

No. 781,400.

PATENTED JAN. 31, 1905.

T. A. B. CARVER.
JACQUARD MACHINE.
APPLICATION FILED JAN. 18, 1904.

3 SHEETS—SHEET 1.

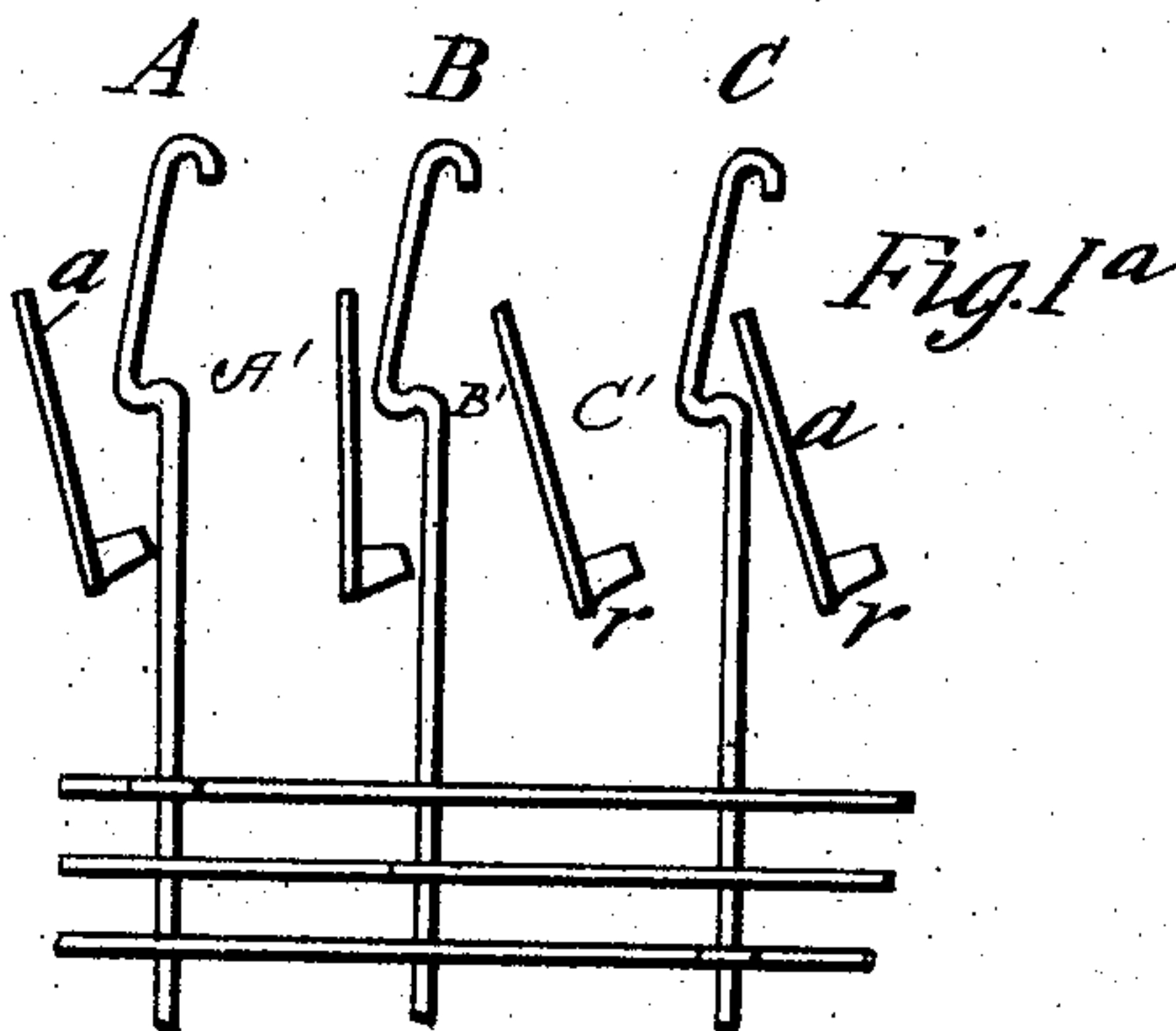
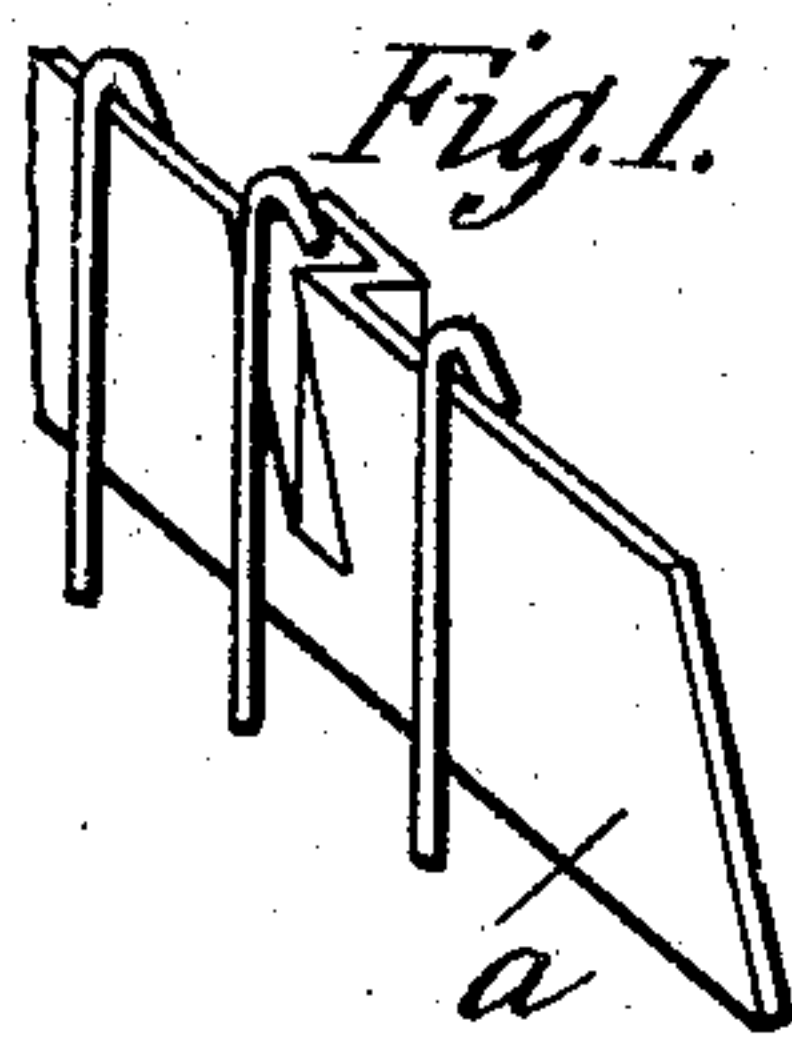
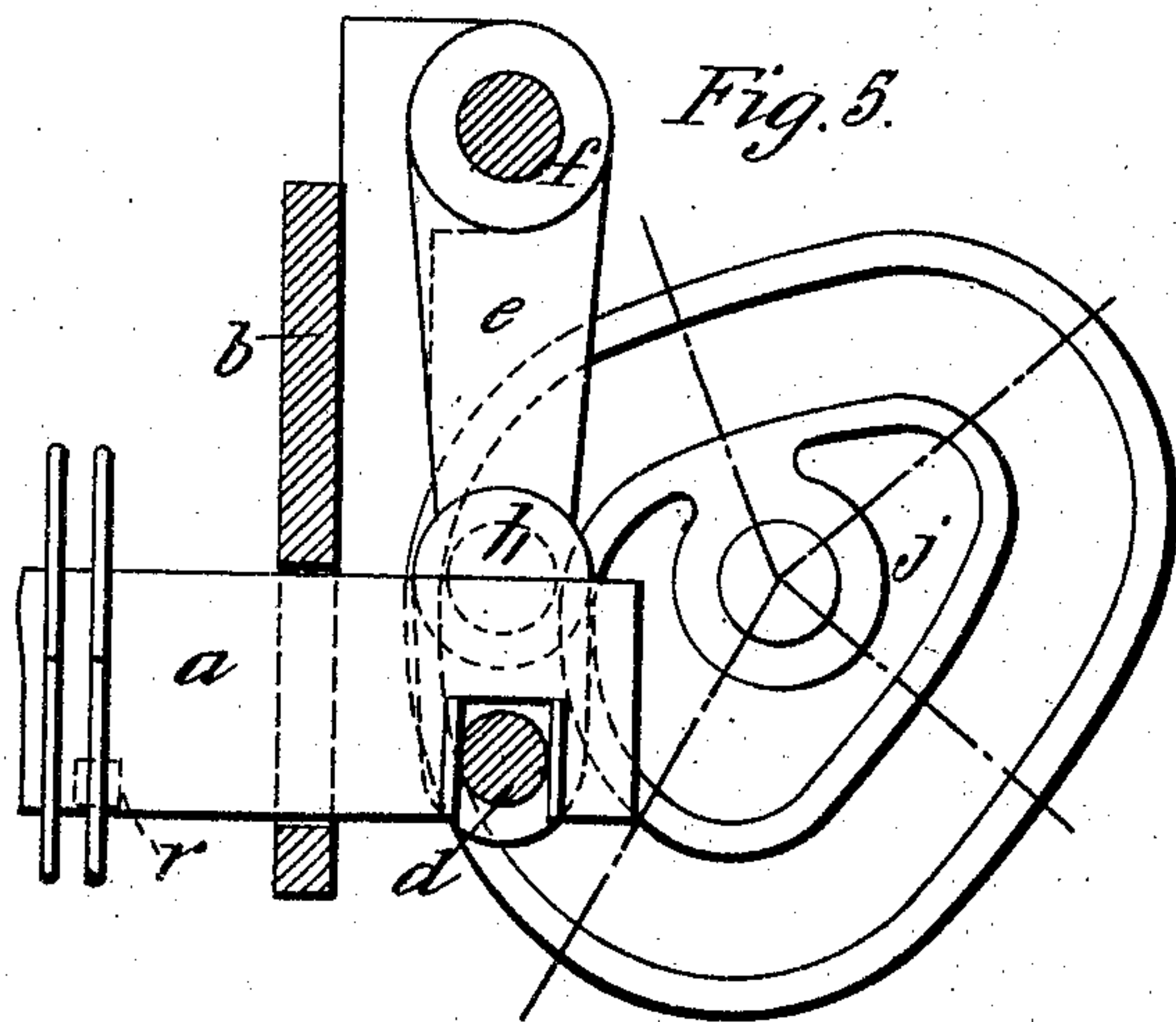


Fig. 2

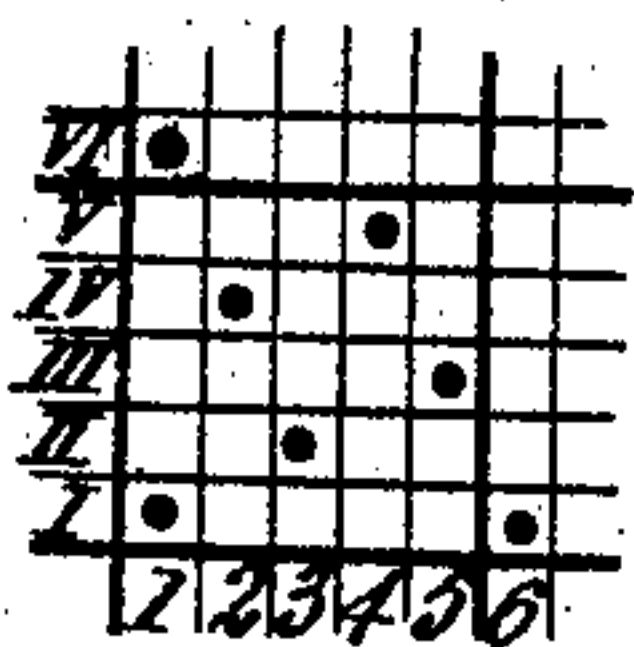


Fig. 3.

	1	2	3	4	5	6
1	1	3	3	2	4	1
2	4	1	3	5	2	4
3	2	4	1	3	5	2
4	5	2	4	1	3	5
5	3	5	2	4	1	3
6	1	3	5	2	4	1

Witnesses:
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C. D. Kiesler,

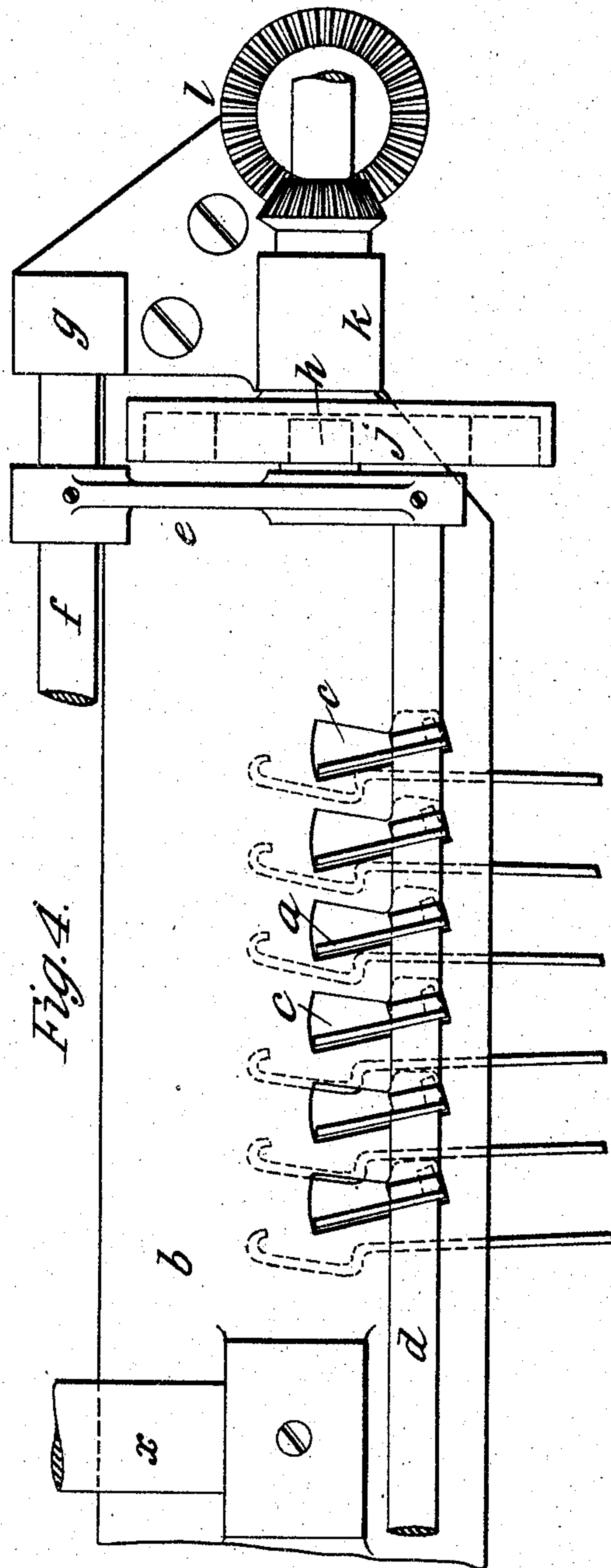
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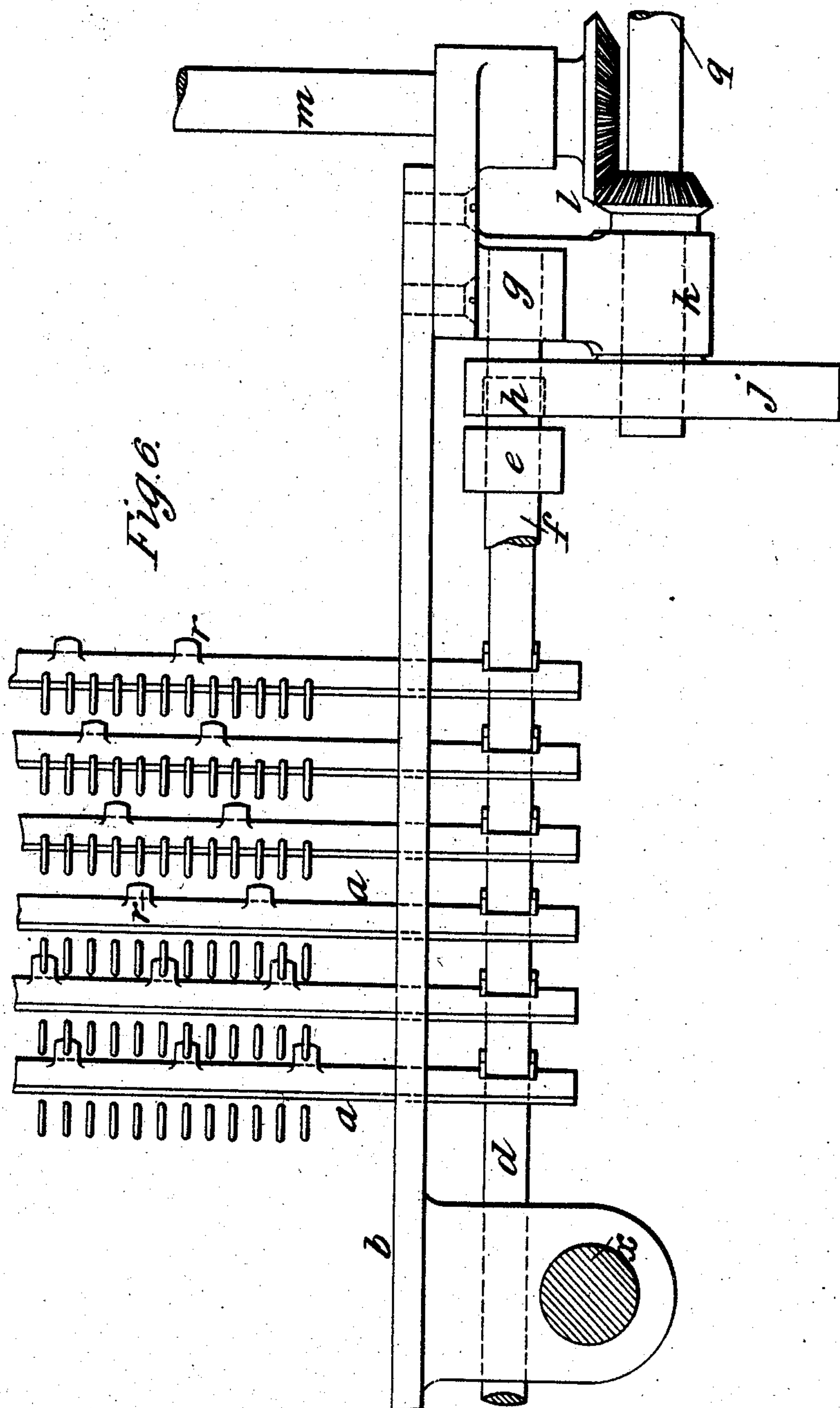
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Inventor
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UNITED STATES PATENT OFFICE.

THOMAS A. B. CARVER, OF GLASGOW, SCOTLAND.

JACQUARD-MACHINE.

SPECIFICATION forming part of Letters Patent No. 781,400, dated January 31, 1905.

Application filed January 18, 1904. Serial No. 189,573.

To all whom it may concern:

Be it known that I, THOMAS ALBERT BRIGGS CARVER, a subject of the King of Great Britain and Ireland, residing at 33 Renfield street, Glasgow, Scotland, have invented certain new and useful Improvements in Jacquard-Machines, (for which I have applied for a patent in Great Britain, dated February 17, 1903, No. 3,687,) of which the following is a specification.

This invention relates to improvements in jacquard-machines in which the twill is automatically performed, and has for its object the formation of a twill of one kind in the figure of the cloth, while of another kind in the ground.

In the ordinary jacquard-machine the hooks operating those threads of the warp which it is desired to raise are caused by the pattern-determining mechanism to stand in the position to engage the knives of the brander as it rises, and the hooks operating those threads which it is desired should be not raised are caused by the pattern-determining mechanism to stand in the position in which they will not engage the knife of the brander as it rises. Regardless of the twill, therefore, all the hooks controlling the figure of the cloth stand forward to engage the ordinary knives, while those controlling the ground stand back in the position in which they would not engage them. I accordingly arrange the system for twilling the figure of the cloth so that it operates the hooks only when they stand forward in the position in which they ordinarily engage the knives, and I arrange the system for twilling the ground so that it operates the hooks only when they stand back in the position in which they ordinarily do not engage the knives.

In the accompanying drawings, Figure 1 is a perspective view of part of one of the knives and the hooks with which it coöperates to produce the twill in the figure. Fig. 1^a is a diagrammatic view of the bent hooks and their coöperating bars and projections for producing the twill in the ground. Fig. 2 is a diagram showing the sequence in producing the five-leaf twill in the ground, the Roman numerals representing periods of the loom,

and the Arabic numerals the numbers of the hooks. Fig. 3 is a diagram showing the sequence of successive lifts in the case of a twenty-four-row machine; and Figs. 4, 5 and 6, respectively, a side view, a transverse section, and a plan of the mechanism used for shifting the knives at each period of the loom into the positions required to produce the proper sequence of the five-leaf twill.

In order to twill the figure, it is necessary to cause not to be lifted those of the hooks which stand forward in the position in which they ordinarily engage the knives in the proper sequence to produce the twill desired in the figure. To accomplish this, I provide gaps in the ordinary knives, each of size and shape to cause not to be raised one hook and of suitable number and disposition along the knives to produce the twill desired in the figure of the cloth, and I slide the knives while they are below the hooks during the lower part of the brander's range at each turn of the loom in the direction of their length, so that the gaps will always take up the new positions to cause the hooks to remain in their lower position in the proper sequence to produce the twill desired in the figure. One form in which I may construct these gaps is shown in Fig. 1 of the accompanying drawings, which is a perspective view of part of a knife *a*, with the hooks it engages. Here the metal is simply punched out to a pocket shape such that it will cause one hook to be missed while the strength of the knife is preserved. In order to twill the ground, it is necessary to lift those of the hooks which stand back in the position in which they ordinarily do not engage the knives in the proper sequence to produce the twill desired in the ground. To accomplish this, I bend the vertical wires of the jacquard to give, in addition to the hook, such as A B C, at the top in one direction as usual, a second hook, such as A' B' C', in the opposite direction, as shown in Fig. 1^a, and to engage these hooks when the vertical wires stand back in the position to be not raised by the ordinary knife I provide bars *a*, which may be the ordinary brander-knives, having projections *r* of suitable number and disposition to produce the twill desired in the

ground, and I slide the bars at each turn of the loom in the direction of their length, so that the projections will always take up the new positions to cause the hooks to be raised
 5 in the proper sequence to produce the twill desired in the ground. The effect of this combination is, therefore, to cause each thread in the figure to remain in the lower position in the proper sequence to perform the twill
 10 desired in the ground. In certain instances in which the hooks to be not raised in the figure of the cloth or to be raised in the ground of the cloth occur in complete rows of the jacquard-machine I may control all
 15 these hooks from a single bar, rocking them into and out of the range of their respective hooks at the proper intervals to produce the twill desired in the manner well known in twilling jacquard-machines.
 20 I shall illustrate the action of my improvements by describing them as applied to an ordinary machine of twenty-four rows of fifty hooks for producing an eight-leaf twill in the figure of the cloth and a five-leaf twill in the
 25 ground. Now in this application the ordinary method of rocking the knife out of the range of the hooks when they stand in the position to be raised is sufficient for producing the eight-leaf twill in the figure of the cloth, be-
 30 cause as there are twenty-four rows in the machine row No. 1, row No. 9, and row No. 17 will consist of all the eighth hooks throughout the machine, and similarly rows Nos. 2,
 35 10, and 18, and so on. To perform the eight-leaf twill in the figure, therefore, I employ any of the well-known methods for rocking out of the range of the hooks those knives oper-
 40 ating the rows of hooks in the proper sequence to perform the eight-leaf twill. To perform the five-leaf twill in the ground, it is necessary to raise throughout the machine every fifth hook if it is standing back in the position in
 45 which it will not be raised by its knife of the brander. This I accomplish by providing the ordinary hook with an additional hook in the opposite direction and by provid-
 50 ing suitable lifting-pieces to engage them singly, which in this application I preferably arrange as projections from the back of the next knife, as shown in Fig. 1^a of the
 55 accompanying drawings, the form of the projection being such that it will lift its hook when the knife is in either its normal position, as shown at A, Fig. 1^a, or in the posi-
 60 tion into which it is rocked by the eight-leaf mechanism, as shown at B, Fig. 1^a. The hooks and knives are so disposed that when any hook is standing in the position to engage the ordi-
 65 nary knife its additional hook is out of the path of its corresponding projection from the next knife as the brander rises, as shown at C, Fig. 1^a. So long, therefore, as the hook stands back in the position not to engage its knife the additional hook I provide upon it will be
 engaged and lifted by the projection from the

knife next it if that projection is allowed to remain in the position to engage it; but, as I shall now proceed to describe, the projection from the knife is only brought into the posi-
 70 tion to engage the additional hook on any particular hook once every five periods of the loom. The sequence of the five-leaf twill is illustrated by Fig. 2 of the accompanying
 75 drawings, in which the Roman numerals represent periods of the loom, while the Arabic numerals represent the numbers of the hooks. It will be seen that throughout the machine it is necessary to lift the hooks controlling the
 80 ground of the cloth in the following order: At period I of the loom, No. 1 hook must be raised; at period II of the loom, No. 3 hook must be raised; at period III of the loom, No. 5 hook must be raised; at period IV of the
 85 loom, No. 2 hook must be raised; at period V of the loom, No. 4 hook must be raised; at period VI of the loom, No. 1 hook must be raised, and so on. To produce the five-leaf twill in the ground, it therefore becomes necessary to
 90 provide upon all the knives projections to engage the additional reversed hooks at the proper distance along their lengths and to provide mechanism for moving them at each pe-
 95 riod of the loom into the new position to produce the proper sequence of the five-leaf twill. One arrangement by which I accomplish this is shown in Figs. 4, 5, and 6, of which Fig. 4
 100 is a side view, Fig. 5 a transverse section, and Fig. 6 a plan, of the arrangement. In the figures, *b* is one side of the brander-frame, which has vertical motion in vertical guides, which
 105 may be bearings upon, say, the vertical shaft *a*, through the necessary range in the ordinary manner. The knives *a* are carried in holes *c* in this frame of such a shape that the knives have freedom to move in them in the
 110 direction of their length and freedom to rock through the range required by the eight-leaf twilling mechanism. The knives are provided, as described, with the projections *r* for engaging the five-leaf bends on the hooks, and
 115 they are slotted at one end to engage a horizontal rod *d*, running along the side of the brander at right angles to the length of the knives in such a way that the knives when at rest lie with their projections all below one
 120 set of fifth hooks throughout the machine. All the knives can therefore be moved at once by the rod *d* in the direction of their length into the five positions required to control the five sets of fifths throughout the machine.
 125 Now the rod *d* is mounted upon a lever *e* at each of its two ends, (one end only is shown in the drawings,) which lever has freedom to rock with the spindle *f*, upon which it is fixed in the bearing *g*, in such a way as to
 130 give the rod *d* motion approximately in the direction of the length of the knives. The lever *e* also carries the cam-roller *h*, which engages in the cams *j*, revolving in the bearing *k*. The cam is cut to such a shape, as shown

in Fig. 5, that by turning it through seventy-two degrees at a time it will drive the lever, and through it the rod *d* and the knives *a*, into five successive positions, such that the projections upon the knives will at each of the five successive movements take up the positions in which they will lift the five sets of fifth hooks throughout the machine in the sequence to produce the proper five-leaf twill. To produce this effect, it is therefore necessary to give the cam *j* at each period of the movement of the brander and when the brander is near the lower end of its range a movement through one-fifth of a revolution, and this I perform by a ratchet and pawl of ordinary form, operated during a small portion of the downward movement of the brander at the lower end of its range and mounted upon the cam-spindle, say, at *q*. To the spindle carrying the cam, however, I connect by bevel-gearing *l*, giving a ratio of five to eight, the shaft *m*, driving the mechanism of any well-known kind for rocking the knives to produce in this case the eight-leaf twill, and I may find it preferable to drive this shaft through one-eighth of its turn, and therefore the cam through one-fifth of its turn at each period by any well-known arrangement ordinarily employed for driving the twilling-shaft.

Although I have illustrated my improvements as applied to a machine giving five-leaf twill in the ground and eight-leaf twill in the figure, it is obvious that they are applicable to other variations, which can be accomplished in the manner described, but with different dispositions of the projections upon the knives and different shapes of the cam to give them their proper sequence of movements to produce the twill desired. It is further obvious that the same method has application in cases where the hooks controlling the twill of the figure—that is to say, hooks which it is neces-

sary to cause to be not raised in the proper sequence—may not occur all in complete rows in the machine and that I may in this case employ knives which have gaps in them suitably disposed along their length and of such a shape as to cause to be not raised any hook which is to cause a twill in the figure of the cloth.

What I claim is—

1. A twilling jacquard-machine having knives mounted in the brander so that they can move in the direction of their length and made so that at places along them they cannot engage the hooks, and a device for moving the knives step by step in the direction of their length, substantially as and for the purpose set forth.

2. A twilling jacquard-machine having bars movable in the direction of their length, projections on the said bars adapted to engage the wires of the jacquard for lifting them to twill the ground of the cloth, and means for moving the said bars step by step in the direction of their length.

3. In a twilling jacquard-machine, wires having forwardly-extending hooks adapted to engage the brander-knives and rearward bends, a series of bars having projections adapted to engage said rearward bends and to raise the wires when the latter are in the position in which they would not be raised by the brander-knives, and means for sliding the said bars lengthwise step by step, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS A. B. CARVER.

Witnesses:

ANDREW M. MACINTOSH,
ROBT. RICHMOND.