Aug. 27, 1963 E. PFARRWALLER 3,101,745

DOBBY FOR A WEAVING MACHINE

Filed Feb. 1, 1961 3 Sheets-Sheet 1

Fig. 1

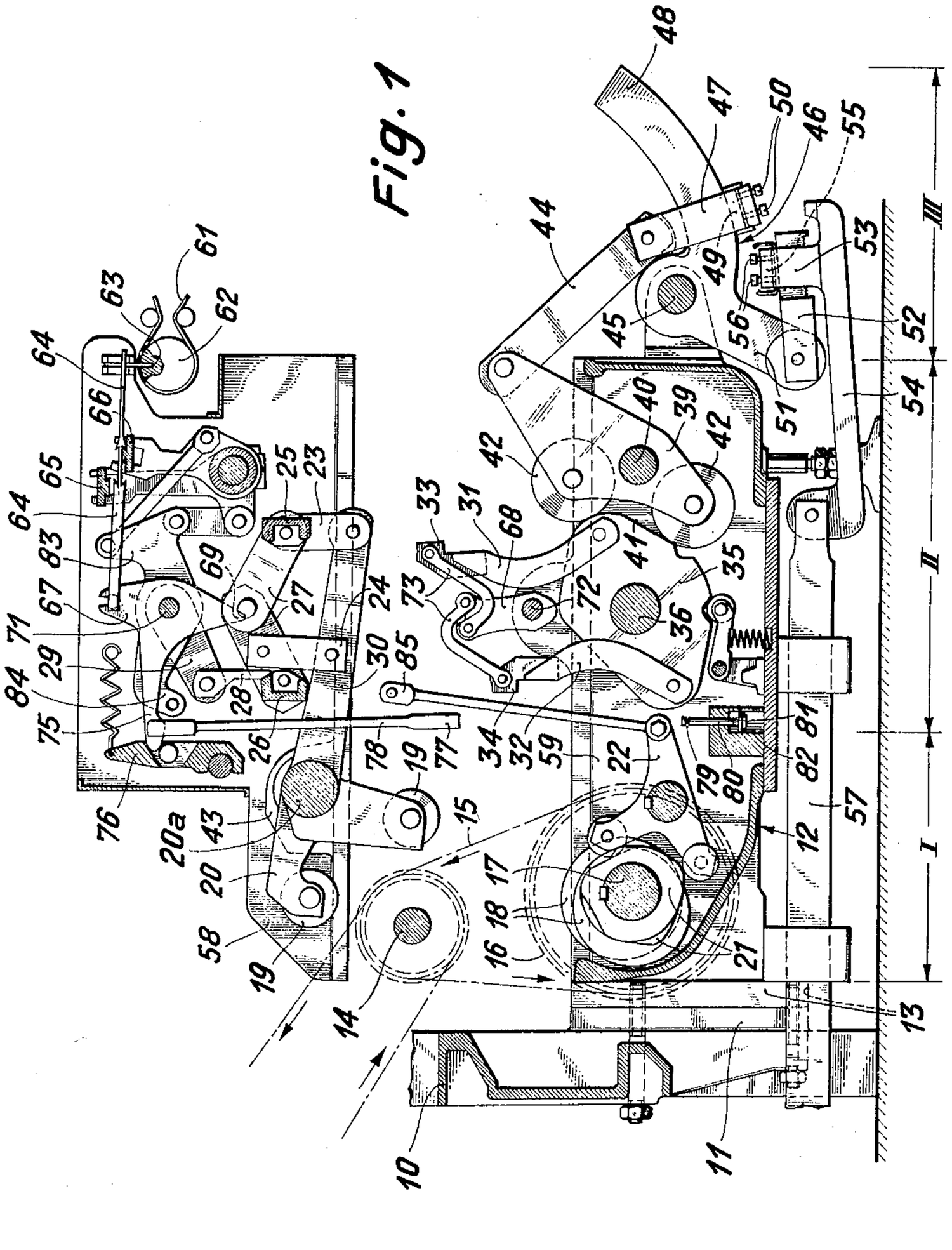

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Fig. 2

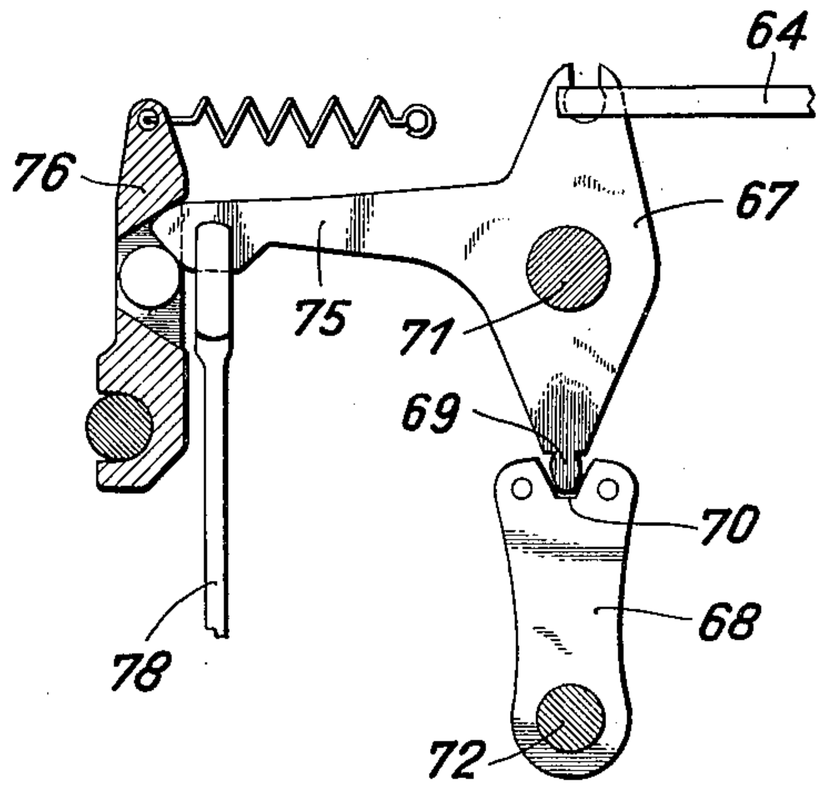
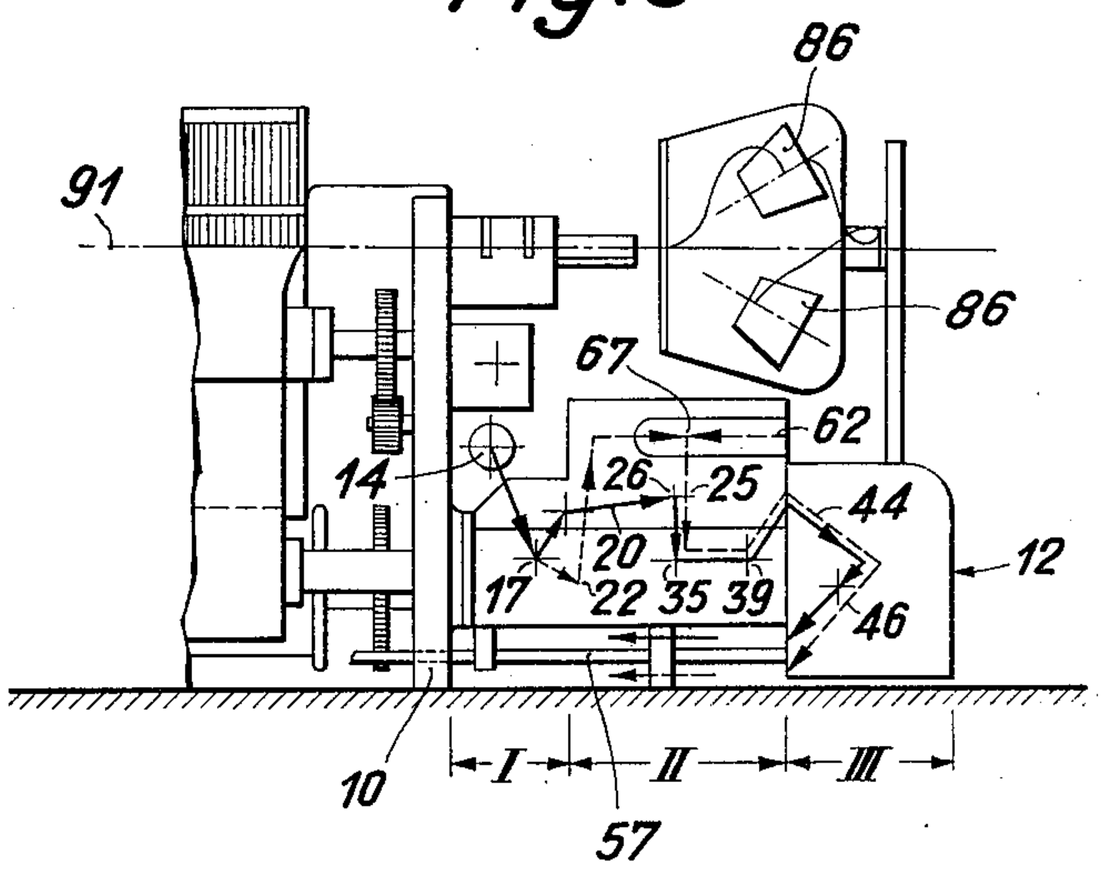


Fig. 5



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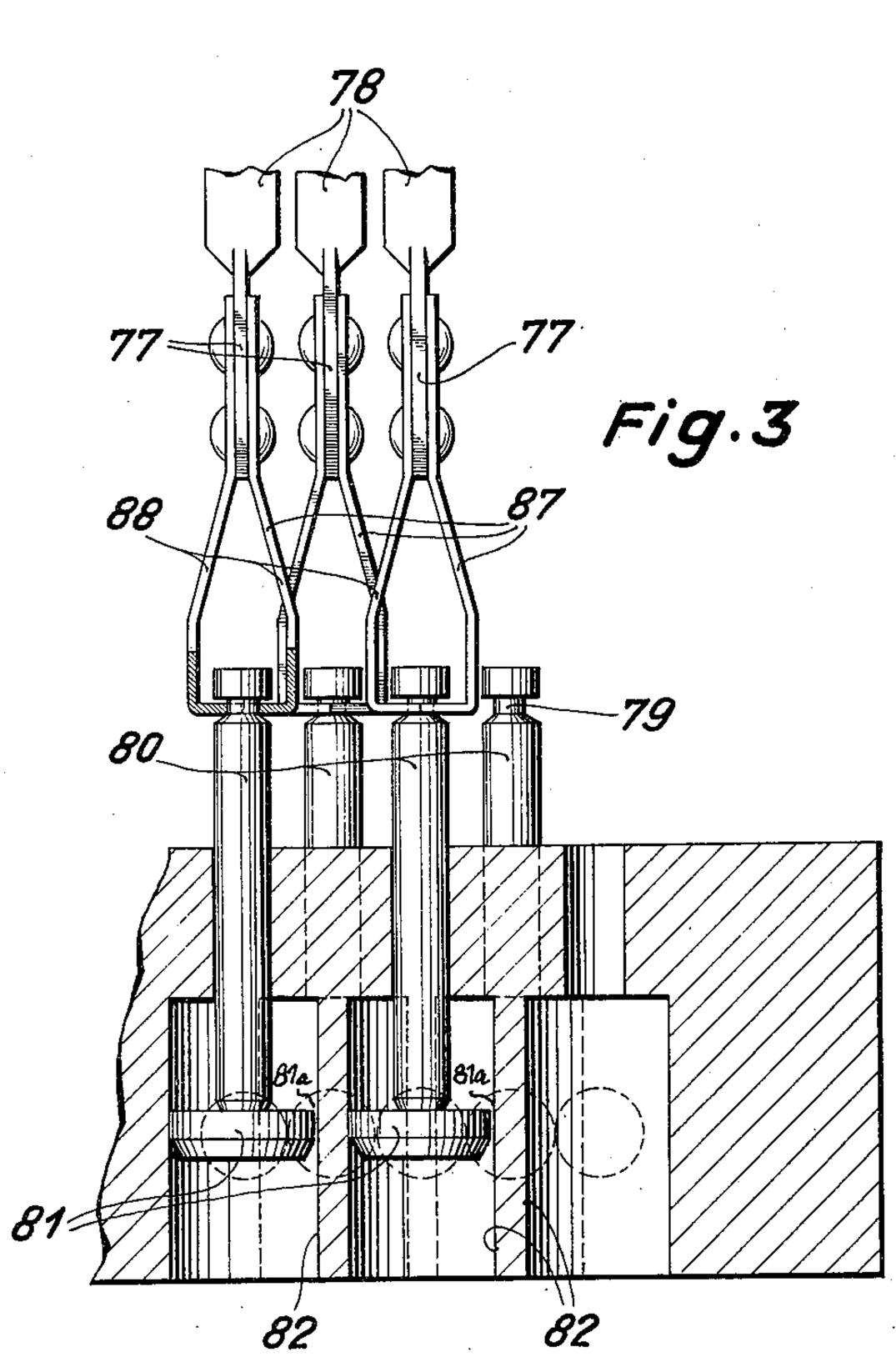
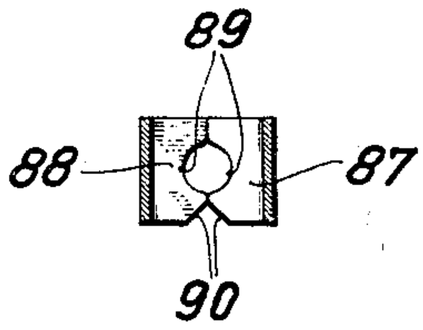


Fig. 3

Fig. 4



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DOBBY FOR A WEAVING MACHINE

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4 Claims. (Cl. 139—66)

The present invention relates to a dobby for a weaving machine for actuating the heddle frames according to a pattern card. The dobby is of the type having reciprocating lifter rails for actuating lifting blades which are selectively moved by a pattern-card-responsive mechanism into positions in which they are engaged by a lifter rail. The lifting blades are pairwisely connected to rocking elements for rocking the latter upon actuation of a lifting blade by a lifter rail. The movement of the rocking elements is transmitted by an adjustable linkage to the heddle frames.

It is an object of the invention to provide a dobby mechanism of the aforesaid type which requires a minimum space and whose lever elements have very short arms. This is achieved by connecting the dobby to a side shield of the weaving machine and placing the drive shaft of the dobby next to the weaving machine and arranging the lifter rails and parts operated thereby in the same sequence as they transmit and produce movements at increasing distance from the weaving machine, the pattern card mechanism being preferably placed distant from the weaving machine and above the lifter rail and lifting blade mechanism, and lever mechanisms actuated by the rocking elements which are operated by the lifting blades being placed farthest away from the weaving machine. The movements of the lever mechanisms are transmitted to the heddle frames of the loom by means of a linkage placed underneath the dobby.

In conventional weaving machine and dobby arrangements the levers which are controlled by the dobby and which operate the heddle frames are close to the weaving machine so that rather extensive means are required for driving the dobby by the main shaft of the loom and producing the required lever motions. Furthermore, in the conventional arrangements the dobby is placed at the same elevation as or even higher than the plane of the woven fabric so that the dobby obstructs the space adjacent to the loom which space, in a weaving machine of the gripper shuttle type whose weft thread supply spools are outside of the shed formed by warp threads, could be better used for placing the weft thread supply spools.

An object of the invention is the provision of a dobby for actuating the heddle frames of a weaving machine wherein the lifter rails producing the power for operating the heddle frame actuating mechanism reciprocate in a vertical direction so that the control mechanism for selectively moving the lifting blades into engagement with the lifter rails can be placed above the lifter rails whereby the length of the dobby is considerably reduced and vibrationless operation is afforded, also at a great number of picks per minute. With the vertical arrangement of the lifter rails and lifting blades horizontal vibrations which would be transmitted to the weaving machine are prevented and irregularities such as faulty weaves are avoided.

The dobby according to the invention is placed on the floor or close to the floor and the low position also contributes to reduce vibrations. Due to the low position and horizontal splitting of the dobby casing into an upper and a lower part, the dobby mechanism is easily accessible. In the dobby according to the invention not only the casing is horizontally split, but the entire dobby mechanism is so arranged that the top parts including the drive

of the lifter rails and the pattern-card-operated mechanism for controlling movement of the lifting blades into and out of engagement with the lifter rails can be lifted off together with the upper part of the casing so that the lower parts of the mechanism are conveniently accessible and the time required for setting up is much reduced. In the dobby according to the invention the provisions for adjusting the length of the stroke of the heddle frames effected by the dobby are not obstructed whatsoever and conveniently manipulated.

The low position of the dobby makes it possible to arrange the weft thread supply spools in gripper shuttle looms above the dobby and close to the side shield of the weaving machine. The dobby according to the invention does not appreciably increase space requirements in the longitudinal direction of the loom.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will best be understood from the following description of an embodiment thereof when read in connection with the accompanying drawing wherein:

FIG. 1 is a diagrammatic longitudinal sectional illustration of a card-controlled dobby, the upper portion of the dobby being shown in a position lifted from the lower portion of the dobby.

FIG. 2 shows a detail of the mechanism shown in FIG. 1 in larger scale.

FIG. 3 is a part sectional side view of a shock absorber forming part of the dobby shown in FIG. 1.

FIG. 4 is a horizontal sectional view of a part of the device shown in FIG. 3.

FIG. 5 is a diagrammatic elevational view of the dobby and a portion of a weaving machine whereto the dobby is connected.

Referring more particularly to FIG. 1 of the drawing, numeral 10 designates a side shield of a weaving machine which is provided with a flange 11 to which a flange 13 provided on the casing of a dobby 12 is bolted. A shaft 14 is operatively connected to the main drive shaft of the weaving machine and drives a main shaft 17 located in a lower part 59 of the casing of the dobby by means of a chain 15 and a sprocket wheel 16.

Cams 18 are made fast on the shaft 17 for actuating a lever 20 provided with cam follower rollers 19 which engage the cams 18. The fulcrum of the lever 20 is in an upper casing part 58. A follower lever 22 is actuated by cams 21 which are also made fast on the shaft 17. The lever 20 actuates two vertically movable lifter rails 25 and 26 by means of links 23 and 24. The lever 22 whose fulcrum is in the lower part of the dobby casing actuates horizontally movable actuating rails 65, 66 by means of a rod 85 and a lever 83.

A guide link 27 is connected to each end of the rails 25 and 26. The guide links 27 have the same length and are swingably connected to the upper part 58 of the casing of the dobby so that all guide links 27 swing on the same axis. An arm 28 is rigidly connected to each lifter rail, only the arm 28 connected to the rail 26 being shown. The upper ends of the arms 28 are pivoted to guide links 29 which have the same length as the links 27 and whose fulcrums are coaxial and in the upper casing part. This arrangement assures translatory vertical reciprocating movement of the rails 25 and 26.

Lifting blades 31 and 32 are provided with heads 33 and 34, respectively, fitting into channels of the rails 25 and 26, the latter having a U-shaped cross sectional configuration. A pair of lifting blades 31, 32 and a rocking cam 35 to which the lifting blades are pivoted are provided for each heddle frame of the weaving machine. All rocking cams 35 are freely swingable on a shaft 36 sup-

ported in the lower part 59 of the casing of the dobby. Each rocking cam 35 has a cam surface 41 cooperating with follower rollers 42 of a lever 39, the levers 39 being individually swingable on a common shaft 40 which is connected to the lower part 59 of the casing of the dobby.

The levers 39 are individually adjustably connected by means of links 44 and a slide 47 to arcuate arms 48 of levers 46 swinging on a shaft 45 connected to the outside of the lower casing part 59. Each lever 46 has a second arm 51 to the end of which a rod 52 is swingably connected. The rod 52 extends through a recess in a protuberance 53 of a connecting rod 54 which is swingably connected to the end of a rod 57 guided to move horizontally below the casing portion 59 and connected to a heddle frame, not shown, for moving the frame up and down. By moving the slide 47 along the arm 48 and fixing the slide 47 in the desired position by pressing an intermediate element 49 against the arm 48 by manipulating adjusting screws 50 and by adjusting the position of the rod 52 in the protuberance 53 and fixing it in the desired position by tightening screws 56 against an element 55 which presses against the rod 52, the vertical stroke of the heddle frame connected to the rod 57 can be adjusted. The casing of the dobby 12 is horizontally split, the upper part 58 resting on the lower part 59 and being connected thereto by bolts, not shown.

The right side of the upper part 58 of the casing of the dobby contains a mechanism actuated by a pattern card 61. The pattern card extends around a card cylinder 62 and has apertures which are scanned by needles 63. The cylinder 62 and the pattern card thereon are advanced after every pick of a shuttle through the shed formed by warp threads in the weaving machine. If a needle 63 meets with a hole in the pattern card, a control rod 64 to the end of which the needle 63 is connected is lowered to be engaged by a substantially horizontally reciprocating rail 66. If the needle 63 does not meet with a hole, the control rod is in uppermost position and engaged by a horizontally reciprocatingly moving rail 65. A needle 63 and a control rod 64 are provided for each heddle frame of the weaving machine.

Each control rod 64 has a free end engaging a control lever 67 so that the lever is moved in counterclockwise direction when the rod 64 is moved to the left and in clockwise direction when the rod 64 is moved to the right. The levers 67 are freely swingable on a shaft 71 mounted in the upper casing part 58. The lower casing part 59 contains a shaft 72 on which arms 68 are freely swingable. Each lever 67 has a downwardly extending arm with a tooth 69 at its free end which tooth engages a corresponding notch 70 in an arm 68 when the upper casing part 58 rests on the lower casing part 59 as shown in FIG. 2. Two links 73 are pivoted to each arm 68 and are individually pivoted to the heads 33 and 34 of the lifting blades 31 and 32, respectively, for alternately placing the heads 33 and 34 in a position where they are engaged by the lifter rails 25 and 26.

The control lever 67 has an arm 75 extending substantially horizontally to the left and has a free end adapted to engage a pawl 76 which has a cam means placed opposite the middle position of the arm 75 which swings between two end positions. The pawl 76 is pressed against the end of the lever arm 75 by a spring. Actuation of the control rod 64 by one of the rails 65 or 66 moves the lever arm 75 from one end position past the aforesaid cam means. The spring-loaded pawl 76 snaps the lever arm 75 toward the opposed end position. This snap mechanism is more elaborately disclosed in my copending application Serial No. 86,492, filed at the same date as the present application.

A connecting rod 78 is movably connected to each arm 75. The lower end of each connecting rod 78 is provided with a resilient clamp 77 adapted to grip an annular groove in the top of a piston rod 80 of a damping piston 81 which operates in a cylinder 82 mounted in the lower

part 59 of the casing. Between the damping piston 81 and its cylinder 82 is a clearance or a throttling opening 81*a* to cause the necessary damping effect. The damping device, per se, is described in my aforementioned copending application.

As seen in FIGS. 3 and 4, each clamp 77 comprises two plate springs 87 and 88 whose lower ends are bent to face one another. Each of these lower ends is provided with a semicircular recess 89 and a slanted leading edge 90 so that the clamps can be pushed sideways onto the piston rods 80 to embrace the recessed parts 79 thereof.

The actuating rails 65 and 66 are reciprocated in opposite directions upon swinging of the lever 33.

As seen in FIG. 5, the dobby 12 is placed below weft thread storage spools 86 and substantially lower than the plane 91 of the fabric woven by the weaving machine. The arrangement and relative location according to the invention of the several elements necessary for actuating the heddle frames of the weaving machine is so compact that not only one storage spool can be provided above the dobby, but a second storage spool can be placed between the dobby and the first storage spool, i.e., below the plane of the woven fabric. If the second storage spool is placed above the plane of the woven fabric, the view of the weaving machine is obstructed and the weft thread may be soiled. It is of interest in this connection that eight weft thread storage spools must be provided in a weaving machine having a four-pick mechanism. In order to equalize the pulling-off operation of the weft thread from the spools the latter must be symmetrically placed with respect to the weaving plane 91 and must be as close to the weaving machine as possible. If disc spools of large diameter are used, only four spools can be placed on a semicircle so that the spare spools must be placed therebelow.

As seen in FIG. 5, the dobby 12 according to the invention requires very little space in addition to that required by the weaving machine and the weft thread supply spools.

The solid line arrows in FIG. 5 indicate the power flow which originates at the shaft 14 wherefrom operating power for the dobby is consecutively transmitted to the shaft 17, to the lever 20, to the lifter rails 25, 26, therefrom in downward direction to the rocking levers 35, and thereupon to the levers 39, the links 44, the adjustable levers 46 and to the linkage 57 which actuates a heddle frame of the weaving machine.

The dotted line arrows in FIG. 5 indicate the path of the control movements. These are originated in part in the shaft 17 with the cams 21 which are followed by the rollers of the levers 22 and are transmitted to the actuating rails 65 and 66 and therefrom to the control lever 67. The aforesaid movements are controlled by the pattern card 61 on the cylinder 62 for operating the control lever 67. The controlled movements of the latter are transmitted to the heads 33 and 34 of the lifting blades 31 and 32. From here on, the control movements travel along a path which is parallel to the power flow.

In order to better explain the arrangement of the dobby mechanism according to the invention, let us divide the dobby casing into three juxtaposed spaces I, II and III. The arrows in FIG. 5 show that the power as well as the control follow a path beginning at the shaft 17 and extending consecutively through the spaces I, II and III, i.e., from left to right. The linkage 57 for transmitting the control movements produced by the dobby to the heddle frames is placed below the dobby and does not obstruct in any way the spaces I, II and III. The cams 18 on the shaft 17, the rollers of the lever 20 which rollers follow the cams 18, the bearings 43 supporting the fulcrums 20*a* of the levers 20, the cams 21 and the lever 22 actuated by the cams 21 and operating the actuating rails 65 and 66 are placed in the space I which is adjacent to the weaving machine. Therefore, the chain for rotating the shaft 14 and the chain drive 15 between the shaft 14 and the shaft

17 can be made very short. In the space II vertically moving elements predominate. The upper part of the space II contains the pattern-card-operated mechanism including the actuating rails 65 and 66, the control rods 64 with the needles or feelers 63 and the pattern card cylinder 62 for the pattern card 61. The space II also contains the control lever 67, 68 and the pawls 76. The lifter rails 25 and 26 are placed below the pattern-card-operated mechanism and are reciprocatingly moved up and down by means of an arm 30 extending substantially horizontally from the lever 20 into the space II. The rocking levers 35 actuated by the lifting blades 31 and 32 are below the lifter rails.

It is of advantage that the considerable masses of the lifter rails 25 and 26 and of the lifting blades 31 and 32 with the heads 33 and 34 move in vertical direction, because with this arrangement no vibrations are caused which will be transmitted laterally to the weaving machine.

The arrangement of the cam surfaces 41 on the right side of the rocking levers 35 has the advantage that the follower levers 39 can be placed equally low and the mechanism for transmitting the heddle frame actuating force including the adjustable levers 46 in space III is very short. The levers 46 and adjustable connections thereof to the levers 39 and to the rods 54 are placed outside of the main casing of the dobby, away from the weaving machine and readily accessible.

Because of the two-part arrangement of the connection consisting of the control lever 67 and of the arm 68 and the arrangement of the coupling 87, 88 in the connection between the arm 75 and the damping device 81, 82 the upper dobby casing part 58 and parts mounted therein can easily be removed from the lower casing part 59 for overhauling and cleaning. For removing the upper part of the dobby mechanism from the lower part only a screw connection between the rod 85 and the lever 83 must be disconnected. The coupling parts 87 and 88 can be disconnected from the piston rods 80 and the levers 67 can be disconnected from the arms 68 without any tools.

Because of the division of the dobby mechanism into a lower part and into an upper part rivet connections which require little space can be used for connecting the links 73 to the arms 68 and to the lifting blades 31, 32. The latter can be connected by riveted pivots to the rocking elements 35.

A further advantage of the horizontal splitting of the dobby is the easy interchangeability of the rocking cams with their actuating elements 31, 32, 73 and 68 which can be effected by simply pulling out the shafts 72 and 36. This considerably shortens the time required for setting up the mechanism.

I claim:

1. A dobby for a weaving machine comprising:
a drive shaft,
cams mounted on said drive shaft,
a lever engageable with said cams for actuation thereby and having a substantially horizontal arm,
lifter rails operatively connected to said arm for reciprocating movement thereby,
lifting blades adapted to be engaged by said lifter rails,
rockable cam elements placed below said lifter rails and movably connected to said lifting blades to be rocked according to the movements of said lifting blades engaged and actuated by said lifter rails,

levers engageable by said cam elements, and
a casing horizontally split into an upper part and into a lower part,
said upper part containing and supporting said lifter rails and said lever which is engageable with said cams mounted on said drive shaft,
said lower part containing and supporting said drive shaft, said rockable cam elements, and said levers engageable by said cam elements,
said lifting blades protruding from said lower casing part into said upper casing part,
said lifter rails and said lever contained in and supported by said upper casing part abuttingly engaging and being readily separable from said lifting blades and from said cams contained in and supported by said lower casing part, and said upper casing part and elements contained therein forming a unit vertically separable as a unit from the lower casing part and elements contained therein.

2. In a dobby according to claim 1:
a pattern-card-controlled mechanism including upper actuating levers swingably connected to said upper casing part, and
lower actuating levers swingably connected to said lower casing part and operatively connected to said lifting blades for selectively moving the latter,
said upper and lower actuating levers having correspondingly shaped end portions fitting into and engaging one another for actuating the lower levers by the upper levers when said upper casing part is placed on said lower casing part and affording free vertical removal of the upper unit from the lower unit.

3. In a dobby according to claim 1 a pattern-card-controlled mechanism contained in said upper casting part and including actuating levers having a substantially horizontal arm swingable between two end positions, means for swinging said actuating levers from said end positions past a middle position between said end positions according to the pattern card, a snapping mechanism operatively connected to each of said horizontal arms and adapted to snap said arms from the position past the middle position to complete the movement of said arms from one end position to the second end position, damping devices contained in said lower casing part for damping the movement of said horizontal arms produced by said snapping mechanism, and disconnectable connecting means individually connecting said horizontal arms to said damping means.

4. In a dobby according to claim 3 and wherein said damping devices individually include pistons and piston rods and said disconnectable connecting means include resilient means adapted to be snapped onto said piston rod for connecting the latter to said connecting means when said upper casing part is placed on the lower casing part.

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