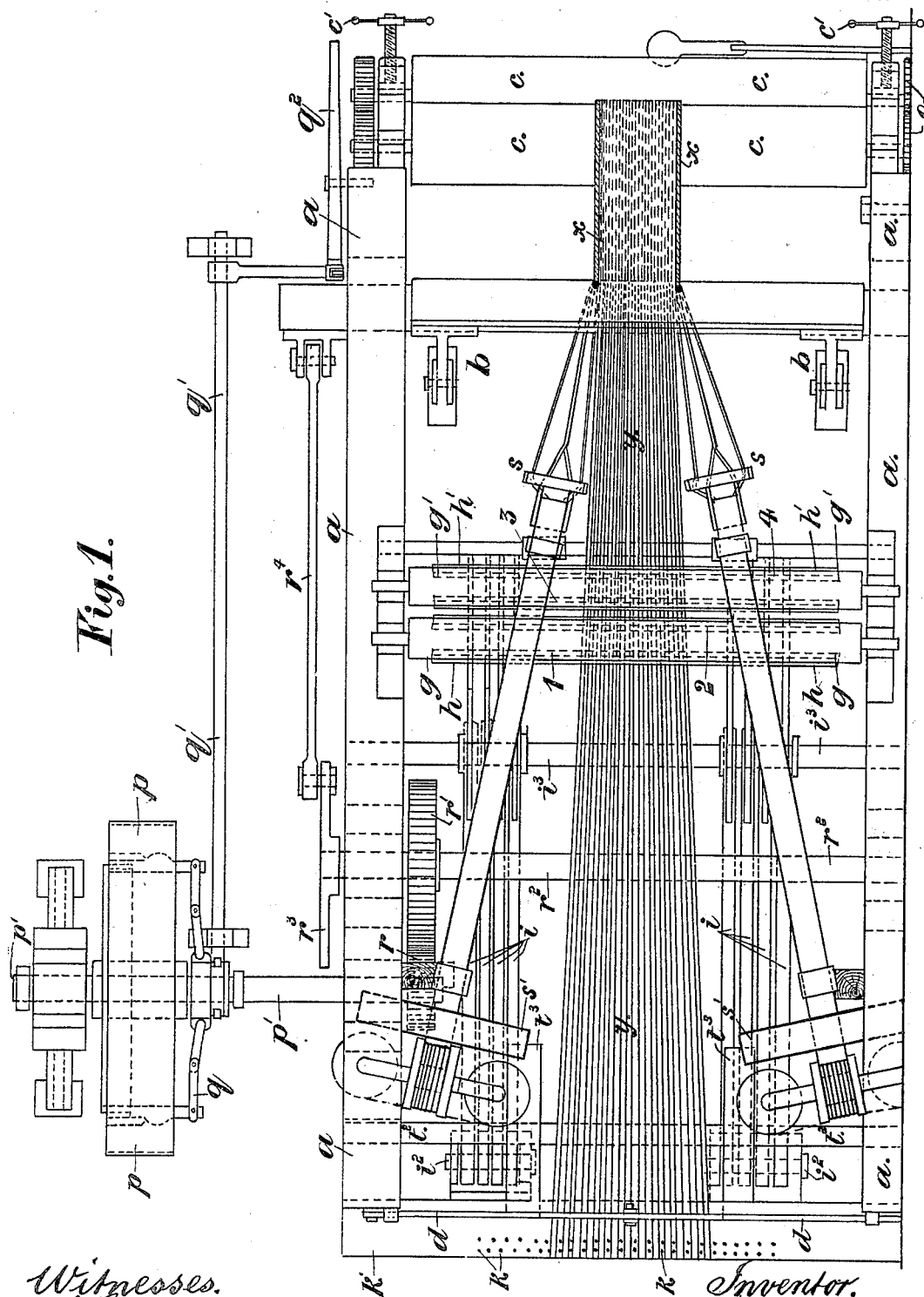
H. ELLIS.
LOOM.

(Application filed Dec. 28, 1897.)

(No Model.)

7 Sheets—Sheet 1.

Fig. 1.



Witnesses.
C. H. Bolton
C. H. Bolton

Inventor.
Harry Ellis
By *W. H. H. H.*
his Attorneys

No. 649,920.

Patented May 22, 1900.

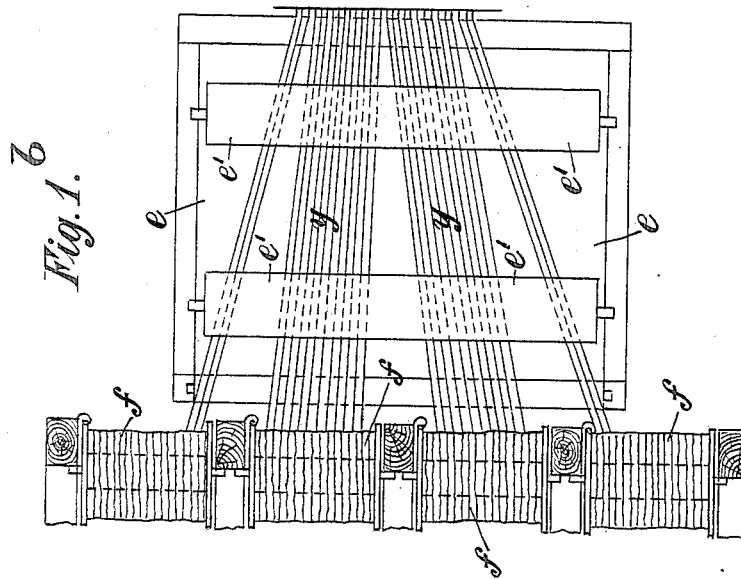
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(No Model.)

7 Sheets—Sheet 3.



Witnesses.

E. B. Bolton

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No. 649,920.

Patented May 22, 1900.

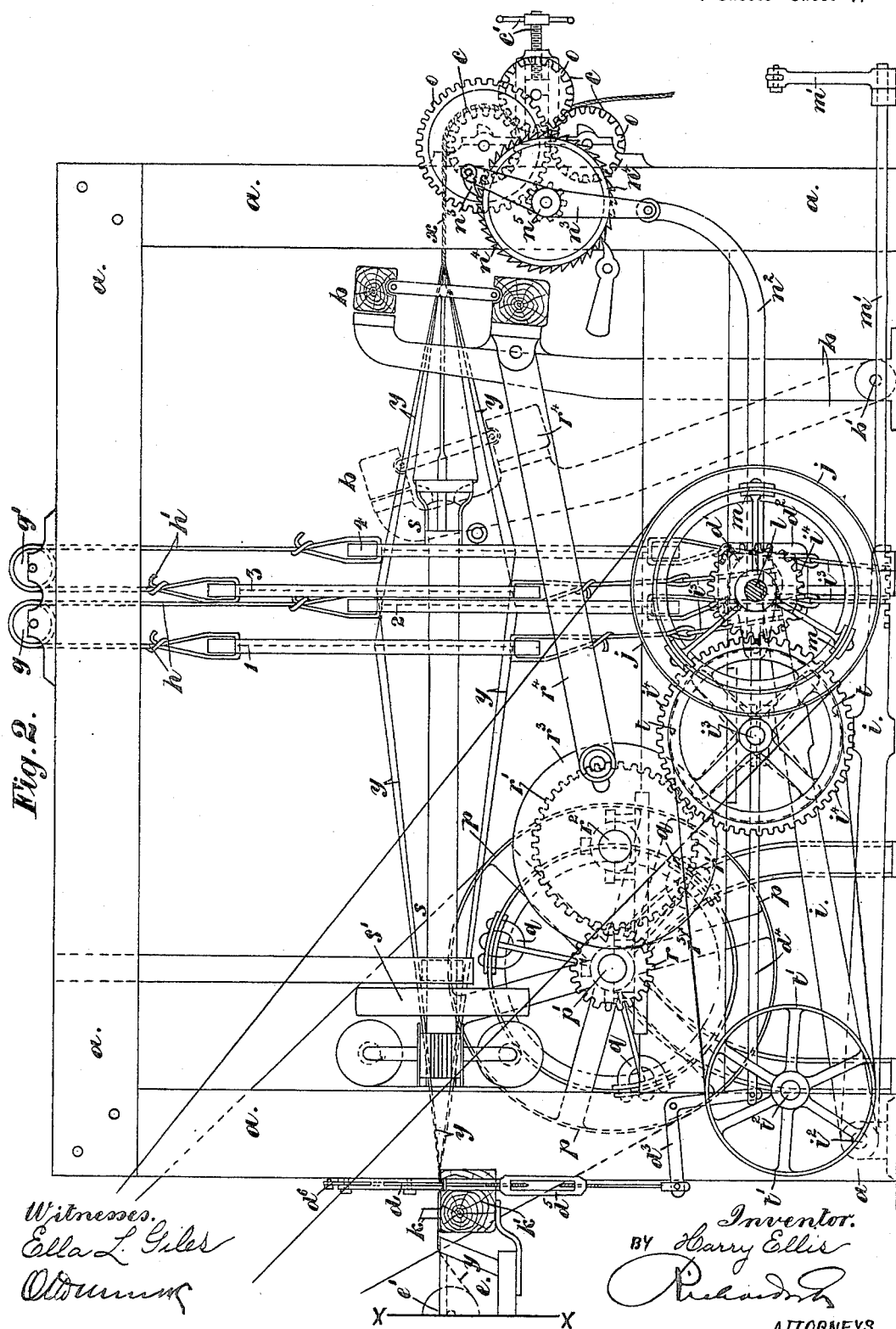
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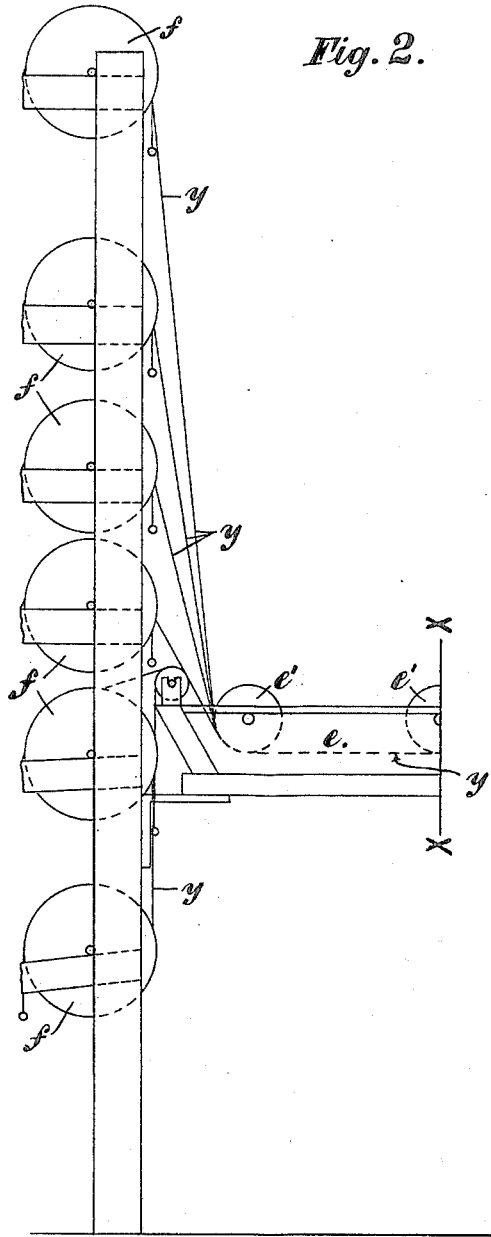
H. ELLIS.
LOOM.

(Application filed Dec. 28, 1897.)

(No Model.)

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Fig. 2.



Witnesses.
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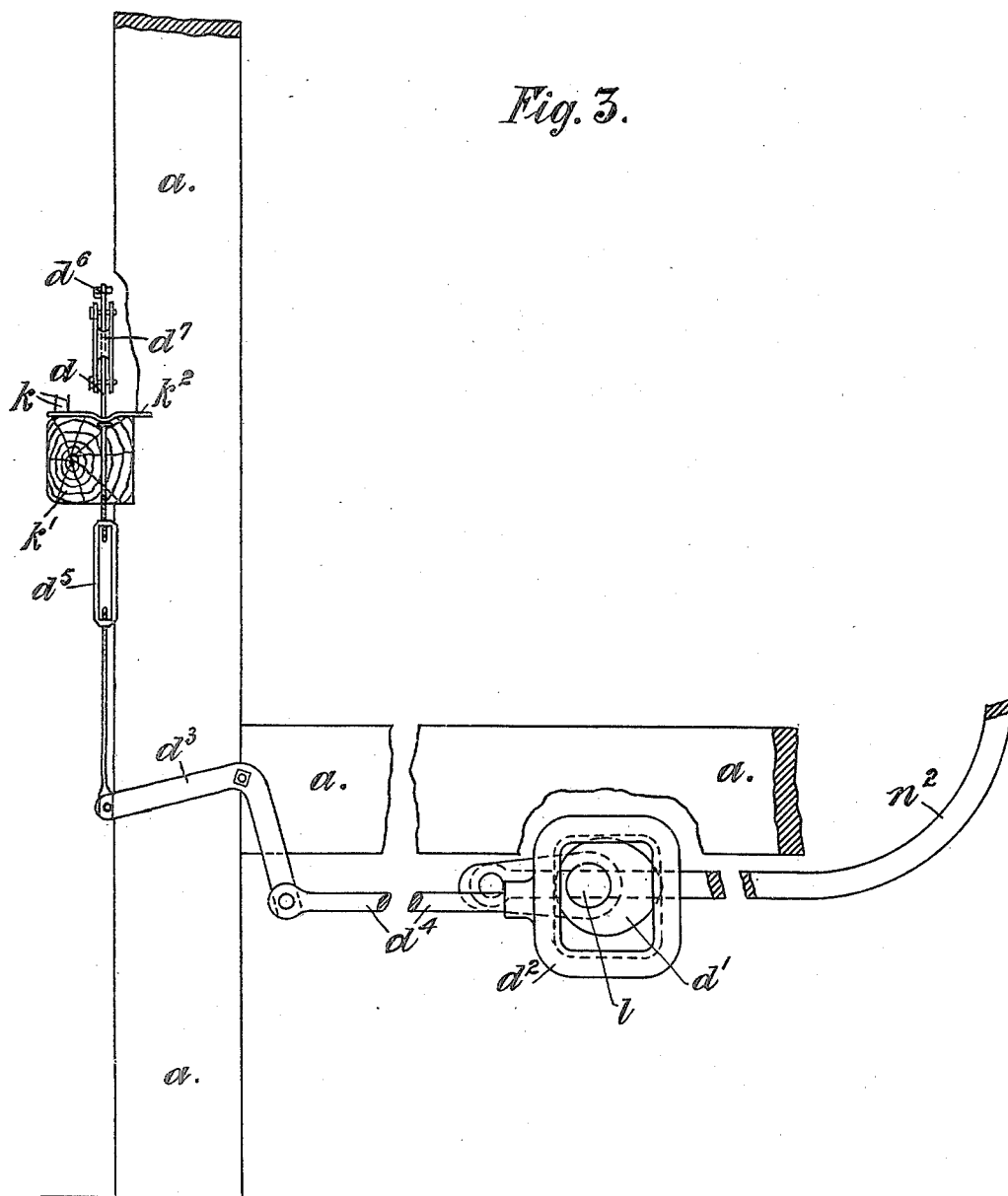
LOOM.

(Application filed Dec. 28, 1897.)

(No Model.)

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Fig. 3.



Witnesses.

E. B. Bolton

[Signature]

Inventor.

Harry Ellis

By

[Signature]

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H. ELLIS.
LOOM.

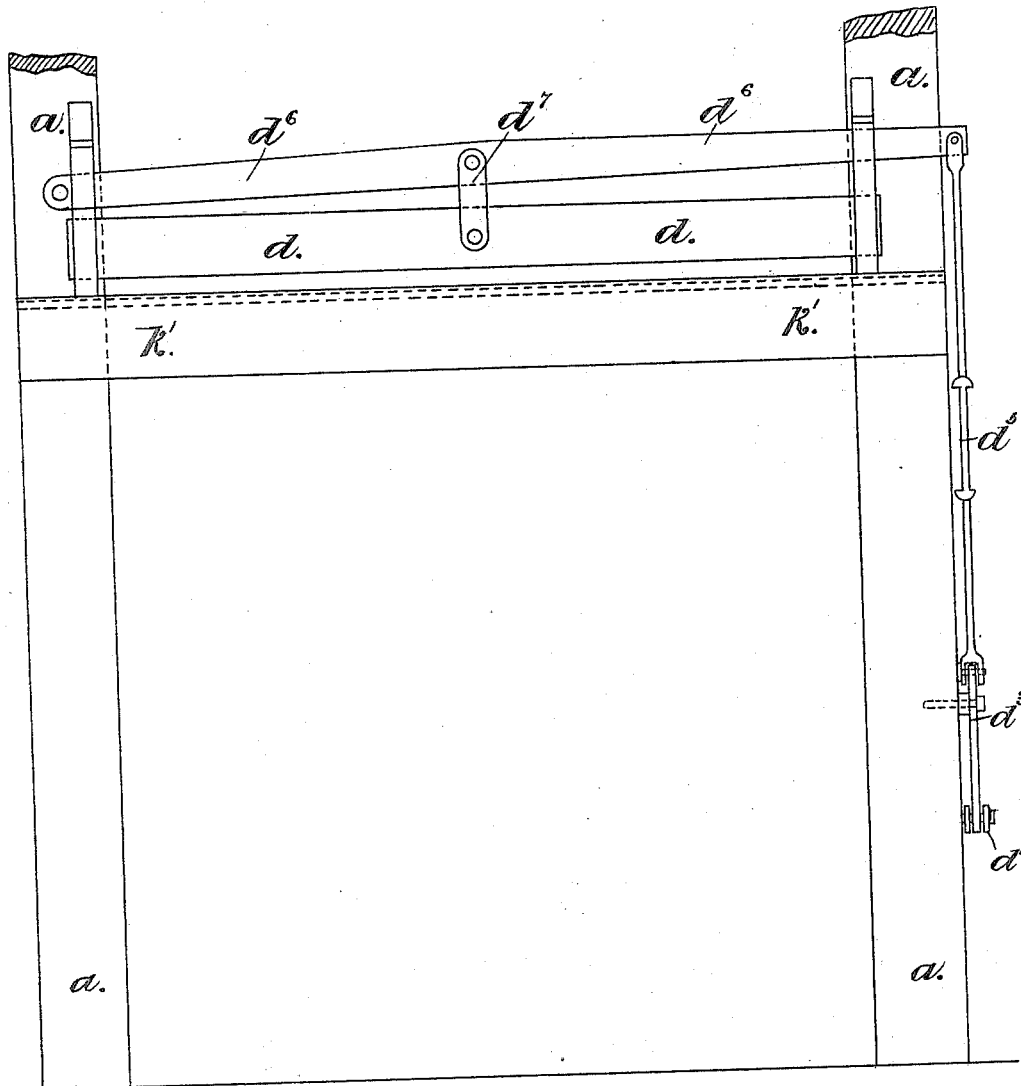
Patented May 22, 1900.

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(No Model.)

Fig. 4.



Witnesses:

C. B. Bolton

Admunt

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UNITED STATES PATENT OFFICE.

HARRY ELLIS, OF WALLASEY, ENGLAND.

LOOM.

SPECIFICATION forming part of Letters Patent No. 649,920, dated May 22, 1900.

Application filed December 28, 1897. Serial No. 664,118. (No model.)

To all whom it may concern:

Be it known that I, HARRY ELLIS, engineer, a subject of the Queen of Great Britain and Ireland, residing at 14 Leasowe avenue, Wallasey, in the county of Chester, England, have invented certain new and useful Improvements in Looms for Weaving Leather and Like Belts, of which the following is a specification.

10 This invention has reference to looms for weaving leather belts for driving machinery and similar or other purposes, and has more particularly for its object to provide improvements by which the belts produced shall be
15 firm and hard and tight woven and of equal strength and elasticity throughout their width and also of such a character that there is no tendency or liability of any of the warps being under greater tension or strain when the
20 belt is in work than others, so obviating the breakage of individual warps.

In a loom according to this invention the leather warps or strings are wound on separate bobbins or reels, and each bobbin or reel
25 has a braking device or retarding action by which a tension is put upon all the warps and to the required degree during the weaving. The taking-off means, by which the warp and belt or fabric is drawn through and delivered
30 from the loom, consists of positively and intermittently actuated rollers, between which the belt or fabric passes and which are operated from a part of the loom after each pick is completed. Between the warp-bobbins
35 and the heddles of the loom there is introduced a holding or gripping mechanism which holds all the warps during the beating-up motion, so that a positive holding and tension of the warps while the beating up is being effected is obtained. During this time
40 the taking-off rollers are stationary, and then after this action the stopping or gripping mechanism is operated so as to release the warps, whereupon instantly the taking-off
45 rollers are actuated and the next picking movement is effected. According to one form of holding or gripping device there is an upper and under plate or jaw and one or both of which are faced with india-rubber, and
50 through these plates or jaws the warps are passed. By the use of the rubber face or faces the gripping of all the warps is assured,

as, although the warps will necessarily vary in size and thickness, yet when one plate or jaw is pressed onto the other by suitable
55 means in the gripping action the rubber enables the jaws to be pressed sufficiently close so as to come in contact with and hold those warps which are thin, as well as those of course which are thicker. In one form of
60 gripping or holding device there is one fixed jaw or plate and one moving part, which is moved up and down in any suitable way by a suitable mechanism. The taking-off mechanism in one case consists of three rollers—
65 an upper and two lower rollers—between which the belt passes when they are operated, and this mechanism, the gripping or holding mechanism, and the heddles are all actuated from the same shaft of the loom,
70 while the slay is operated by a separate mechanism.

In a loom for the weaving of leather belts or fabrics, as above described, the leather warps are wetted by drawing them through a
75 bath of water in passing between the taking-off bobbins and the shed. This enables the weaving action to be performed with greater regularity and ease and the packing of the warps to be better effected and generally im-
80 proves the structure of the belt.

By the improvements above described in the first place the belt is woven under tension, as described, with the result that it is firm in texture; also, the tension of the fabric
85 of the belt at different parts of its width is the same. Hence when the belt is in operation (it being assumed it is of a suitable design or stitch and nature of weaving) it is not liable to stretch at one side more than an-
90 other or work crookedly or unevenly, and it is firm both diagonally and laterally; also, provided the belt is of a suitable type of weaving or stitch, it is thoroughly compact and sound and in use does not stretch and become
95 narrower or attenuated.

The loom above described is illustrated in the accompanying drawings, of which—

Figure 1 is a partial plan view. Fig. 1^a is a plan view of that portion of the loom belonging on the lower side of Fig. 1, and Fig. 1^b is a plan view of that portion belonging on the left-hand side of Fig. 1. Fig. 2 is a side elevation. Fig. 2^a is a side view of the part of

the machine at the left of Fig. 2, and Figs. 3 and 4 side elevation in section and end view of a part of the loom.

Referring to the drawings, *a* represents the frame members of the loom.

b is the slay.

c represents the taking-off rollers.

d is the holding or gripping device, by which the warps are held.

e is the trough or bath containing water through which the warps are passed, and *f* represents the reels or bobbins, each of which contains and has wound upon it a separate leather warp, string, or thong.

1, 2, 3, and 4 designate the heddles, and *g* *g'* are the rollers above, from which the heddles are suspended, 1 and 2 being connected by bands *h* to the roller *g*, and 3 and 4 being similarly connected to the roller *g'* by the bands *h'*.

i *i* represent two sets of levers fulcrumed at *i*² at either side of the loom and connected at their outer ends by cords *i*³ to the bottoms of the heddles, each heddle being connected at each side to one of the levers. The heddles are worked by these levers, and in action those connected with the heddles 1 and 3 will be up when those connected with heddles 2 and 4 are down, and vice versa. This arrangement of heddles is specially adapted for use in weaving leather belts of the type set forth in my specification of application for patent filed December 28, 1897, and serially numbered 664,117. The levers *i* are operated by suitable cams on the shaft *i*³, which is driven from the driving mechanism of the loom, as hereinafter described.

The completed belt shown in the drawings is designated *x*, while the warps from which it is partly made are denoted throughout the machine by the letter *y*. These warps, as stated, pass through the water in the bath *e* from the reels *f*, passing under the rollers *e'*, thence through a comb or guide-pin *k* on the upper side of the beam *k'*, thence under the gripping and holding bar *d*, and then through the heddles and the slay. The completely-woven belt is passed through the take-off rollers *c*, of which there are three, the taking off or feeding forward being effected by passing it between the two back rollers, which, say, are stationary, and the front roller, which is adapted to be moved up to and away from the back rollers by screws and hand-wheels *c'*, which move the bearings carrying the journal of this roller, and thus by passing this roller on to the others, with the belt between them, the taking off is effected as the rollers are rotated.

The taking-off rollers, the heddles, and the gripping and holding bar *d* are worked by one interconnected mechanism, while the slay is worked by a separate or independent mechanism, and both of these mechanisms are adapted to be controlled and set in action and stopped by hand by the weaver from the end of the loom, and they are worked in-

dependently and at different times. The three first-mentioned parts or elements of the loom are operated through a belt-driven wheel *j*, which is mounted on shaft *l* and is alternately made to revolve it and revolve upon it loosely without revolving it through a clutch-gear *m* of any known suitable kind, which revolves with the shaft and which alternately engages with and disengages from the wheel *j*, these actions being performed through the rod-and-lever connections *m'*, operated by a foot-lever. The taking-off rollers are actuated from the shaft *l* by a crank *n* thereon, a connecting-rod *n*², a pawl-lever and a pawl *n*³, and ratchet-wheel *n*⁴, engaged by the pawl, and spur-gearing *o*, driven from a pinion *n*⁵, on the spindle of which the pawl-lever and ratchet-wheel *n*⁴ are mounted and fixed. By the rotation of the crank *n* it will be seen the pawl-lever *n*³ will be reciprocated, and the degree of each reciprocating movement will determine the amount of feed or drawing-off movement of the belt after each beating-up action.

The heddle-shaft *i*³ is revolved from the shaft *l* by the spur-wheels *i*⁴, and the warp-gripping bar *d* is operated—that is, raised and lowered—from the shaft *l* by a cam *d'* on the shaft *l*, a cam frame or ring *d*², actuated by *d'*, a lever *d*³, connected by a rod *d*⁴ with *d*², and an adjustable rod *d*⁵, connecting the lever *d*³ with the gripping-bar through a lever *d*⁶, which is connected to the center of the bar *d* by a link *d*⁷. Thus in action as the shaft *l* revolves the cam *d'* moves the rod *d*⁴ to and fro, and thereby lifts and depresses the gripping-bar *d*.

Regarding the mechanism for driving the slay, it is driven by a belt-pulley *p*, which drives a shaft *p'* and is alternately made to revolve this shaft or revolve loosely upon it by a clutch *q*, similar to the clutch *m*, and operated—that is, thrown into and out of gear with the pulley—by the rods and levers *q'*, which are actuated by a hand-lever *q*² at the end of the loom. The slay *b* is rocked to and fro by this driving mechanism by a pinion *r*, meshing with a spur-wheel *r'*, which is fixed on and drives a shaft *r*², extending through the loom laterally and having upon it at either end a disk *r*³, these disks being connected with the slay *b* by connecting-rods *r*⁴. Thus as the shaft *p'* is revolved the cranks *r*³ rotate and move the slay to and fro upon its hinges or pivots *b'*.

The loom shown is also provided with mechanisms for producing a belt made of warp and weft and stranded or corded selvages of the kind set forth in the specification of my concurrent application for patent filed December 28, 1897, and serially numbered 664,117. These mechanisms, which are generally marked *s*, consist of means of laying up together strands of leather thongs as the belt is being made. As these mechanisms are fully described in my said otherspecification, their detailed construction and mode of operation will not be

further described here more than to say that they are rotated from the heddle-shaft \bar{v} from a belt-pulley t , Fig. 1^a, thereon and belt through a belt-pulley \bar{t} on the shaft t^2 and belt-pulleys s' on the rotating tubular shaft of the mechanisms s , the pulleys s' being driven from the pulleys t^2 , Fig. 1, by belts connecting them.

It will be seen that the taking-off rollers, heddles, and the warp gripping or holding means, and also the stranded or corded selvage-making mechanisms when these are employed, are all driven by a set of interconnected mechanisms, as stated, and driven by a single belt, while the slay is driven by a separate mechanism and belt-driving gear.

The operation of the loom and machinery is as follows: When after the weft (which has been passed through the shed by the shuttle) has been beaten up by the slay the slay-driving clutch q is thrown out of gear with the driving-wheel p and the clutch m is put into engagement with the driving-pulley j , the gripping-bar d and the mechanisms driven by it are set in motion. The part first operated being raised off the warps, then the taking-off rollers receive partial rotation by their actuating mechanism. The heddles are operated and make a fresh shed, and the bar d is brought down onto the warps and presses them into the groove or recess of the rubber face k^2 , Fig. 3, on the beam k' , and thus firmly grips and holds them, the equal gripping and holding of all the warps (which will be of different thickness) being effected by the yielding nature of the rubber strip k^2 . The clutch m is then thrown out of gear with the wheel j , and all these parts and mechanisms described are brought to rest. When this condition of things exists, the warps will be under tension in the loom, the tension being effected by the warp-reels having a frictional device of any known suitable kind in connection with them tending to prevent their rotation, and the shuttle is then put through the shed. The clutch q is then put into gear

with the wheel p , and the slay b is operated and drives the weft hard up against the completed fabric and then returns, whereupon the clutch q is thrown out of gear with wheel p by the hand-lever q^2 , and the clutch m is thrown into gear with the wheel j by the foot-lever m' , and the cycle of operations is then repeated—that is, the gripping-bar d is raised off the warps, the taking-off rollers are rotated, and the heddles are operated, as described.

In the term "leather" herein used it is intended that the word shall be read to include both natural—*i. e.*, animal—leather and substitutes for leather or material which for the present purpose of its application would be practically analogous or equivalent to it.

What is claimed in respect of the herein-described invention is—

1. In a loom for making woven-leather belts, the combination of a slay, the heddles, taking-off rollers and means for gripping and holding the warp, a driving mechanism connected with the heddles, take-off rollers and warp-holding means and a separate driving mechanism for operating the slay, substantially as described.

2. In a loom for making woven-leather belting, the combination of the taking-off means, the heddle mechanism and warp-holding mechanism arranged to be at rest while the beating-up motion is operating and with the warp-holding mechanism gripping the warp, driving mechanism for said parts including stopping and starting means, a beating-up motion and a driving mechanism for the same, independent of that first mentioned with stopping and starting means, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

HARRY ELLIS.

Witnesses:

JOHN H. WALKER,
F. C. FLEETWOOD.