No. 755,457. PATENTED MAR. 22, 1904.

L. COIN.

JACQUARD MECHANISM FOR LOOMS.

APPLICATION FILED FEB. 17, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1

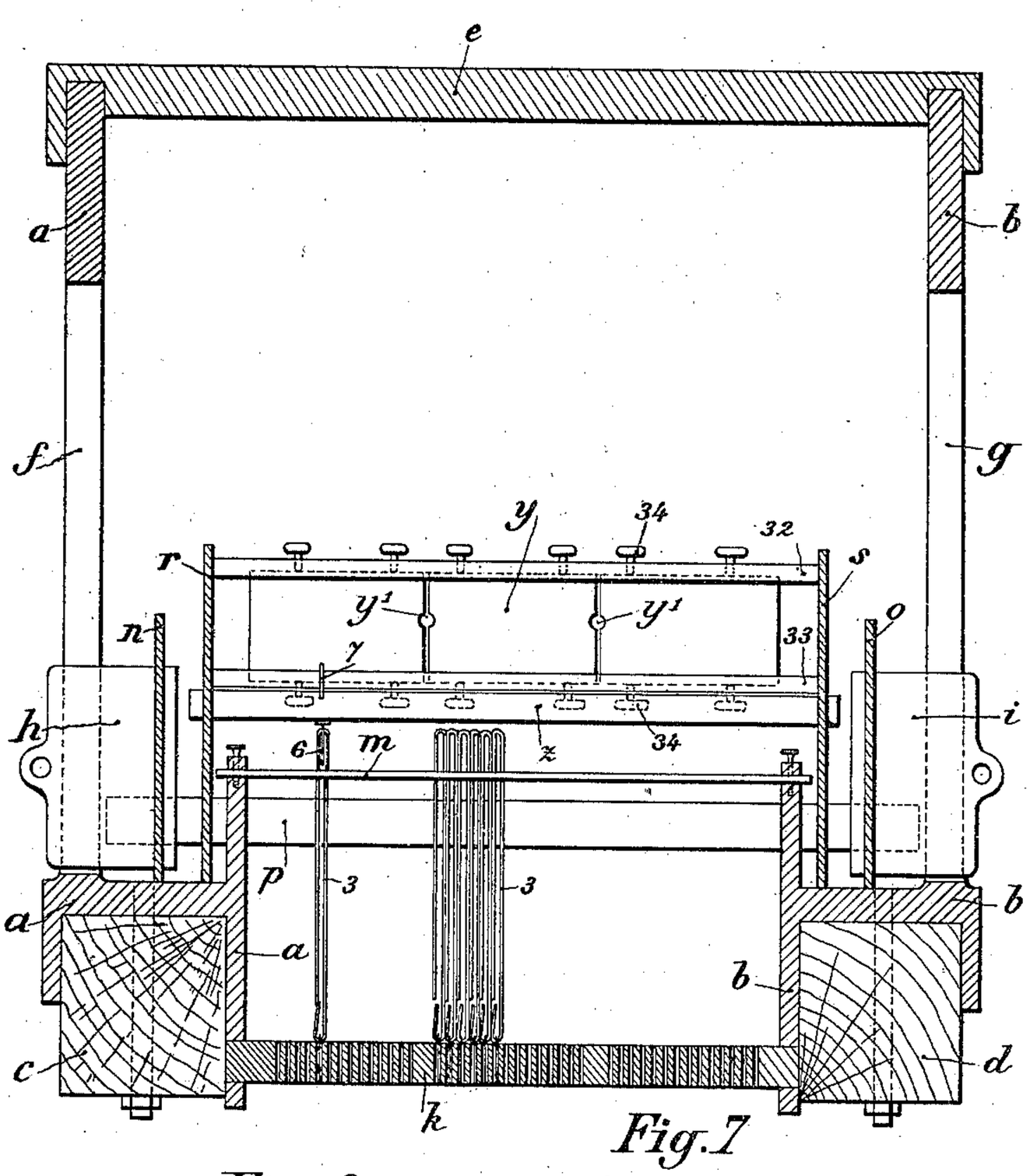


Fig. 7

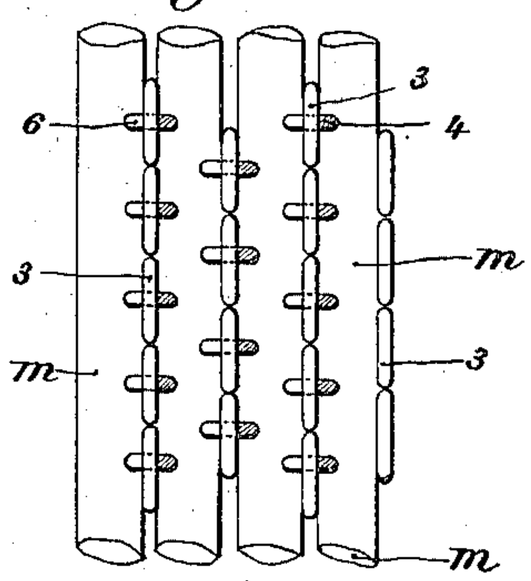
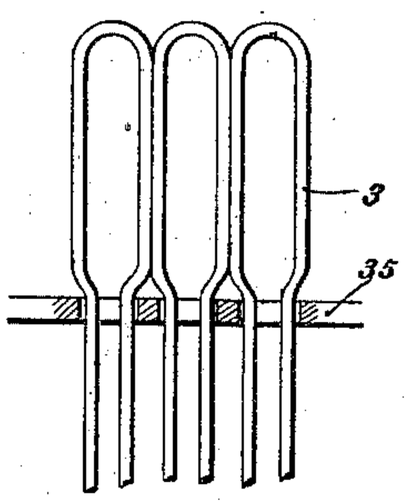


Fig. 6



Witnesses:
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By James L. Norris.
Atty.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.

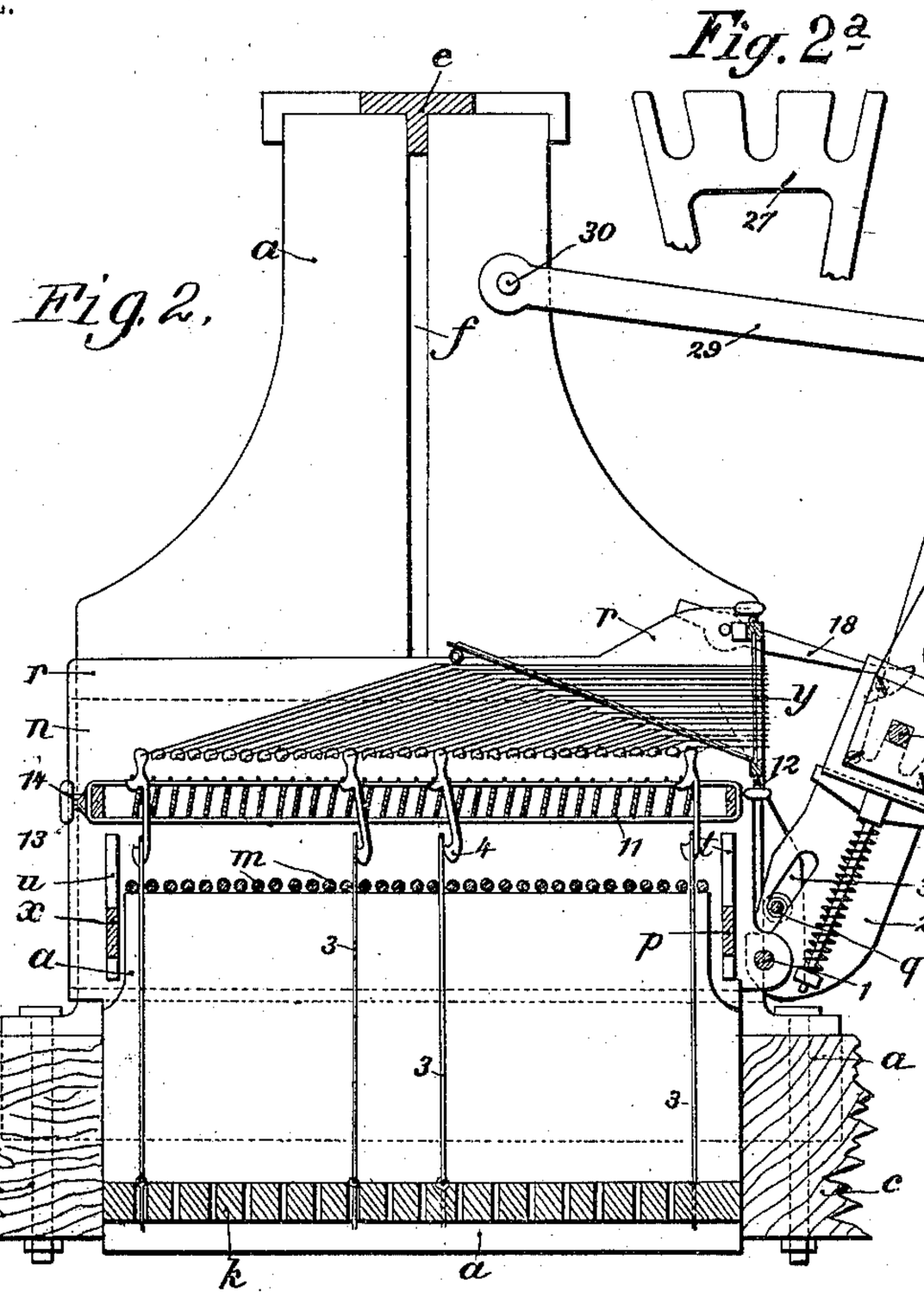


Fig. 2a.

Fig. 2b.

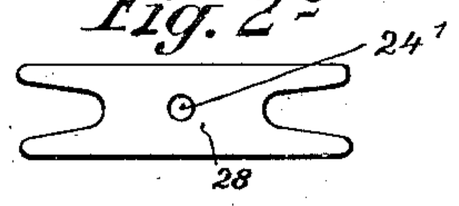
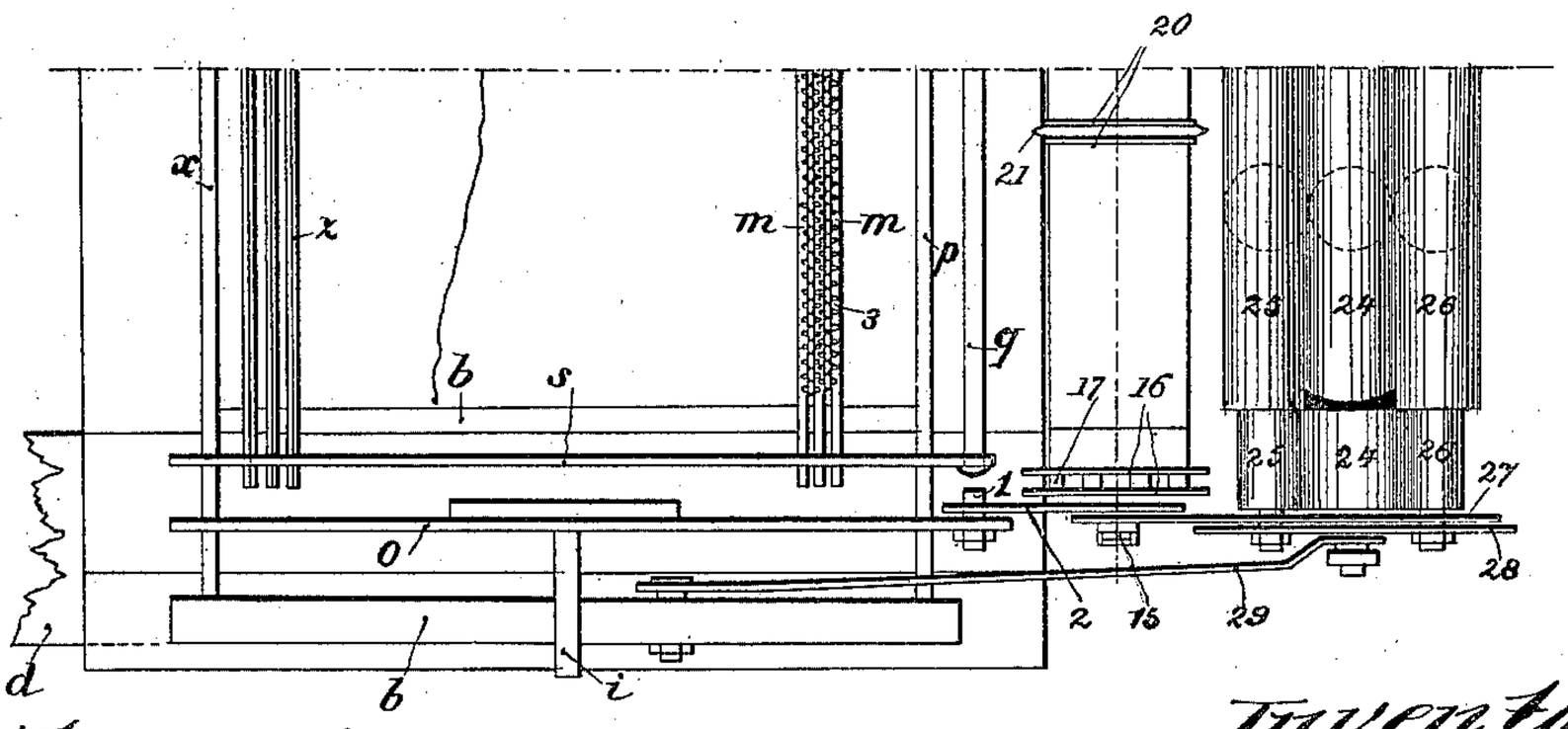


Fig. 3



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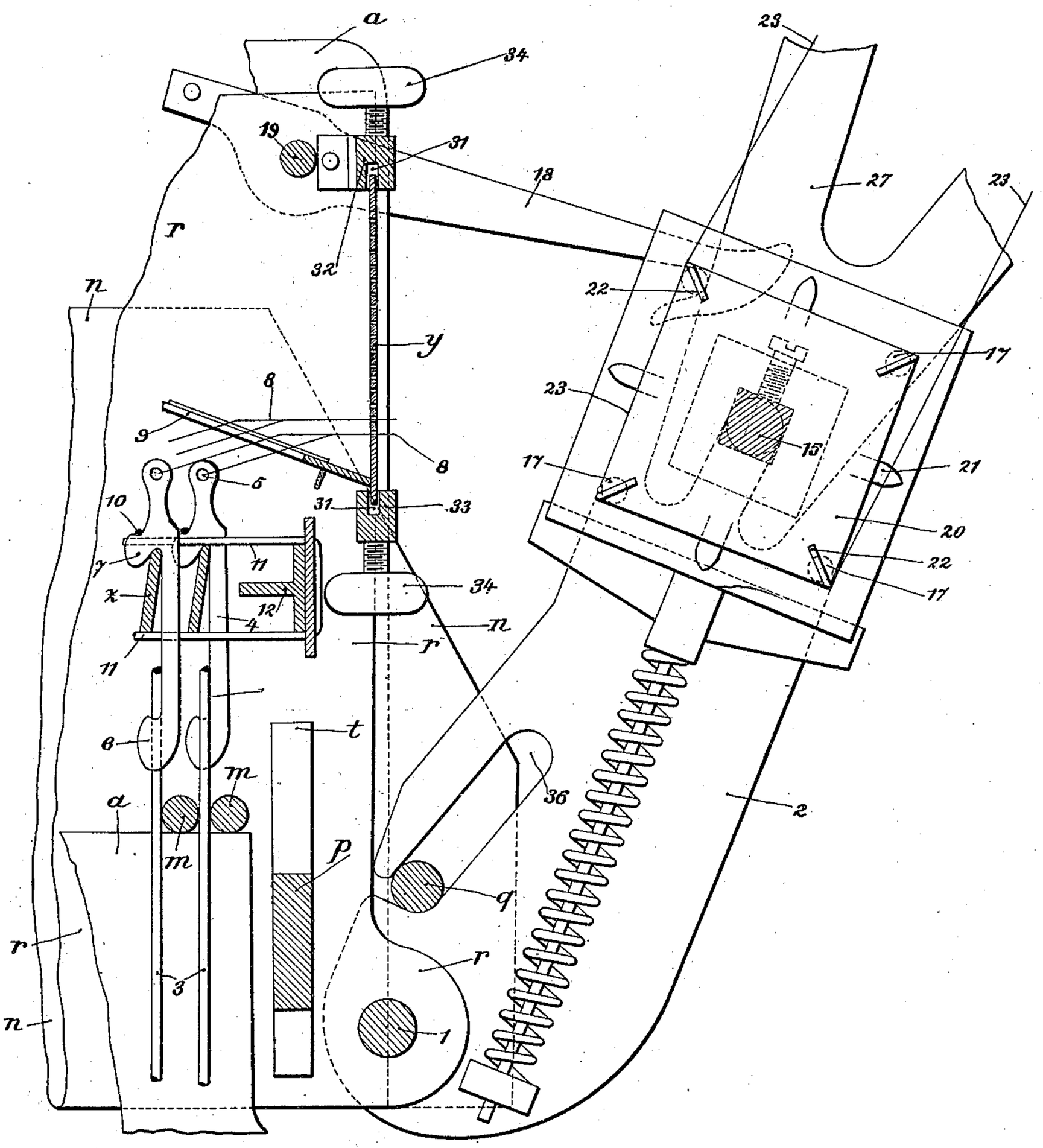
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 4



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No. 755,457. PATENTED MAR. 22, 1904.

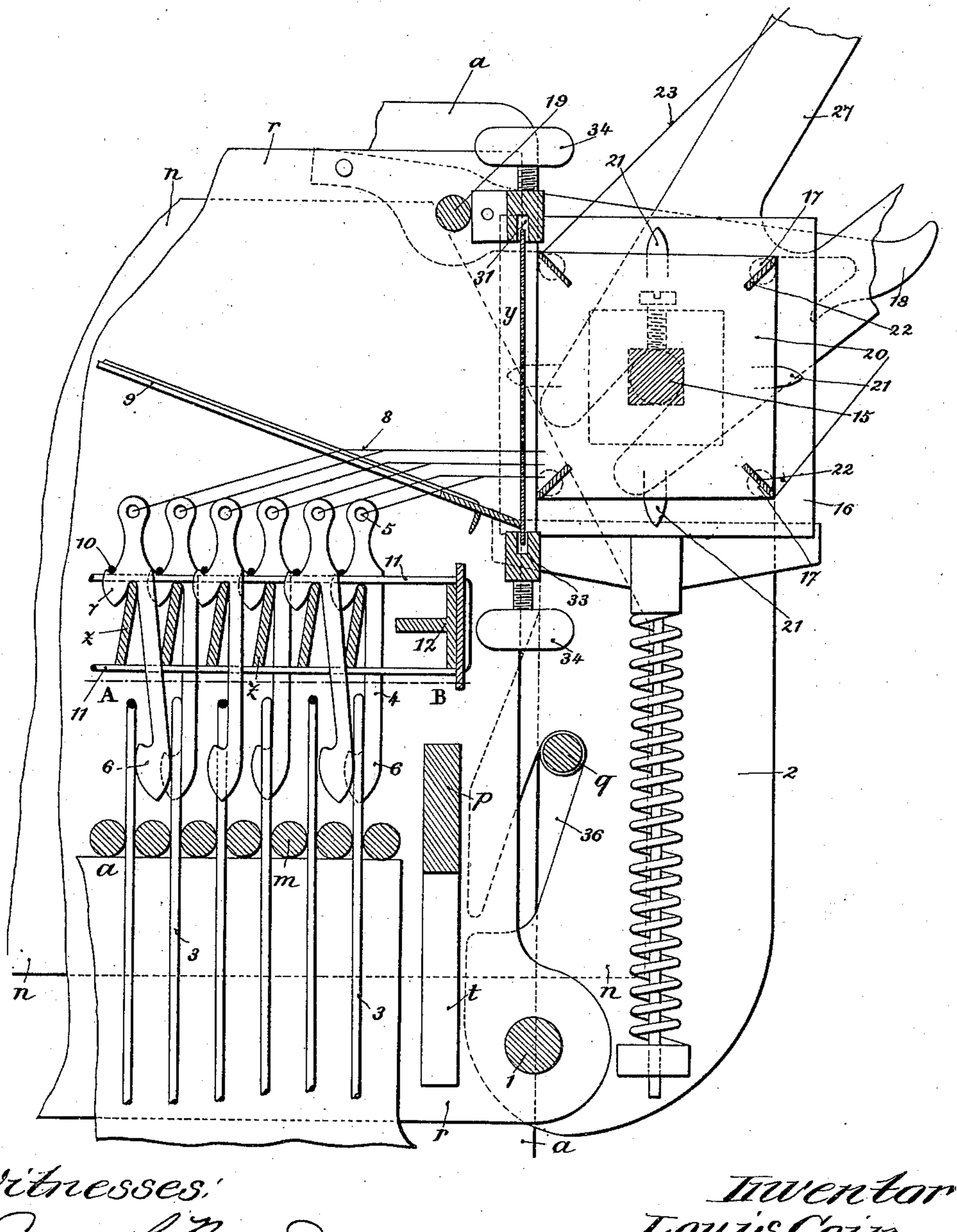
L. COIN.

JACQUARD MECHANISM FOR LOOMS.

APPLICATION FILED FEB. 17, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 5



Witnesses:
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No. 755,457. Patented March 22, 1904.

UNITED STATES PATENT OFFICE.

LOUIS COIN, OF TASSAIN LA DEMI-LUNE, FRANCE.

JACQUARD MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 755,457, dated March 22, 1904.

Application filed February 17, 1902. Serial No. 94,540. (No model.)

To all whom it may concern:

Be it known that I, LOUIS COIN, a citizen of France, residing at Tassain la Demi-Lune, Rhône, France, have invented certain new and useful Improvements in Jacquard Mechanism for Looms, of which the following is a specification.

In looms as at present known each of the needles intended to be actuated by the perforated card is invariably connected to the corresponding lifting-hook which supports the thread. Owing to this various kinds of friction are set up, which are very prejudicial to the life of the machine. Such connection between the needle and the lifting wire or hook has also the great inconvenience that it renders any repairs whatever very difficult. If at present, for instance, it is desired to repair a bent lifting wire or hook or one which has got out of place, dragging with it its needle, which also is necessarily damaged, it is requisite to displace at the risk of bending them all the parts adjacent to that which it is desired to repair. Furthermore, in order that the needle may come forward again after it has been pushed back by the card it is necessary that it be pressed forward by some suitable force, (such as a spring, the arrangement of the lifting-hook, &c.) Hence the card requires to have the necessary resistance to overcome this opposing force without being pierced by the needle.

Another serious inconvenience of existing looms in which the lifting wires or hooks are directly raised by the griffs of the moving griff-frame is that very often a wire which has not been raised with its own set finds its way during the descent of the frame behind the griff corresponding to the next set.

Now the present invention is designed to remedy all these serious inconveniences and, further, to apply to looms certain other improvements of a secondary order.

The said invention is characterized by the fact that the lifting wires or hooks are entirely independent of the needles and of the griffs of the movable frame, the connection between these parts being effected by means of intermediate hooks or latches suspended from the griff-bars and either engaging or missing the lifting-hooks, according as the corresponding needle has met a hole or a blank in the card. In this arrangement the needle has only to cause the intermediate hook or latch to pivot around its axis of suspension and to displace it from the vertical position, the inherent weight of the latch serving to throw the needle forward again. In all the movements there is no friction to be overcome, and this allows of using very thin paper instead of the cards at present employed. Moreover, the lifting hooks or wires never leave the upright position, but are only displaced vertically, being perfectly guided from the commencement until the end of their movement. The cylinder around which the perforated paper travels is entirely hollow, open, or frame-like, so that the needles can never strike against any other surface except the blanks of the paper. Moreover and contrary to the practice in existing machines, the cylinder and the needles participate in the ascending and descending movements of the griff-frame.

In order that my invention may be readily understood, I will proceed to describe it in detail by reference to the annexed drawings, in which—

Figure 1 is a vertical section of a loom embodying my improvements in a plane parallel to the axis of the cylinder. Fig. 2 is another vertical section thereof in a plane perpendicular to the axis of the cylinder. Figs. 2^a and 2^b are detailed detached views of the upper part of the swing-frame and of its guard-plate, respectively. Fig. 3 is a part plan of the same. Figs. 4 and 5 show, to a larger scale, the more essential parts of the loom. Fig. 6 shows a modification of the lifting hooks or wires. Fig. 7 shows a portion of Fig. 3 to a larger scale.

The body of the machine is composed of two metal frames or standards *a* and *b*, solidly mounted on two beams *c* and *d*. The two standards *a* and *b* are connected at their upper part by a tie-bar *e*. In the standard *a* is formed a vertical slot *f*, a similar slot *g* being formed in the standard *b*. These slots serve as guides to two T-shaped iron blocks or slides *h* and *i*, to which a suitable mechanism (not shown in the drawings) communicates vertical

up-and-down movements. At their lower part the frames *a* and *b* carry a perforated guide-plate or slay-board *k*, through which the lifting-hooks are threaded, while between them a series of wires *m* are stretched parallel to the axis of the cylinder. These wires are intended to preserve the proper separation between the different sets of lifting-hooks.

My loom also comprises two vertically-movable casings, the outer of which is formed by two vertical plates *n o*, riveted, respectively, on the flanges of the slides *h* and *i* and connected together by means of two cross-bars *p* and *x*. This outer casing carries a spindle *q*, parallel to the axis of the cylinder, for the purpose hereinafter mentioned. The inner casing or griff-frame is formed by two vertical plates *r* and *s*, parallel to the plates *n* and *o* of the outer casing. Each of these plates *r s* has gaps or slots into which the cross-bars *p* and *x* enter. These gaps allow of a certain amount of lost motion between the frames, their length being such that for a certain time, while the outer casing is rising, the cross-bars *p* and *x* simply slide in the slots *t* and *u;* but if the outer box continues to rise it then carries with it the inner or griff casing. This latter carries the needle-plates *y*, the griff-bars *z*, and the pivots 1, around which turn the brackets 2, which carry the cylinder.

The lifting-hooks 3 are each formed (see Fig. 1) of a wire doubled over on itself in such a manner that its extremities meet in the vicinity of one of the ends of the loop thus obtained. The hooks are placed vertically in rows or sets, and the successive sets are separated from one another by the aforesaid wires or strips *m*. The sides of all the lifting-hooks are in contact with each other, so that when a certain number of hooks are raised in a particular set or row they slide between the adjacent hooks, which serve as guides for them. The length of the hooks is such that they do not reach the level of the needles, this being a distinction from the present practice. Similarly, it is not the griff catch-bars *z* which directly raise the hooks, but on each of these bars are suspended as many intermediate latches 4 as there are lifting wire hooks 3 in a row or set. Each catch lies in a vertical plane perpendicular to the cylinder and passing through the axis of the corresponding lifting-hook, the two legs of which are in a plane parallel to the cylinder, Figs. 3 and 7. These latches, Figs. 4 and 5, consist of a larger arm 4, carrying at one extremity an eylet 5 and at the other a catch 6, and of a smaller arm 7, which projects from the large arm 4 at a point in the latter very near to the eyelet 5. The parts 4 and 7 are placed astride the griff-bar *z* in such a manner that each latch is able to swing about this point of suspension after the manner of a pendulum. When one of the latches is vertical, its catch 6 comes between the legs of the corresponding hook 3, and under these conditions the griff-frame in rising draws up with it the said loop. On the contrary, if by any means the latch 4 is displaced from the vertical position its catch 6 comes out of the lifting-hook 3, and then the ascent of the catch-frame no longer raises the hook.

The movement of each latch 4 is limited in both directions. On the one hand, Fig. 5, when the needle causes it to tilt the larger arm 4 comes into contact with the lower edge of the bar *z* of the next set, so that the latch does not strike the next hook 3, which is of course directly under this bar. When the latch is set free, its weight brings it back to the vertical position, and to insure that it shall not swing too far the smaller arm 7 is arranged to come into engagement with a wire 10, stretched across between the walls of the griff-frame. Moreover, to insure that the hooks shall not oscillate or twist parallel to the bars *z* I arrange between them other wires 11, stretched transversely over two **T**-bars 12 and 13. The bar 12 is fixed, while the latter, 13, is movable (see Fig. 2) and can be adjusted by the aid of a screw 14 for the purpose of tightening the wires 11.

The needles 8 consist of very thin wires, (0.3 millimeter, for example.) They are bent uniformly on a gage which gives them all the same angle, and their length increases gradually, so that all their extremities at either end lie in the same plane. One extremity of each needle is fast in the eyelet 5 of its latch 4, the other extremity resting in the corresponding hole of the needle-plate *y*. To keep each needle in a plane which is substantially vertical and prevent it inclining over, I arrange a series of wires 9, stretched on two cross-bars fixed to the walls of the griff-bar frame, there being a wire 9 between all the vertical rows of needles. These needles do not present any resistance to the card or paper 23, since all they have to do is to cause the latches 4, whose weight is insignificant, to swing on their pivots. When once left to themselves, they are returned instantly to their position of repose by the latch 4 as it resumes the vertical position, and this action is very certain, since the largest of the needles is only one-tenth the weight of its latch. The return movement is, moreover, very rapid on account of the short length of the latch 4, a complete oscillation of which requires about one-tenth of a second only. This arrangement overcomes all objectionable friction of the lifting wire hook and of the needle. Each hook slides vertically between its neighbors with practically no friction, since one of its legs is flexible and yields to the slightest pressure. It is quite independent of the needle and works with ample play. The needle 8 has only to slide in its hole in the needle-plate *y* or between the wires 9, the distance between which is equal to several times the thickness of the needle.

With regard to effecting repairs these can be done very simply, since the needles may be easily separated from the hooks 3. In fact, each of the parts can be taken out and replaced with great facility.

The needle-plate *y* is formed in three parts, Fig. 1, each of which can be adjusted in the grooves 31, formed in the cross-bars 32 and 33, Figs. 4 and 5, of the griff-frame. Set-screws 34 permit of fixing each of the parts of the plate *y* in any desired position.

There are for each horizontal row of branched needles two corresponding griff-bars *z*, two sets of latches 4, Figs. 4 and 5, and two sets of lifting-wire hooks 3, Fig. 7. To permit of this the parts referred to are arranged to alternate or break joint with each other.

Fig. 6 shows another form of lifting-hook 3, in which the two legs are brought closer together at the lower part, the upper part only being sufficiently large to enable the loops to touch one another. By substituting for the dividing-wires *m* a suitably-perforated sheet 35 this arrangement allows of supporting the hooks by their heads, and consequently permits of the holes in the slay-board *k* being enlarged. It thus becomes very easy to attach the lifting-wire to its corresponding hook, because this attachment may be made before the lifting-hook has been fitted into the loom. Such placing in position may be done by first causing the lifting-wire to enter the desired hole in the sheet 35 and afterward that of the plate *k*.

15 is the axle of the cylinder on which is wound the perforated paper band 23. This axle is carried by the brackets 2, mounted on the pivots 1, which are fixed on the griff-frame. At each extremity of the axle 15 are arranged two plates 16, separated by a few centimeters and interconnected at their four corners by gudgeon-pins 17, which thus form a kind of rack or lantern wheel serving to turn the cylinder on its axis 15. In connection with these I provide two clawkers 18, pivoted on studs 19, one of which is fixed to the standard *a* and the other to the standard *b*. These clawkers come into successive engagement with the gudgeon-pins 17 as the cylinder swings to and fro. It is evident that if the cylinder instead of being square were hexagonal or octagonal it would be necessary to provide six or eight gudgeons instead of four.

On the aforesaid axis 15 are keyed in pairs metal plates 20 at suitable distances apart. Between each pair is held a wood block, in which are fixed studs 21, intended to enter the guiding-holes provided to receive them in the paper band 23 and also corresponding holes *y'* in the needle-plate *y*.

Parallel to the axle 15 and forming the edges of the prism (improperly called the "cylinder") are arranged diagonally four narrow webs or strips 22, which, in fact, really constitute the cylinder. It will thus be seen that I dispense altogether with the perforated faces of the cylinders at present in use, these faces being essentially intended to reinforce the cards 23 and enable them to push back the needles. Now in my loom only a minimum effort is required on the part of the card, and, on the other hand, the perforated walls of the cylinder possess the disadvantage that they do not expand to an equal extent with the card, and hence the holes in the two are liable to get out of register. Hence it is a great feature in favor of my loom that it has no walls in its cylinder.

To keep the paper band tight and evenly in place on the cylinder whatever may be the position of this latter, I provide three parallel rollers 24, 25, and 26, covered with rubber, the paper forming an endless belt or band around the cylinder and the central roller 24. The extremity of the axles of the three rollers rest in recesses arranged for this purpose in two triangular frames 27, the apex of each frame having a bearing on the cylinder-axle 15.

The axle of the central roller is longer than those of the rollers 25 and 26, and on each end outside the piece 27 a guard-plate 28, Fig. 2^b, is slipped on. The guard-plate 28 is provided with an opening 24′ for the reception of the axle of the roller 24. At the outer side of the plate 28 is arranged the hook-shaped end of an arm 29, which is hinged to the axle of the roller 24. The other end of the arm 29 is pivoted to a stud 30, fixed to the adjacent standard. The frames 27 serve to keep the rollers at a proper and invariable distance from the axle 15. The arm 29 keeps them practically stationary and prevents them moving bodily.

The guard-plates 28 insure the proper pressure of the rollers on the band 23 and keep the three axles always in one and the same plane. The diameter of the three rollers is such as to allow the required space for the passage of the paper band. At the ends the diameter of the roller 24 is increased and that of the two other rollers is diminished for the purpose of preventing any displacement whatever of the paper parallel to the axle 15.

Having thus described my loom, I will now proceed to explain the action.

The apparatus being at rest, Figs. 1 to 4, if we cause the outer casing *n o p* to rise by operating the slides *h* and *i* the two cross-bars *p* and *x* ascend in the slots *t* and *u* of the griff-casing until they bear against the upper extremities of these slots. During this movement the spindle *q* rises with the outer casing, of which it forms part. Since it extends into the oblique slots 36, provided in the bracket 2, it causes these brackets 2, and consequently the cylinder also, to move around the pivot 1 and brings the cylinder from the position shown in Fig. 4 to that shown in Fig. 5. This

latter figure shows the parts at the moment when the first part of the movement is completed. The two strips or webs 22, which face the plate *y*, come to rest with their extremities against the edges of the plates *r* and *s*, forming the griff-casing, in such a manner that the paper 23 properly engages the points of the needles, but without touching the plate *y*. Each needle 8, which has no corresponding hole in the paper, is pushed back by the latter and made to tilt its latch 4, so setting free the corresponding lifting-hook 3. The outer casing thereupon continuing to rise it carries with it the interior casing, and in consequence the cylinder and its associated parts, as well as all the hooks 3, which correspond to the holes in the paper band 23. In descending the parts preserve the position shown in Fig. 5 until the griff-casing comes to rest on the body of the loom. At this moment the outer casing will continue to descend alone and the spindle *q* will bear on the lower edge of the slot 36 and return the cylinder into the inclined position, Fig. 4. In these movements the clawkers 18 slip over and engage those of the gudgeons 17, which are at the top and to the right, Fig. 5, and they thus impart to the cylinder as it swings back a rotation of a quarter-turn around its axis 15, so causing it to advance the paper one step. All is then ready for the next operation, because as soon as the cylinder has moved out of contact with the plates *r* and *s* the needles 8, which have been pressed back, reassume their normal position.

Wherever there are any parts which turn or which slide on one another I arrange some of the usual known means—such as rollers, balls, &c.—to obviate friction. More particularly the vertical movements of the two casings should be well guided and all the guides should be furnished with rollers.

Obviously my invention may be modified in respect of the various details without in any way departing from the essential nature thereof.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a jacquard mechanism for looms, a vertically-movable griff, a plurality of lifting-hooks, a plurality of needles independent of said hooks, and a plurality of latches carried by said griff connected to the needles and adapted when the needles are at rest to engage said hooks and when the needles are pushed back to be free of said hooks thereby causing the griff when rising to draw after it those of the hooks engaged by the latches.

2. A jacquard mechanism for looms comprising a needle-plate, a plurality of needles having their extremities at one end in the same vertical plane parallel to the needle-plate and their other ends in the same horizontal plane, a vertically-movable griff, a plurality of latches carried by said griff and connected at their upper end to said needles, and a plurality of lifting-hooks adapted to be engaged and elevated by the free end of said latches when the said needles pass through the opening of the cards.

3. A jacquard mechanism for looms comprising a vertically-movable griff-casing, a vertically-movable outer casing adapted to engage with and elevate said griff-casing, and a jacquard-cylinder connected with said griff-casing and adapted to be moved against the griff-casing by the outer casing previous to the elevation of the griff-casing, said cylinder participating in the vertical movement of said griff-casing.

4. A jacquard mechanism for looms comprising a vertically-movable griff-casing provided with a needle-plate, a jacquard-cylinder connected with said casing and adapted to be brought against the needle-plate and to participate in the vertical movement of the griff-casing, and means for vertically moving said casing and cylinder and for moving the cylinder against the needle-plate previous to the imparting of a vertical movement thereto.

5. A jacquard mechanism comprising a vertically-movable outer casing, a vertically-movable inner casing engaged by and elevated by said outer casing, a jacquard-cylinder, a pair of brackets for supporting said cylinder and connected at their lower ends to said inner casing, said brackets provided with an obliquely-extending slot, a spindle carried by said outer casing and engaging in said slot for moving said cylinder against said inner casing when the outer casing is elevated, griff-bars carried by said inner casing, needles arranged in said inner casing, and a needle-plate connected with the inner casing and through which the needles extend.

6. In a jacquard mechanism for looms, a pair of standards, a jacquard-cylinder, a series of rollers 24, 25 and 26, an endless card passing around said cylinder and roller 24, axles for said rollers, a pair of frames pivoted on the axle of the cylinder and provided with notches in their free ends to receive the axles of the rollers, a pair of guard-plates for keeping the axles of the rollers in the same place, and means for retaining said rollers 25 and 26 equal distances from the axle of the cylinder and the frames immovable.

7. A jacquard mechanism for looms comprising a vertically-movable casing, a plurality of needles carried thereby, griff-bars arranged in said casing, a plurality of oscillatory and gravity-return latches mounted in said bars and connected at one end to said needles, said latches adapted to be elevated by said bars when the casing is moved, and a plurality of lifting-hooks adapted to be engaged and elevated by the latches when the latter are in their normal positions.

8. A jacquard mechanism for looms comprising a vertically-movable casing, a plurality of needles carried thereby, griff-bars arranged in said casing, a plurality of oscillatory and gravity-return latches mounted on said bars and connected at one end to said needles, said latches adapted to be vertically moved by said bars when movement is imparted to the casing, a plurality of lifting-hooks adapted to be engaged and elevated by the latches when the latter are in their normal positions, separating-wires arranged in said casing for said hooks, stop-wires arranged in said casing for the said latches, and keeper-wires arranged in said casing for said needles.

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

LOUIS COIN

Witnesses:
VICTOR MELCHIOR,
ANTOINE DUMAS.