

No. 645,562.

Patented Mar. 20, 1900.

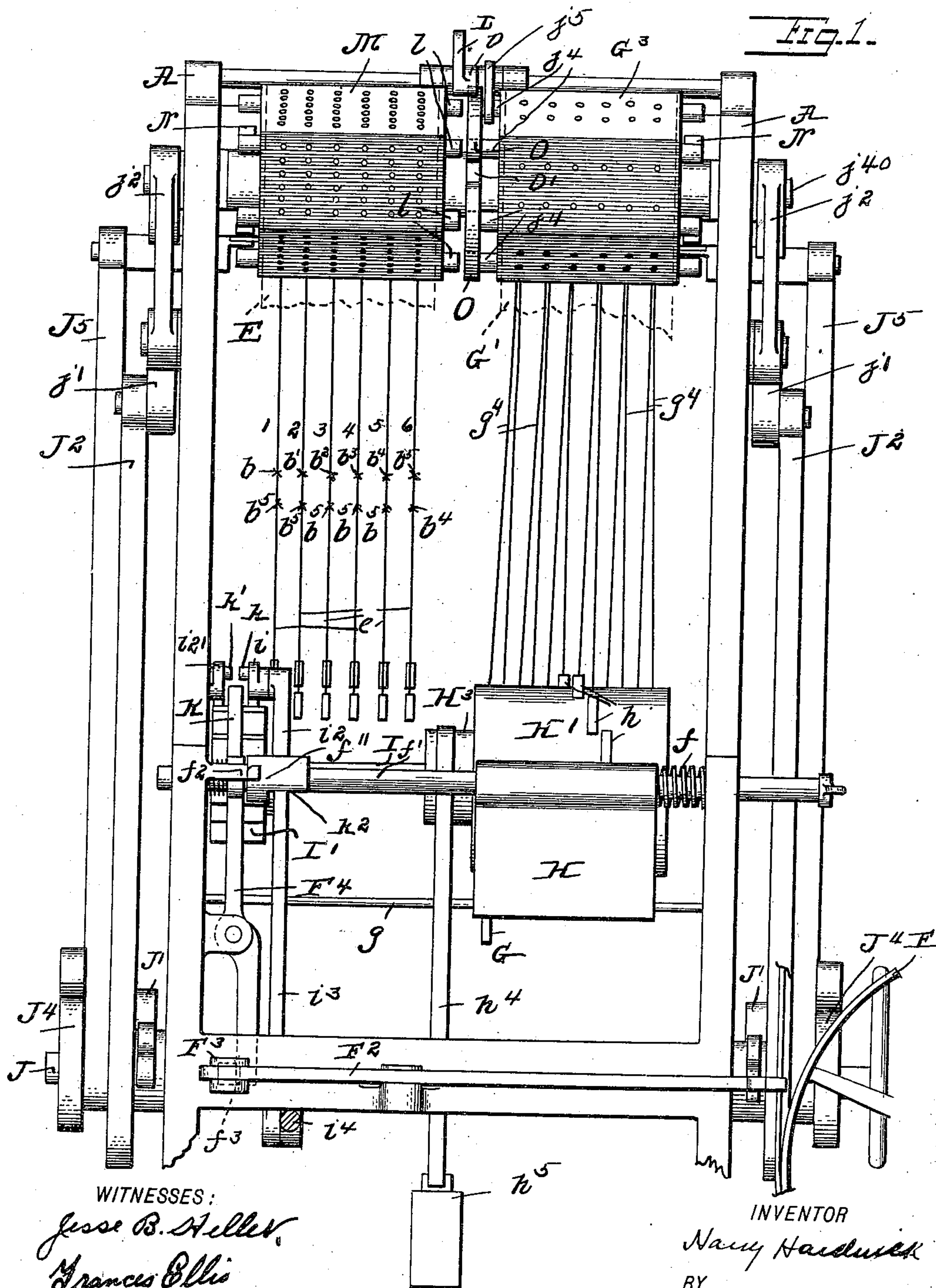
H. HARDWICK.

INDICATOR MECHANISM FOR LOOMS.

(Application filed May 1, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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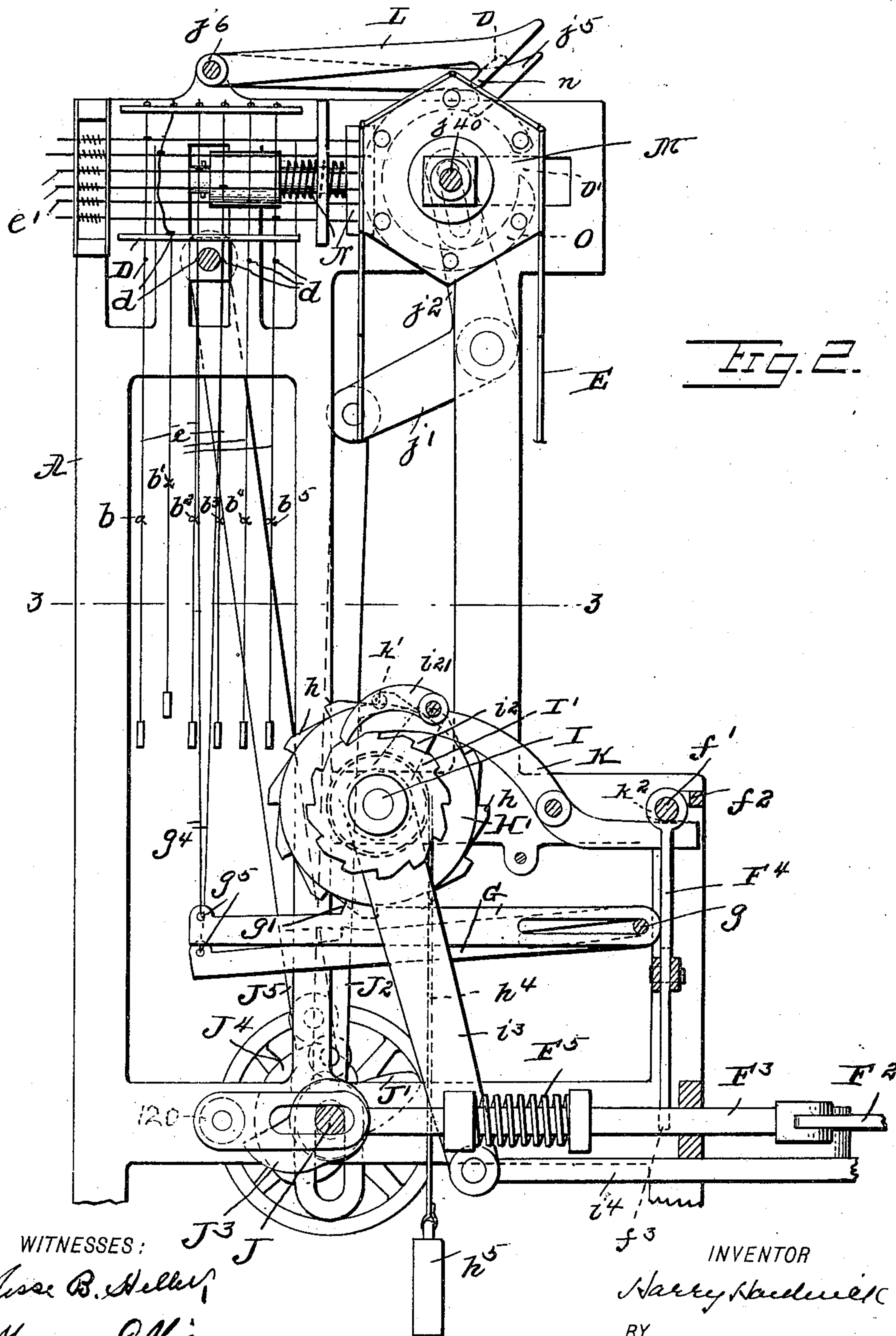
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3 Sheets—Sheet 2.



WITNESSES:

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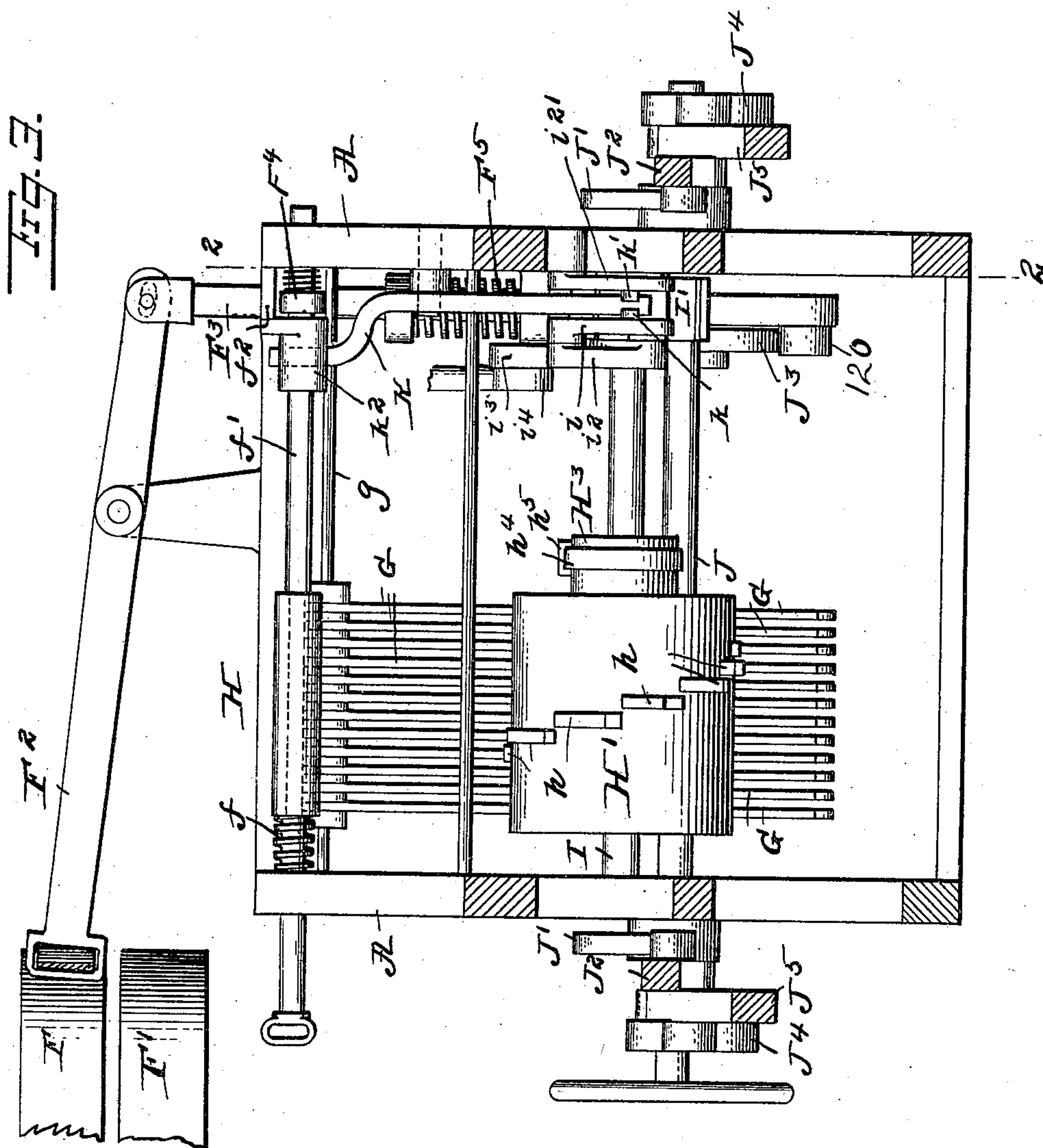
**H. HARDWICK.**

# INDICATOR MECHANISM FOR LOOMS.

(Application filed May 1, 1899.)

(No Model.)

**3 Sheets—Sheet 3.**



**WITNESSES:**

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# UNITED STATES PATENT OFFICE.

HARRY HARDWICK, OF PHILADELPHIA, PENNSYLVANIA.

## INDICATOR MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 645,562, dated March 20, 1900.

Application filed May 1, 1899. Serial No. 715,082. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY HARDWICK, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Weaving Fabrics, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention is applicable to the weaving of that class of goods in which it is necessary that the shuttles should not always be thrown in a predetermined order. In the ordinary weaving the operation of the loom is to throw the shuttles, whatever number there may be, in a given order, pick for pick, which is continued throughout the weaving. In certain classes of weaving—such as, for instance, in the manufacture of chenille-weft—it is necessary that the throw of the shuttle should be irregular. Thus, for instance, if there are six colors to be used in the chenille-weft—white, red, blue, green, black, and olive—instead of these shuttles being thrown in regular order, pick for pick, it is necessary to have an irregular number of throws of the shuttle—that is, it is necessary at one time that the white shuttle should repeat itself, say, three or four times, and the same way with the other shuttles carrying other-colored threads.

The specific object of my invention is to provide means which will form a guide to the operator, so that he may with certainty control the operation so as to cause the desired weft to be used and the desired number of consecutive picks thrown.

I will now describe the construction of mechanism illustrated in the drawings accompanying this specification for carrying out my invention.

In the drawings, Figure 1 is a rear view of the machine. Fig. 2 is a section on the line 2 2 of Fig. 3. Fig. 3 is a section on the line 3 3, Fig. 2.

A is a framework placed adjacent to the main loom.

$b$ ,  $b'$ ,  $b^2$ ,  $b^3$ ,  $b^4$ , and  $b^5$  are indicators, which may be tufts colored to correspond to the color of the weft to be used in making the fabric. As may be seen, there are in transverse alignment six of each indicators, so as to form six

rows, each of which contain the six indicators. To each of these indicators are connected the cords  $e$ , which cords pass up through the notches of an ordinary jacquard lifter-board D and are provided with knots  $d$ , which by the operation of the needles  $e'$  are thrown into or out of the notches in the lifter-board. These needles  $e'$  are operated by means of the cards E. These cards are perforated so that each card will, with the six indicators, determine the order in which the wefts corresponding to the indicators are to be thrown. Thus the indicator appearing on transverse line 1 will determine the color of the first stripe of the throw. The color illustrated on transverse line 2 will show the color of the second stripe, and so on. In the drawings, Fig. 1, I have shown the indicators lifted in the order  $b$   $b'$   $b^2$   $b^3$   $b^4$   $b^5$  corresponding to the colors of the weft named. This operation brings the indicator corresponding to the weft to be thrown in a different plane (see Fig. 1) from the remainder of the indicators and forms a guide to the operator to show him the order of color throw.

Of course I do not intend to limit myself to bringing the indicator corresponding to the weft to be thrown in a different plane from the remainder of the indicators by lifting said indicator, as any means whereby the said indicator is brought in a different plane will be within my invention. Thus the jacquard may lift all except the indicator desired, and this indicator would then be on a different plane from the remainder of the indicators.

In order to indicate to the operator the number of throws of the shuttle each color is to have in any one stripe, the following means are provided.

F is the driving-pulley, and F' the idle pulley, of the loom-driving mechanism, and F<sup>2</sup> is the belt-shifter. This belt-shifter is connected to a spring-operated rod F<sup>3</sup>, which is normally locked by means of the locking-lever F<sup>4</sup>, which rests in a detent  $f^3$  in the rod F<sup>3</sup>.

$f$  is a spring on the rod  $f'$ . On the rod  $f'$  is a collar  $f^{11}$ , having a projection resting against the stop  $f^2$ , locking the rod  $f'$ . The collar  $f^{11}$  is in alignment with the end of the lever F<sup>4</sup>. Secured upon the rod  $g$  are a series of levers G, having projecting surfaces



$g'$ . These levers rest against the surface of the drum  $H'$ .

$H$  is an arm fixedly connected at one end to the rod  $f'$ . The other end of this rod is of such size and shape as to be in the line of movement of each and all of the levers  $G$ .

$H'$  is the drum, having a series of staggered projections  $h$ , equal in number to the levers  $G$ . If the levers  $G$  are elevated so that their projecting ends  $g'$  contact with the surface of the drum  $H'$ , each lever would be in alinement with one of the projections  $h$ , and when struck by its corresponding projection  $h$  would release the locking-lever  $F^4$  by rotating rod  $f'$ , which releases the rod  $f'$  from stop  $f^2$ , and the spring  $f$  moves the rod  $f'$  forward, striking the locking-lever  $F^4$  and releasing it from the rod  $F^3$ , and thus allow the springs  $F^5$  of the belt-shifter rod  $F^3$  to act on the belt-shifter  $F^2$  and shift the belt from the running to the idle pulley, and thus stop the loom. Upon which lever is elevated depends the number of picks of the loom before stopping.

The levers  $G$  are operated in the following manner: Connected to the eye  $g^5$  of each lever  $G$  is the cord  $g^4$ , which is operated upon by the jacquard mechanism controlled by the cards  $G'$ . Each card is so cut as to lift one of the levers  $G$  and leave the other levers down. There are at least as many levers as there are picks made without stopping the loom, and the stop projections  $h$  are also equal in number. These staggered projections start from one point of the drum  $H'$  and extend around the periphery from one side of the drum to the other. Now the levers, if all were lifted, would occupy positions from one side to the other of the drum. The drum is also so arranged that when starting projection  $h$  on one side of the drum is ready to act. By this it may be seen that if the first lever  $G$  were lifted in the rotation of the drum the loom would be stopped after one pick, and if the second lever were lifted after the second pick, and so on up to the number of levers. This drum  $H'$  is moved on each pick of the loom in the following manner:

$I$  is the shaft of the drum  $H'$ , and upon this shaft is the ratchet-wheel  $I'$ , which ratchet is operated by the pawl  $i$ . This pawl is secured to the arm  $i^2$  of the bell-crank, to the other arm  $i^3$  of which is connected the rod  $i^4$ . This rod  $i^4$  is connected to any parts of the loom, so as to operate at each pick.

My device consists of two jacquards, each having an independent movement and operating as follows: In starting, the card of one jacquard will indicate the order of the colors, and thus the order in which the shuttles are to be thrown up to the limit of its series of indicators. By this means the operator has a visual indication of the order in which the shuttles are to be thrown. At the same time the other jacquard has lifted the lever corresponding to the number of picks which the first shuttle to be used is to have. The operator selects the shuttle corresponding to

the first color indicated and starts the loom. This, as before described, causes the pawl  $i$  to operate upon the ratchet  $I'$ , turning the drum  $H'$ , and as soon as the projection  $h$ , corresponding to the lever lifted, strikes the lever in the rotation of the drum  $H'$  the belt-shifting mechanism will be released, as before described, and the loom stopped. As before described, the jacquard controlling the lever will lift the lever corresponding to the projection to indicate the desired number of picks. As the drum moves forward at each pick and as these projections  $h$  are staggered, it is only necessary to lift the lever which corresponds with the projection corresponding to the number of picks desired. The loom being stopped, it is necessary to lift the lever corresponding to the second color of the six indicated by the jacquard controlling these colors and return the drum  $H'$  to its original position.

$J$  is a shaft. On that shaft is the cam  $J'$ , which operates a link  $J^2$ , connected to arm  $j'$  of the bell-crank, to the other arm  $j^2$  of which is connected the shaft  $j^{40}$  of the card-cylinder  $G^3$ . On the same shaft  $J$  is the cam  $J^3$ , in alinement with which is a roller 120 on shifting-rod  $F^3$ , and upon the same shaft  $J$  is the cam  $J^4$ , which operates the link  $J^5$ , which operates the lifter-board controlling both the cords connected with the levers and with the indicators. This shaft  $J$ , as shown, is turned by hand; but it may be connected with any desired operating mechanism. When this shaft  $J$  is turned through the medium of the cam  $J'$ , link  $J^2$ , and levers  $j' j^2$ , the card-cylinder  $G^3$  is rotated by means of the hooked lever  $J^5$ , bringing a new card into position, and the cam  $J^4$  lifts the lifter-board, thus releasing the old lever and bringing either it or a new lever into position. At the same time the cam  $J^3$  acts upon the rod  $F^3$  to shift the belt and to start the loom, and it is locked in that position.

The roller or drum  $H'$  is brought back to its initial position by the following means: Upon the roller or drum  $H'$  is the projecting hub  $H^3$ , which has around it and secured to it the cord or strap  $h^4$ , to the end of which is attached the weight  $h^5$ . When the lever  $G$ , as before described, operates to move the lever  $H$  to shift the rod  $f'$  to shift the belt to the idle pulley, the cam  $h^2$  on the sleeve  $f^{11}$  on the rod  $f'$ , through the rotation of the rod  $f'$ , strikes the projecting end of lever  $K$ , the other end of which lies under the pins  $k'$  on the pawl  $i$  and retaining-pawl  $i^{21}$ , thus releasing both pawls from engagement with the ratchet-wheel  $I'$  to allow the weight  $h^5$  to pull the drum back to its initial position. In order to bring a new card into position and to again start the mechanism, the rod  $f'$  is returned by hand to its initial position, so that when the belt is shifted to the on position it will be locked in that position. The return movement of rod  $f'$  allows the locking-lever  $F^4$  to assume a position to lock the rod  $F^3$ . It also



allows lever K to drop releasing-pawls  $i$  and  $i^{21}$ , allowing them to engage ratchet-wheel  $L^8$ . The shaft J is rotated by hand, which, through the medium of cam  $J'$  and link  $J^2$  and levers  $j'$  and  $j^2$ , will bring up a new card or cards, while through the medium of cam  $J^3$  will return the rod  $F^3$  to its initial position, where it will be locked by means of the locking-lever  $F^4$ , thus shifting the belt to the on position.

The cylinder M, upon which the cards E control the color or weft indicators, does not rotate until the whole sequence of weft indicated by the first card has been traversed, and it is thrown at the desired point in the following manner: The card-cylinder  $G^3$ , as before described, is operated through the medium of the bell-crank lever  $j'$  and  $j^2$ , which reciprocates cylinder  $G^3$  so as to bring one of the pins  $j^4$  in contact with the hook end of the lever  $j^5$ , pivoted at  $j^6$ , thus throwing cylinder  $G^3$  the distance of one card. The cylinder  $G^3$  and the cylinder M are connected together, so that in the reciprocation of the cylinder  $G^3$  the cylinder M will also reciprocate; but the cylinder M does not rotate until the full sequence of weft corresponding to the indicators have been thrown. The following mechanism accomplishes this result:

L is a lever pivoted at  $j^6$ , which controls the turning of the cylinder M through the medium of the pins  $l$ . The hook  $n$  of this lever is prevented from contacting with a pin  $l$  until all of the wefts corresponding to the sequence have been thrown by the following mechanism: Secured to the outer ends of the pins  $j^4$  of the cylinder  $G^3$  is the cam O, against which the projection  $o$  of the lever L rests. That cam O is provided with a cut-away portion  $o'$ , which is in alinement with the projection  $o$ . This cut-away portion is placed at such a point that the cylinder  $G^3$  makes six changes or the number of changes corresponding to the number of series of indicating devices. This cut-away portion is in alinement with the projection  $o$ . When this point is reached, the projection  $o$  drops in bringing the hook end on the lever L in alinement with pins  $l$ , and at the next throw of the shaft J both the cylinders  $G^3$  and M will be rotated, bringing up a new indicated sequence.

N N are spring-pressed rods for centering the cylinders  $G^3$  and M.

By this mechanism it may readily be seen that the operator has before him an absolute guide as to the order of the shuttle throws and also has before him an absolute indication as when there is to be a change of shuttle or the number of picks which any shuttle is to be thrown. The latter of these is absolute in that the loom is stopped after the given shuttle has been thrown the desired number of picks, and the operator can then at once see from the indicator-chart the next color which is to follow and can arrange before starting the loom. After the complete

sequence has been used the next card will indicate the following sequence, and so on.

While I have shown this mechanism as applied to six-colored weaving and with twelve picks, still it is perfectly evident that the number of color-shuttles may be increased to any extent, and so may the number of levers corresponding to the picks be increased indefinitely. I do not intend in this case to limit myself, except wherein the same is specifically claimed, to the particular mechanism shown for accomplishing this result, as I believe myself to be the first who has, in the weaving of this class of fabric, provided visual indication of the sequence of weft and the automatic mechanism which will positively determine to the operator the number of picks of each weft to be thrown.

While my invention is specially applicable to the weaving of "chenille-weft," so called, it is of course applicable to the weaving of any fabric in which shuttles are not thrown, pick for pick, in a regular sequence. I may also increase the number of weft sequence any one card can control by increasing the size of the card and a corresponding increase in the number of indicating devices.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In weaving fabrics with a plurality of different-colored wefts, in combination, indicators corresponding to the different-colored wefts of the fabric, a pattern mechanism connected with and adapted to bring the indicator corresponding to the weft to be thrown in a different plane from the remainder of the indicators.

2. In weaving fabrics with a plurality of different-colored wefts, in combination, indicators corresponding in color to the different-colored wefts of the fabric, a pattern mechanism connected with and adapted to bring the indicator corresponding in color to the weft to be thrown in a different plane from the remainder of the indicators.

3. In weaving fabrics with a plurality of different-colored wefts in combination, indicators corresponding to the different-colored wefts of the fabric, a pattern mechanism connected with and adapted simultaneously to bring a plurality of indicators in a prearranged sequence in a different plane from the remainder of the indicators.

4. In weaving fabrics with a plurality of different-colored wefts in combination, indicators corresponding in color to the different-colored wefts of the fabric, a pattern mechanism connected with and adapted simultaneously to bring a plurality of indicators in a prearranged sequence in a different plane from the remainder of the indicators.

5. In weaving fabrics with a plurality of different-colored wefts in combination, indicators corresponding to the different-colored wefts of the fabric, a pattern mechanism con-



5 nected with and adapted simultaneously to  
bring a plurality of indicators in a prear-  
ranged sequence in a different plane from the  
remainder of the indicators and in successive  
operations of the jacquard to maintain or  
change said sequence.

6. In weaving fabrics with a plurality of  
different-colored wefts in combination, indi-  
cators corresponding in color to the different-  
colored wefts of the fabric, a pattern mech-  
anism connected with and adapted simultane-  
ously to bring a plurality of indicators in a  
prearranged sequence in a different plane  
from the remainder of the indicators and in  
successive operations of the jacquard to main-  
tain or change said sequence.

7. In weaving fabrics with a plurality of  
different-colored wefts, in combination, indi-  
cators corresponding to the different-colored  
wefts of the fabric, a pattern mechanism con-  
nected with and adapted to lift the indicator  
corresponding to the weft to be thrown.

8. In weaving fabrics with a plurality of  
different-colored wefts, in combination, indi-  
cators corresponding in color to the different-  
colored wefts of the fabric, a pattern mech-  
anism connected with and adapted to lift the  
indicator corresponding in color to the weft  
to be thrown.

9. In weaving fabrics with a plurality of  
different-colored wefts in combination, indi-  
cators corresponding to the different-colored  
wefts of the fabric, a pattern mechanism con-  
nected with and adapted simultaneously to  
lift a plurality of indicators in a prearranged  
sequence.

10. In weaving fabrics with a plurality of  
different-colored wefts in combination, indi-  
cators corresponding in color to the different-  
colored wefts of the fabrics, a pattern mech-  
anism connected with and adapted simultane-  
ously to lift a plurality of indicators in a  
prearranged sequence.

11. In weaving fabrics with a plurality of  
different-colored wefts in combination, indi-  
cators corresponding to the different-colored  
wefts of the fabric, a pattern mechanism con-  
nected with and adapted simultaneously to  
lift a plurality of indicators in a prearranged  
sequence and in successive operations of the  
jacquard to maintain or change said sequence.

12. In weaving fabrics with a plurality of  
different-colored wefts in combination, indi-  
cators corresponding in color to the different-

colored wefts of the fabric, a pattern mech-  
anism connected with and adapted simultane-  
ously to lift a plurality of indicators in a  
prearranged sequence and in successive op-  
erations of the jacquard to maintain or change  
said sequence.

13. In weaving fabrics, with a plurality of  
different-colored wefts in combination, a plu-  
rality of indicators corresponding to the dif-  
ferent-colored wefts of the fabric, a pattern  
mechanism connected with and adapted to si-  
multaneously lift a plurality of indicators in  
a prearranged sequence and in successive op-  
eration of the pattern mechanism to maintain  
or change said sequence, a stopping and start-  
ing mechanism for the loom, a pattern mech-  
anism, connection between said pattern mech-  
anism and the stopping and starting mech-  
anism arranged and adapted to successively  
stop the loom according to a prearranged plan  
and means to prevent a shift of the indicator-  
controlling pattern mechanism until the loom-  
controlling pattern mechanism has operated  
to stop the loom a number of times equal to  
the sequence of indicators indicated by the  
indicator-controlling pattern mechanism.

14. In weaving fabrics, with a plurality of  
different-colored wefts in combination, a plu-  
rality of indicators corresponding in color to  
the different-colored wefts of the fabric, a  
pattern mechanism connected with and  
adapted to simultaneously lift a plurality of  
indicators in a prearranged sequence and in  
successive operation of the pattern mech-  
anism to maintain or change said sequence, a  
stopping and starting mechanism for the loom,  
a pattern mechanism, connection between  
said pattern mechanism and the stopping and  
starting mechanism arranged and adapted to  
successively stop the loom according to a pre-  
arranged plan and means to prevent a shift  
of the indicator-controlling pattern mech-  
anism until the loom-controlling pattern mech-  
anism has operated to stop the loom a num-  
ber of times equal to the sequence of indica-  
tors indicated by the indicator-controlling  
pattern mechanism.

In testimony of which invention I have here-  
unto set my hand, at Philadelphia, Pennsyl-  
vania, on this 28th day of April, 1899.

HARRY HARDWICK.

Witnesses:

CHAS. COBB VAN RIPER,  
FRANCES ELLIS.