Nov. 19, 1935. W. F. BIRD ET AL 2,021,848

LAY FOR LOOMS

Filed April 26, 1934 3 Sheets-Sheet 1

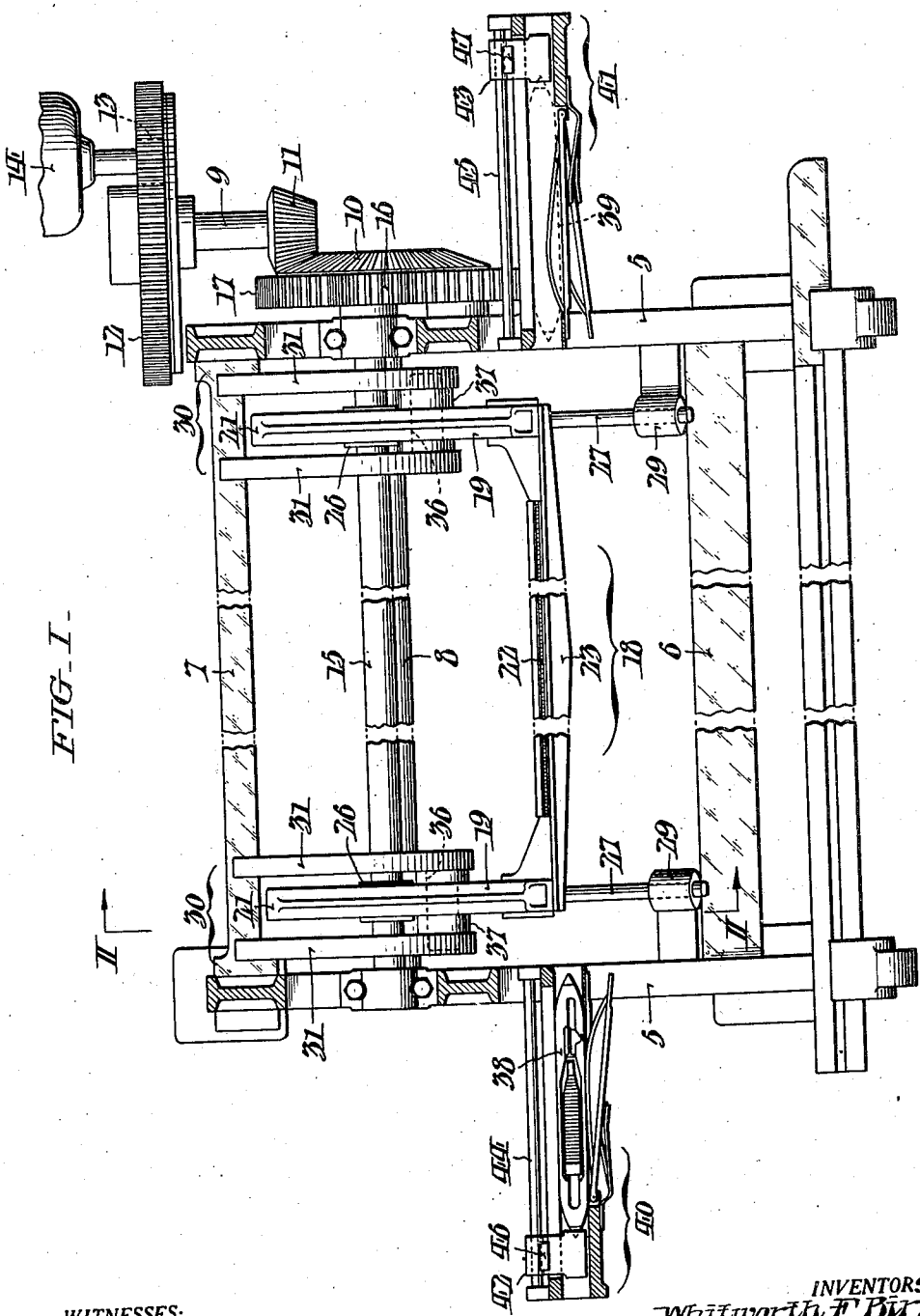


FIG. 1.

WITNESSES:
John C. Bergner.
Thomas W. Kerr, Jr.

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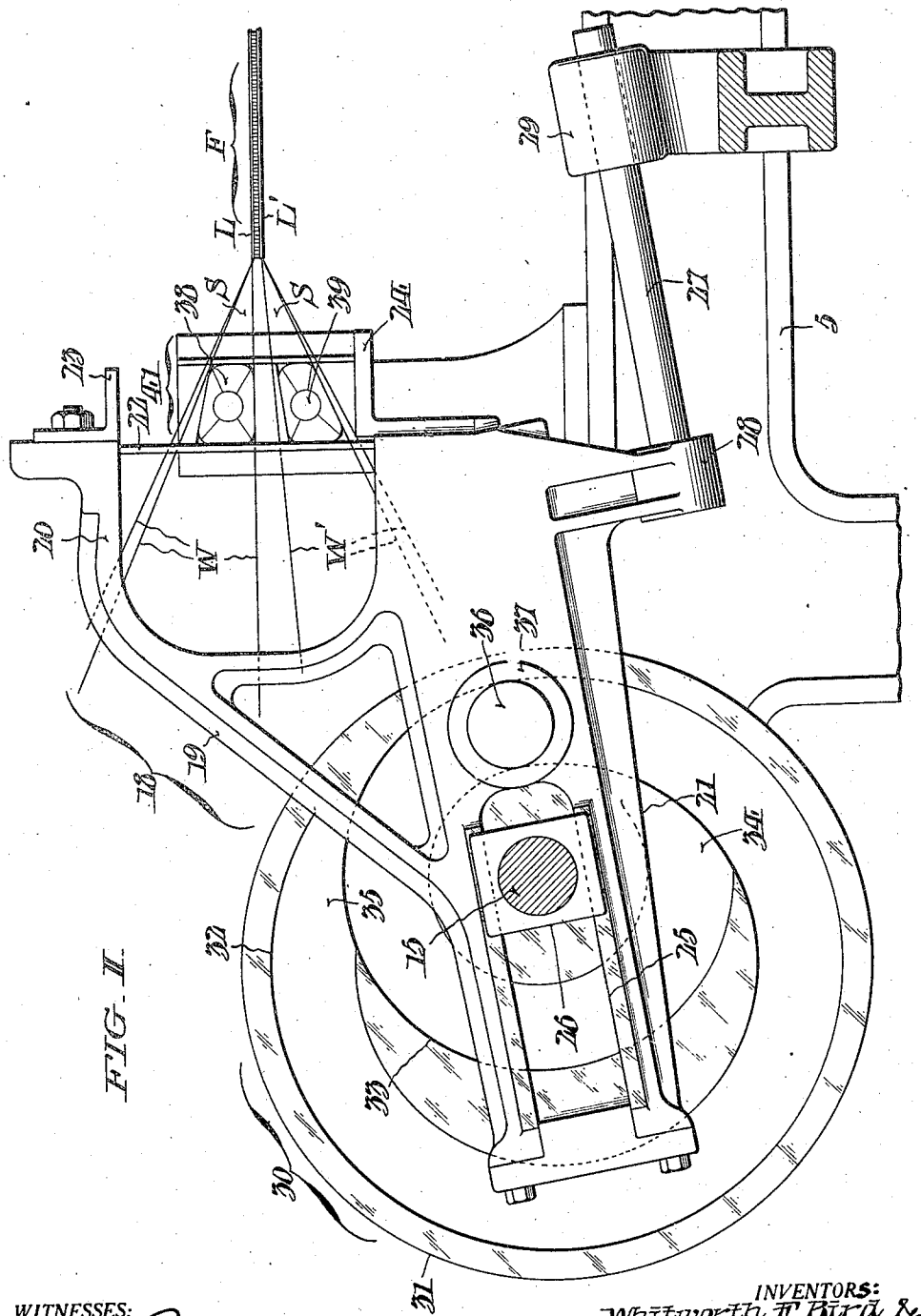


FIG. 1.

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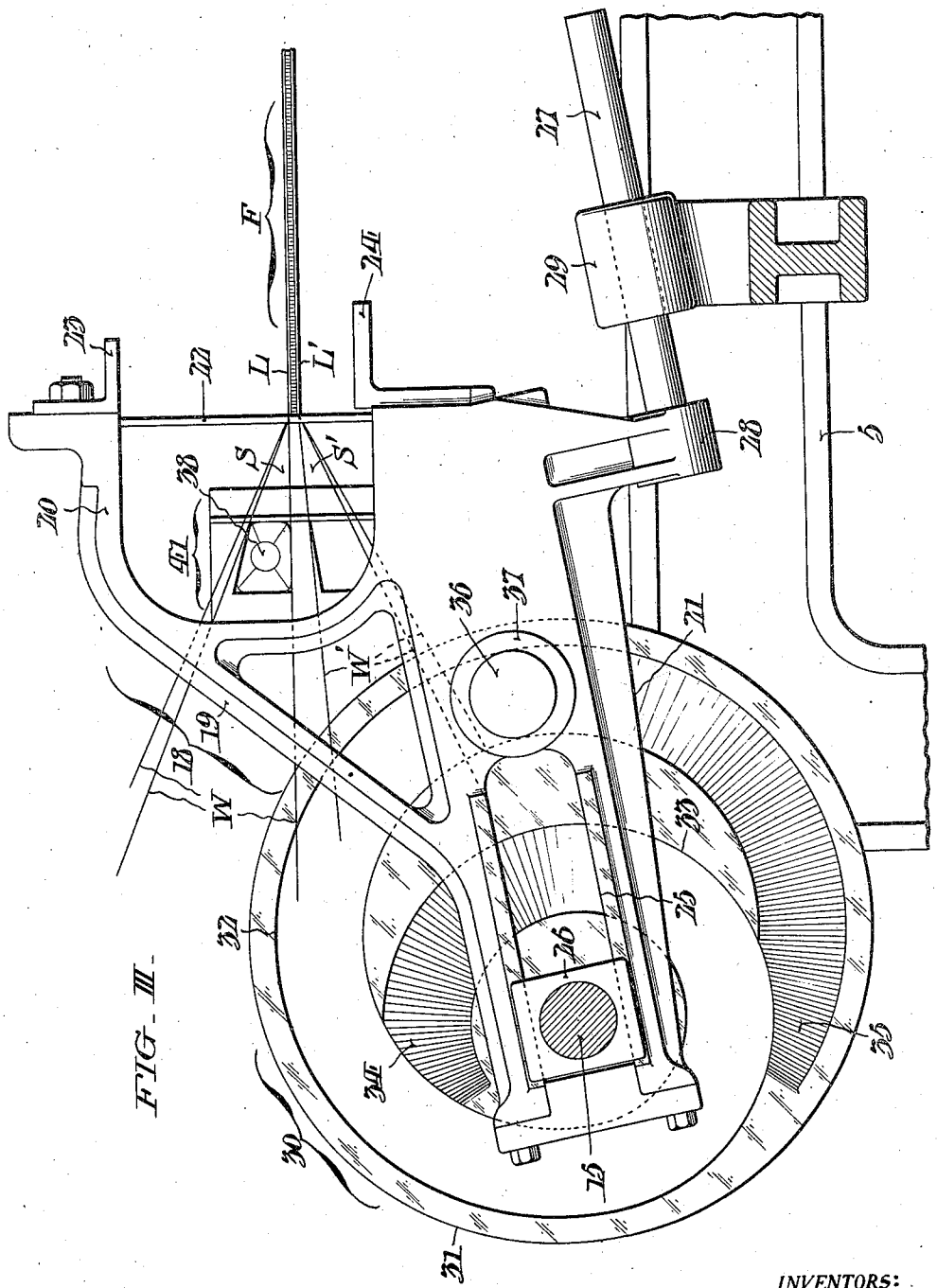


FIG. III.

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UNITED STATES PATENT OFFICE

2,021,848

LAY FOR LOOMS

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Application April 26, 1934, Serial No. 722,438

6 Claims. (Cl. 139—190)

This invention relates to lays useful in connection with plain looms as well as in connection with multi-shed looms such as are employed in the production of double pile fabrics.

In conventional forms of looms, the shuttle boxes are carried at the opposite ends of the lay so that the latter must, of necessity, be sturdily constructed of heavy and bulky parts. The means by which the lays are directly actuated are thus subjected to severe strains as reversals take place incident to oscillations of the lays; and the operation of the looms is attended by incessant pounding and vibration. As is well known, these factors have a restricting or limiting effect upon the speed of the looms, and in turn, upon the fabric yield from them.

In the main, our invention is directed toward overcoming the above recited drawbacks, that is to say: it has for its chief aim, the attainment of higher operating speed and consequently greater production of fabric than possible of attainment with the conventional forms of looms. This desiderata we secure as hereinafter fully disclosed, by elimination of the shuttle boxes as parts of the lay; by otherwise lightening the construction of the lay; through providing for actuation of the lay by smooth operating rotary cam means; and by confining the lay to reciprocation in a straight plane at an acute angle to the horizontal such that the reed is elevated during the beat stroke to determine impact of the reed wires with the fell of the fabric at the region of maximum rigidity of said wires near the lower balk of the reed, and lowered during the return stroke for passage of the warps incident to change of the sheds at the centers of the reed wires where the latter can yield laterally to facilitate passage of knots or snarls in the yarns.

Other objects and advantages of this invention will be manifest from the detailed description following of the attached drawings, wherein Fig. I is a plan sectional view of a double pile fabric loom conveniently embodying our improved lay.

Fig. II is a sectional view on a larger scale taken as indicated by the arrows II—II in Fig. I, and showing the lay in its retracted position; and

Fig. III is a view corresponding to Fig. II but showing the lay in its advanced or beat-up position.

The loom herein depicted has its side frames 5 connected by a number of cross members or girts 6 and 7. This framework affords suitable bearings for a bottom shaft 8 (Fig. I) which receives motion from a power shaft 9 at reduced speed, through a bevel gear couple 10, 11, said power shaft being in turn driven, through speed reducing spur gears 12, 13 by a prime mover 14 conventionally represented as an electric motor. Also journalled in the framework of the loom is an upper shaft 15 which corresponds to the crank shaft of an ordinary loom and which is constantly rotated by means of a pinion 16 thereon in mesh with a spur gear 17 affixed to the bottom shaft 8.

The lay with which the present invention is more particularly concerned, is comprehensively designated by the numeral 18. As shown, the lay 18 comprises laterally-spaced end frames 19, which for the sake of lightness are constructed, in practice from aluminum or the like, said frames having horizontally recessed or yoked frontal portions 20 and rearwardly and downwardly sloping arms or extremities 21. Rigidly connecting the end frames 19 with the reed 22 perpendicularly supported crosswise of the yoked frontal portions 20 of the said frames are transverse upper and lower angle bars 23 and 24. The rearward extremities 21 of the end frames 19, it will be noted from Figs. II and III, are longitudinally slotted as at 25 and engage guide blocks 26 free on the shaft 15; while rods 27 projecting forwardly from pendant lugs 28 at the frontal portions of said end frames in parallelism with the slotted extremities engage in fixed slide bearing brackets 29 reaching inward from the side frames 5 of the loom. As a result of this construction, the lay 18 is confined to reciprocatory movement at an acute angle to the horizontal, which movement is imparted to it by rotary cam devices 30 of the type featured in Figs. I–VII of United States Patent #1,980,527 of November 13, 1934 granted to William R. Hewton, one of the present applicants and filed on August 18, 1933. As in the above identified copending application, each of the rotary cam devices 30 consists of a pair of counterpart disks 31 which are secured to the shaft 15 in spaced opposing relation with one of the rearward extremities 21 of the end frames 19 of the lay 18 extending into the interval between them. The inner faces of the disks 31 of each cam device 30 are formed with grooves or tracks having eccentric and concentric portions 32 and 33 that merge through inclines indicated by the line shading at 34 and 35 in Fig. III. The coincident cam grooves of the disks 31 of each cam device 30 are engaged by the opposite ends of a follower roller 36 which is free to rotate as well as to shift axially in a boss 37

on the rearward extremity of the corresponding end frame 19 of the lay.

As usual, the warps W and W' (Figs. II and III) which respectively enter into the weaving of the top and bottom layers L and L' of the double fabric F, traverse the reed 22 of the lay; and said warps are controlled by suitable harness (not illustrated) to form the necessary upper and lower reversing sheds S and S' in a manner well understood in the art, through which sheds the shuttles indicated at 38 and 39 are simultaneously thrown from shuttle boxes 40 and 41 at opposite sides of the loom, each having two vertically-aligned shuttle compartments. These shuttle boxes 40 and 41, it will be observed from Fig. I are independent of the lay 18 and stationarily supported by the side frames 5 of the loom. The shuttle pickers 42 and 43 are slidable on guide rods 44 and 45 at the backs of the shuttle boxes 40 and 41, and have slotted engagement with the picker sticks 46 and 47 (Fig. I) which are also independent of the lay 18 and suitably fulcrumed on the framework of the loom. The means for actuating the picker sticks may be of any conventional form and for this reason has been omitted from the drawings.

The operation of the loom is as follows:—

The action of the cam devices 30 is such that, during alternate revolutions of the shaft 15, the lay 18 is caused to execute a beat stroke during which the weft threads served by the shuttles 38 and 39 are beaten up into the fell of the fabric F by the reed 22 as in Fig. III; while during the intervening rotations of said shaft, the lay is caused to dwell in its fully retracted position as in Fig. II, as a consequence of which ample time is afforded for the passage of the shuttles crosswise of the loom between the shuttle boxes 40 and 41. Due to definite guidance of the lay 18 to a straight path inclined to the horizontal, the reed 22 is always maintained in true vertical position with the determination that on the beat strokes of said lay, the reed wires engage the fabric at a point slightly above the lower balk (the region of maximum rigidity), whereby the wefts are beaten firmly and uniformly into the fabric. On the other hand, as the lay 18 is retracted toward its idle or rest position shown in Fig. II the reed 22 is lowered, so that upon reversals of the warps W, W' incident to the formation of new sheds, said warps pass each other at or near the center of the reed wires where the latter are most flexible and therefore able to yield laterally somewhat to facilitate passage of snarls or knots in the yarns. By virtue of the lightness of the parts which enter into the construction of our improved lay and further in view of the fact that the shuttle boxes 40 and 41 are entirely separate therefrom, the inertia of the lay is relatively small. The lay can therefore be operated at much higher speeds than possible with the ordinary heavy forms of oscillating lays with attached shuttle boxes, without impartation of excessive pounding or vibration to the framework of the loom. High speed operation of the loom is further favored by the particular actuating mechanism employed, since the grooves of the cam devices 30 are of easy curvature and therefore smooth in their operation. The same advantages as far as the last mentioned consideration is concerned would be obtained by use of any of the other forms of rotary cam devices shown in the patent which has been referred to earlier herein.

Having thus described our invention, we claim:

1. In a loom, a lay supporting a reed in vertical position; means for actuating the lay; means for confining the lay to reciprocation in a straight plane inclined to the horizontal with the reed maintained at all times in true vertical position, whereby, incident to the reversal of the sheds with the lay retracted, the warp yarns pass each other substantially centrally of the height of the reed wires, and that, at the termination of the beat strokes of the lay, the fell of the fabric is engaged by the reed wires at a level near the lower balk of the reed.

2. In a loom, a lay with a vertically-supported reed; rotary cam means for actuating the lay; and means for confining the lay to reciprocation in a straight plane at an acute angle to the horizontal with the reed maintained at all times in true vertical position, whereby, incident to the reversal of the sheds with the lay retracted, the warp yarns pass each other substantially centrally of the height of the reed wires, and whereby at the termination of the beat strokes of the lay, the fell of the fabric is engaged by the reed wires at a level near the lower balk of the reed.

3. In a loom, a transverse lay-actuating shaft; a lay with a reed supported between end frames, said end frames respectively having longitudinally-slotted angularly-receding rearward extremities, swivel blocks free on the shaft and engaged by said extremities, and forwardly reaching rods in parallel relation to the slotted extremities engaging fixed brackets on the loom frame; and rotary cams on said shaft for reciprocating the lay.

4. In a loom, a transverse lay-actuating shaft; a lay with a reed vertically supported between end frames, said end frames respectively having longitudinally-slotted rearwardly-declining extremities, swivel blocks free on the shaft and slidingly engaged by said extremities, and forwardly reaching rods in parallelism with the slotted extremities engaging fixed guides on the loom framework; shuttle boxes at opposite sides of the loom independent of the lay; and rotary cams on the shaft aforesaid for imparting reciprocatory movement to the lay.

5. In a loom with positionally fixed shuttle boxes at opposite sides thereof, a lay comprising a reed; means for confining the lay to reciprocation in a straight plane inclined to the horizontal with the reed maintained at all times in true vertical position; and rotary cams on said shaft for reciprocating the lay with provisions of dwell periods in retracted position for passage of a shuttle between the stationary shuttle boxes, said rotary cams having grooves engaging a follower roller on the lay.

6. In a loom with positionally-fixed shuttle boxes at opposite sides thereof, a transverse lay actuating shaft; a lay with a reed supported between end frames respectively having longitudinally-slotted, angularly-receding rearward extremities, swivel blocks free on the shaft and engaged by said extremities, and forwardly reaching rods in parallel relation to the slotted extremities in engagement with fixed brackets on the loom frame; and rotary cams on said shaft to reciprocate the lay with provision of dwell periods in retracted position for passage of a shuttle between the stationary shuttle boxes.

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