June 10, 1930. R. E. WALLISER 1,763,111

COMBINED POWER AND HAND LOOM

Filed July 16, 1928 7 Sheets-Sheet 1

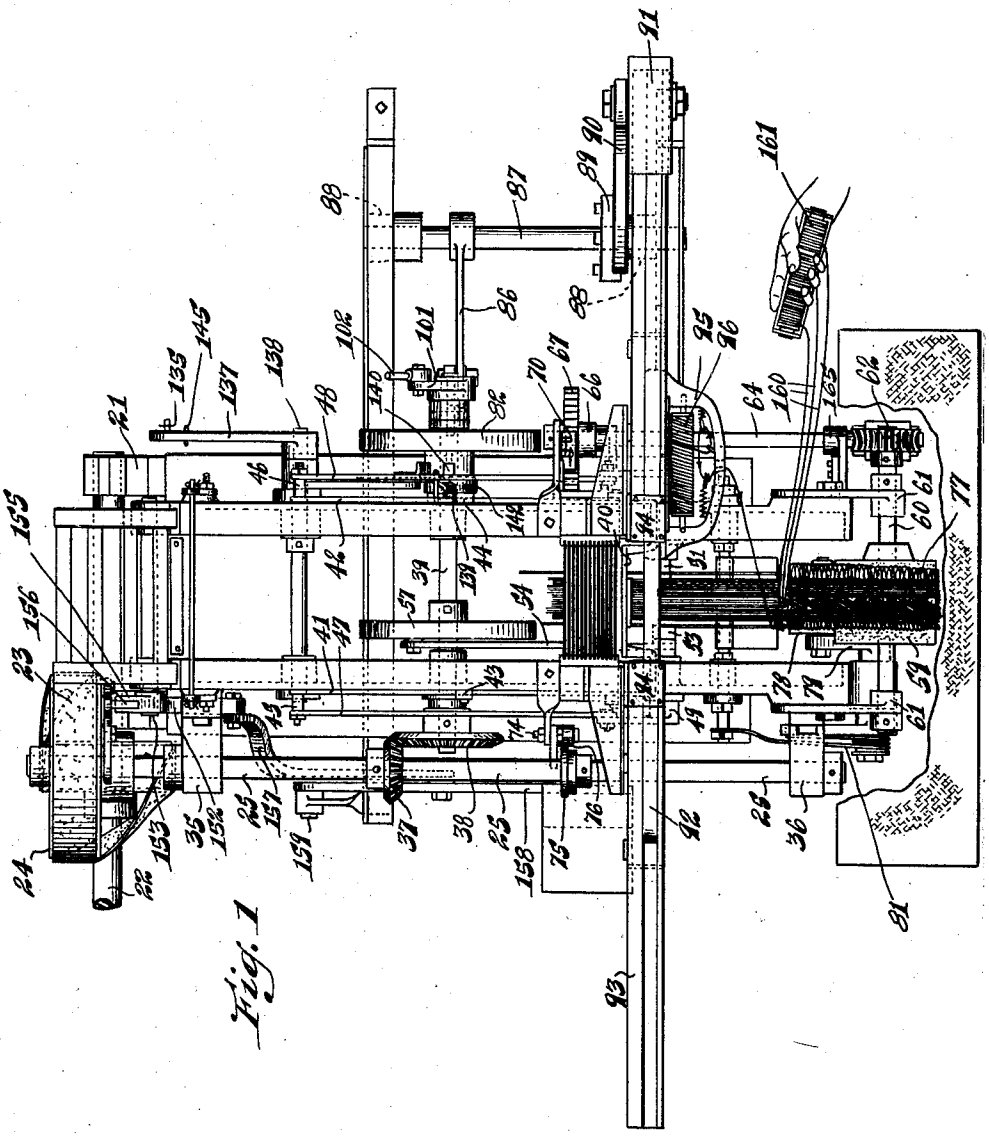

Fig. 1

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E. D. Touschè

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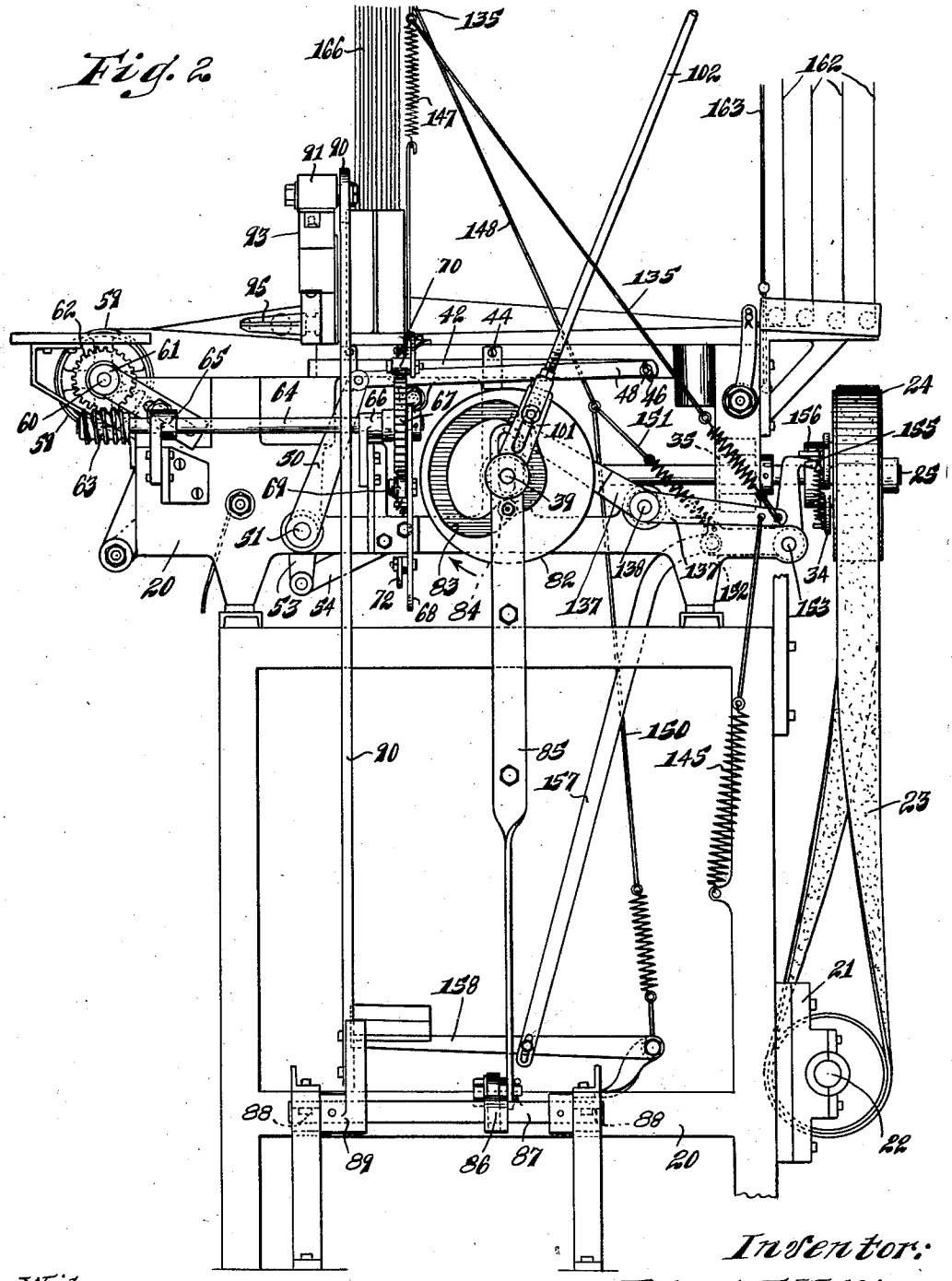
COMBINED POWER AND HAND LOOM

Filed July 16, 1928 7 Sheets-Sheet 2

Fig. 2.



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COMBINED POWER AND HAND LOOM

Filed July 16, 1928 7 Sheets-Sheet 3

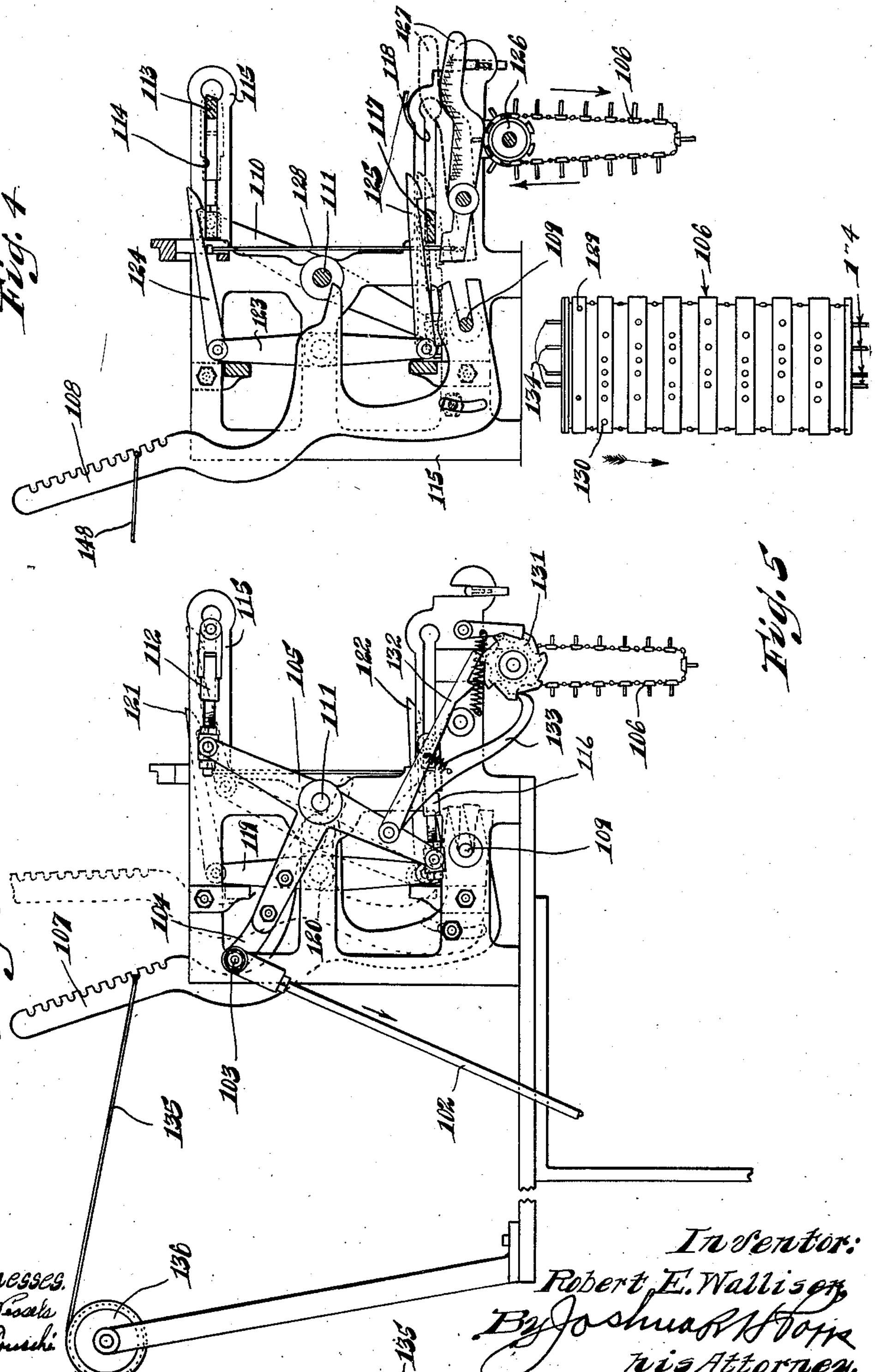

Fig. 4

Fig. 3

Fig. 5

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June 10, 1930. R. E. WALLISER 1,763,111

COMBINED POWER AND HAND LOOM

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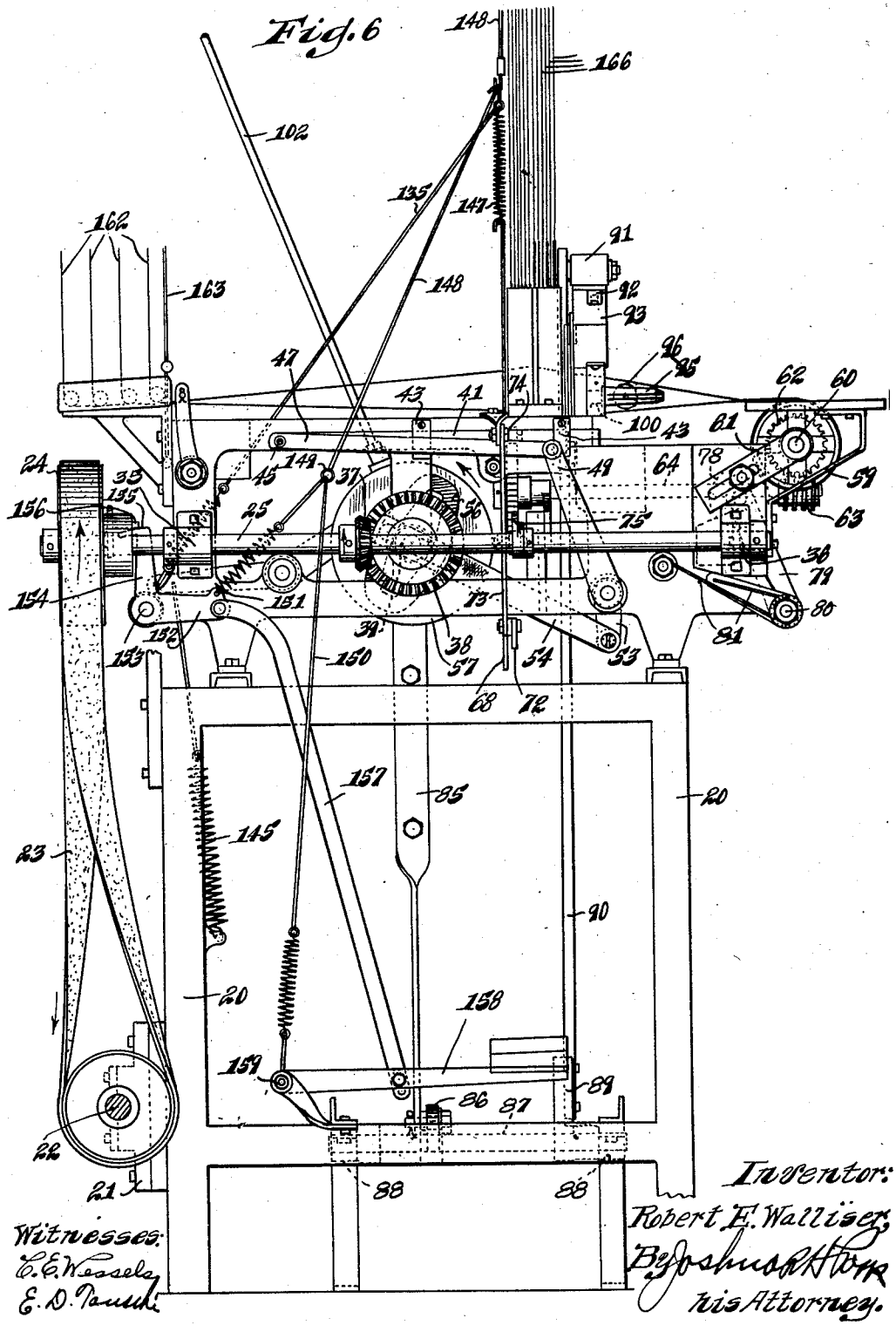
Fig. 6



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June 10, 1930. R. E. WALLISER 1,763,111

COMBINED POWER AND HAND LOOM

Filed July 16, 1928 7 Sheets-Sheet 5

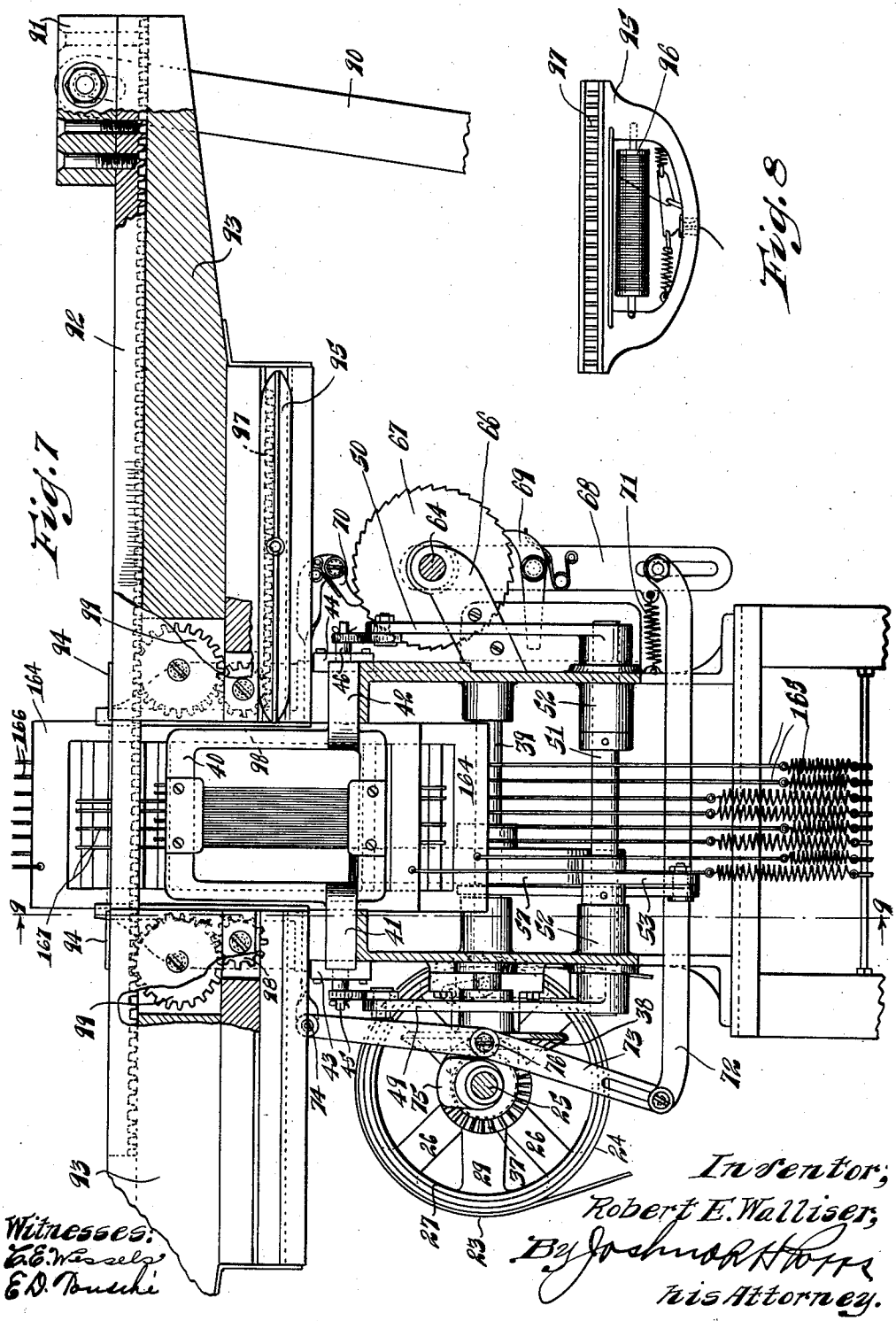

Fig. 7

Fig. 8

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June 10, 1930. R. E. WALLISER 1,763,111

COMBINED POWER AND HAND LOOM

Filed July 16, 1928 7 Sheets-Sheet 6

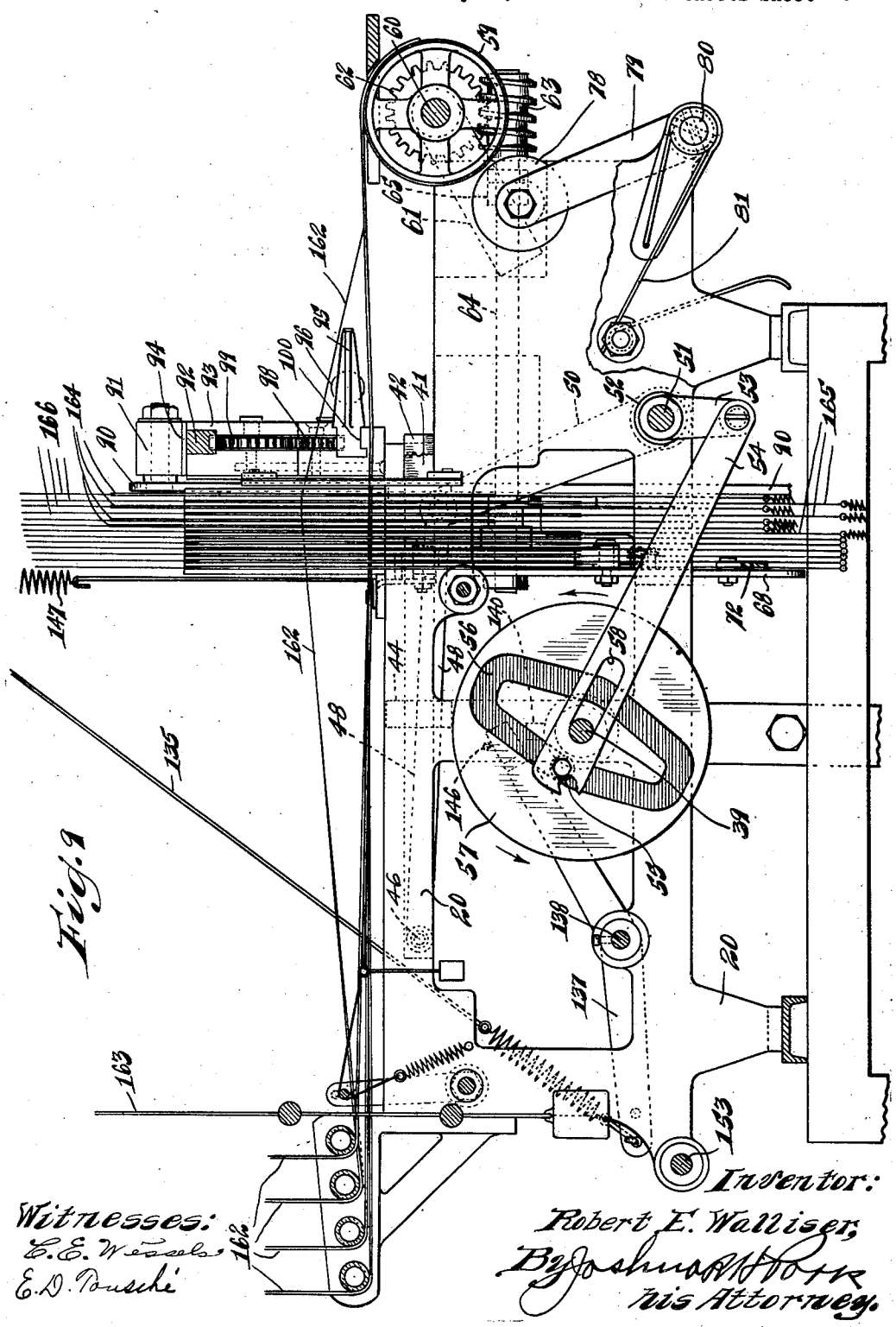

Fig. 9

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June 10, 1930. R. E. WALLISER 1,763,111

COMBINED POWER AND HAND LOOM

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Fig. 11

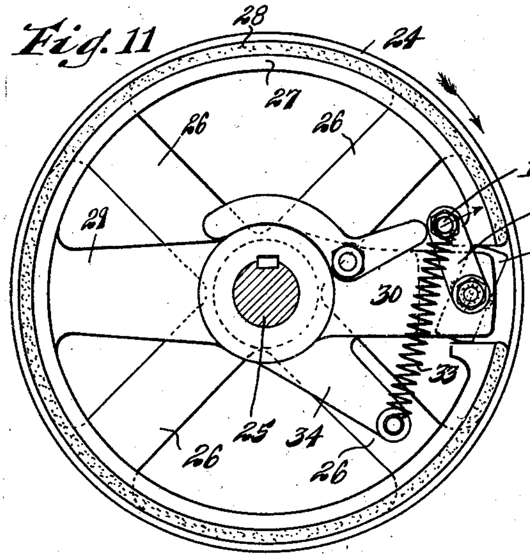


Fig. 10

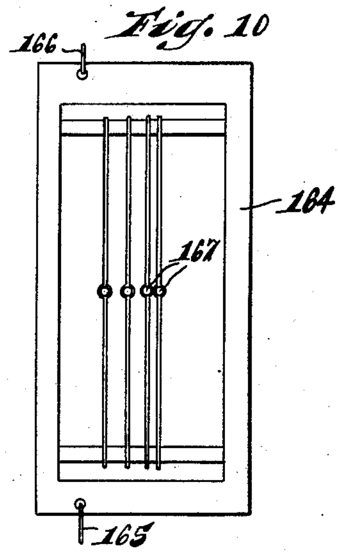


Fig. 12

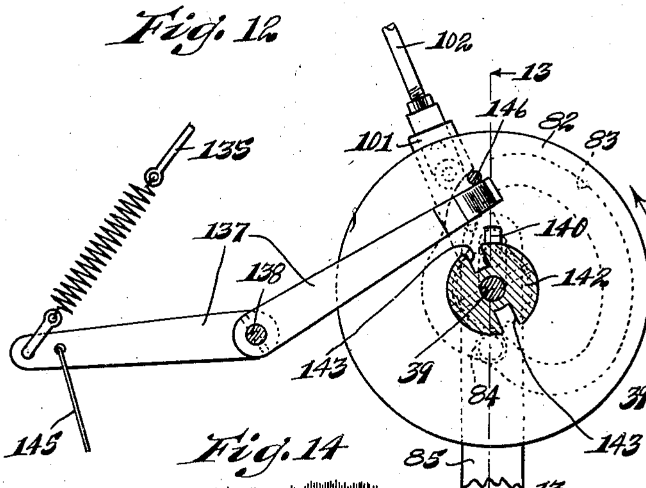


Fig. 13

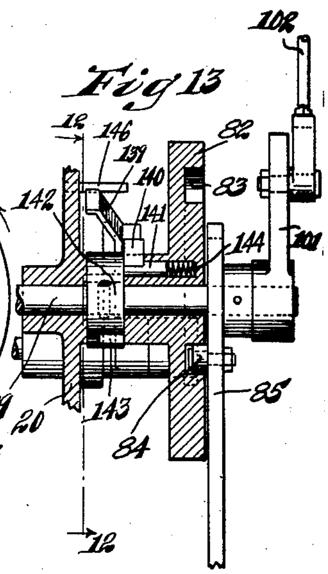
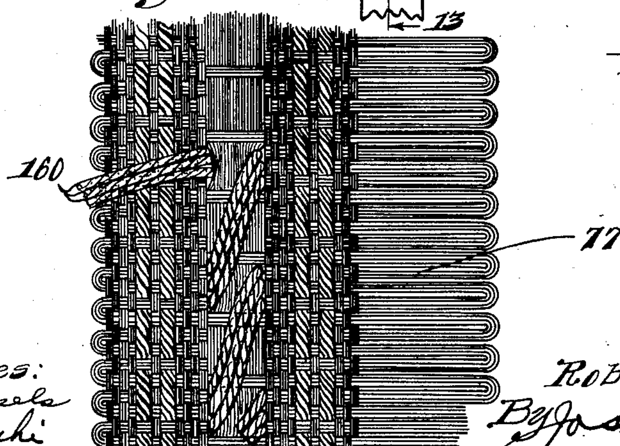


Fig. 14



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Patented June 10, 1930

1,763,111

UNITED STATES PATENT OFFICE

ROBERT E. WALLISER, OF CHICAGO, ILLINOIS

COMBINED POWER AND HAND LOOM

Application filed July 16, 1928. Serial No. 293,277.

This invention relates to a combined power and hand loom designed for producing woven fabric or any figure goods, and has for its object the provision of a machine of this character which will automatically stop at a certain predetermined point in the weaving of the pattern to permit of interweaving threads or cord into the pattern by hand.

A further object is the provision of a machine of this type employing a dobby loom whereby the machine will come to rest when the shuttle is at a particular position in its travel to permit the intermittent hand weaving operation, and thus maintain a uniform pattern. An additional object resides in providing mechanism as an improvement to the type of loom employing a jacquard, dobby, cam or equivalent pattern mechanism by means of which the pattern chain or form usually employed serves to actuate mechanism for intermittently halting operation of the shuttle mechanism and immediately following to actuate the stopping mechanism for the entire machine.

As a general object, the machine of the present invention makes possible the fabrication of textiles almost entirely automatically that formerly were required to be made entirely on a hand loom.

Other objects will appear hereinafter.

The invention consists in the combination and arrangement of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification, and in which:

Fig. 1 represents a plan view of the machine;

Fig. 2 illustrates a side elevation of the right side of the machine;

Fig. 3 is an elevational view of the right side of the dobby mechanism;

Fig. 4 is a view similar to Fig. 3 except taken at a vertical section through the dobby mechanism;

Fig. 5 is an elevation of the type of pattern chain preferably employed;

Fig. 6 is an elevational view of the left side of the machine;

Fig. 7 is an enlarged view partly in section of the front of the machine;

Fig. 8 is a plan view of a type of shuttle advantageously employed;

Fig. 9 is a vertical sectional view taken on the line 9—9 of Fig. 7;

Fig. 10 is an elevation of a heddle frame;

Fig. 11 is an elevational view of the machine starting and stopping clutch;

Fig. 12 is an elevation taken on the line 12—12 of Fig. 13 of the shuttle disengaging mechanism;

Fig. 13 is a vertical sectional view partly in elevation of the shuttle disengaging mechanism taken on the line 13—13 of Fig. 12; and

Fig. 14 is a view of a typical woven fabric produced by the machine of the present invention at a stage when a hand operation is about to be performed.

As illustrated in the drawings, the preferred embodiment of the machine comprises a frame 20 upon which is mounted bearing block 21 for supporting a continuously rotating drive shaft 22. Belt 23 travels over pulley 24 (see Fig. 11) which is loosely mounted upon shaft 25 and supported by spokes 26. Within pulley 24 is a friction drum clutch 27 covered with the usual clutch lining 28 and split at one side to allow for engagement and disengagement with pulley 24. Clutch 27 is keyed to the shaft 25 and is supported by arms 29 and 30, upon the latter of which is pivotally mounted a clutch shoe 31. Secured to the shaft which carries shoe 31 is an arm 32 connected by spring 33 to arm 34 of the clutch proper for the purpose of normally maintaining shoe 31 in position to expand the free ends of the clutch. Shaft 25 is journalled upon the frame of the machine at 35 and 36 and carries bevel gear 37 which meshes with bevel gear 38 for driving shaft 39 disposed at right angles to the main shaft 25. Batten 40 for packing the woven fabric has laterally extending members 41, 42 adapted to slide in guides 43 and 44, respectively, secured to the frame of the machine. Members 41 and 42 extend rearwardly of the machine as shown in Fig. 1 and at their extremities are provided with later-

ally projecting pins 45 and 46. Upon pins 45 and 46, respectively, are pivoted links 47 and 48 which in turn are pivotally connected to arms 49 and 50 secured to rock shaft 51 journalled in the frame of the machine at 52 and rock shaft 51 is actuated through a depending arm 53 secured thereto, which in turn is pivoted to link 54 (see Fig. 9). Link 54 is given oscillatory motion by means of a roller 55 operating within cam groove 56 upon cam wheel 57, keyed upon shaft 39, and link 54 is slotted at 58 to straddle shaft 39 in its reciprocating motion.

The finished material travels over a drum 59 which is driven at a relatively slow rate of speed, and is secured to shaft 60 journalled upon the frame of the machine at 61, (see Figs. 1 and 2). At one end of shaft 60 is a worm wheel 62 which is driven by worm pinion 63 mounted upon shaft 64 in bearings 65 and 66 upon the side of the machine. At the opposite end of shaft 64 is mounted a ratchet wheel 67 and oscillating arm 68 is pivotally mounted upon shaft 64 and carries spring pressed pawl 69 by which ratchet wheel 67 is actuated. Locking pawl 70 is mounted upon a frame of the machine opposite pawl 69 for the purpose of preventing backward rotation of ratchet wheel 67. Arm 68 is normally pulled toward the left as shown in Fig. 7 by spring 71 connected to the frame of the machine, and is also connected by a transversely extending link 72 to a link 73 pivotally mounted to the frame of the machine at 74. It will be noted that link 73 and arm 68 are slotted at their lowermost ends to permit of adjusting the relative rotary speed of drum 59, and oscillatory motion is given to link 73 by means of a cam 75 secured to the shaft 25, and which bears against roller 76 mounted upon link 73. For convenience in the delivery of the woven fabric 77, a friction roller 78 is adapted to bear against drum 59 and the finished material is threaded therebetween. Roller 78 is carried by arm 79 pivoted to the frame of the machine at 80 and is normally spring pressed against drum 59 by means of leaf spring 81. Members 61 are slotted as shown in Fig. 6 to permit of lateral adjustment of drum 59 as desired.

The shuttle reciprocating mechanism is operated through a cam wheel 82 loosely mounted upon shaft 39 (see Fig. 13) and provided with a cam groove 83 within which travels roller 84 secured to a vertically lifting link 85 which in turn is pivotally mounted upon a laterally extending arm 86 best shown in Fig. 1, and which in turn is secured to rock shaft 87 journalled in the frame of the machine at 88. Also secured to rock shaft 87 is hub 89 of upwardly extending rocking arm 90, the upper extremity of which is pivotally and slidably mounted to block 91 (see Fig. 7) which in turn is affixed to the rack 92. When roller 84 is in that portion of cam groove 83 which lies adjacent the center of cam wheel 82, as shown in Fig. 2, rocking arm 90 is in the relative position shown in Fig. 7, that is, at the right-hand limit of its travel, looking from the front of the machine. As cam wheel 82 revolves in a clockwise direction, as shown in Fig. 2, roller 84 is forced through cam groove 83 toward the outer periphery, following the cam groove, and during this operation lifting link 85 is forced downwardly, rocking shaft 87 by means of the connection with arm 86. This rocking operation of shaft 87 causes rocking arm 90 to swing toward the left from the position shown in Fig. 7 until it reaches the opposite limit of its travel, which brings shuttle 95 to the opposite end of the shuttle race from that shown in Fig. 7. It will be noted that cam groove 83 is so formed that rocking arm 90 is held at each limit of its travel the same length of time, and, therefore, one complete revolution of cam wheel 82 causes one complete cycle of operation of rocking arm 90. That is, starting from the position shown in Fig. 7, rocking arm 90 is rocked toward the left, causing engagement of the rack 97 on the shuttle 95 by gears 98, shuttle 95 being held to the left of batten 40, as shown in Fig. 7 for a short period of time while roller 84 is in the curved outer portion of cam groove 83, and shuttle 95 is reciprocated to its initial position shown in Fig. 7, all during one complete revolution of cam wheel 82. Rack 92 is slidably mounted for reciprocating motion upon stationary housing 93 which is divided centrally for operation of the heddles, and rack 92 is held in place by plates 94. The shuttle employed is preferably of the type shown as 95 in Fig. 8 having a removable spool 96 and provided with rack teeth 97 along the upper edge, which are adapted to be engaged by pinions 98 pivotally mounted within the housing 93. As rack 92 is reciprocated transversely by means of rocking arm 90, the gear teeth along the lower edge mesh with intermediate gears 99 also pivotally mounted within the housing 93. The length of the shuttle is such that one of the pinions 98 is always in mesh with a portion of the rack 97, and further to insure smoothness of operation, shuttle 95 makes a dove-tail fit as shown at 100 in Fig. 9. It will be understood that shuttle 95 reciprocates transversely across the space occupied by the warp thread, passing through the shed formed by the warp threads in the usual manner, and as hereinafter explained, when the machine is automatically stopped to permit of a hand bobbin weaving operation as shown in Fig. 1, the shuttle is preferably at the right hand limit of its travel as shown in Fig. 7. As shaft 39 rotates, crank arm 101 secured thereto actuates connecting rod 102 which extends upwardly to a dobby or equivalent mechanism as

shown in Fig. 3, and has its upper extremity pivotally mounted at 103 to arm 104 of T-shaped rocking member 105. In the present embodiment of the invention, a dobby mechanism is employed for manipulating the warp threads in conjunction with a pattern chain 106 as shown in Fig. 5. Referring to Figs. 3 and 4, it will be understood that the dobby mechanism includes a sufficient number of arms to handle the number of heddle frames employed, but in addition thereto an extra arm 107 is placed to the right of the dobby mechanism looking toward the rear of the machine, which is employed in the automatic stopping operation hereinafter described, and an extra arm 108 is placed upon the left of the dobby mechanism for use in connection with the starting operation after an automatic stopping operation as hereinafter described. The arms are pivotally mounted at 109 and T-shaped member 105 as well as lever 110 at the opposite side of the dobby mechanism are fixedly mounted upon rock shaft 111. Further, the upper ends of members 105 and 110 respectively are pivotally mounted to adjustable links like link 112 which in turn are pivoted to sliding bar 113 which is adapted to reciprocate horizontally in slot 114 of frame 115. Similarly the lower extremities of members 105 and 110 are pivotally connected to a lower sliding bar 117 slidably mounted in slot 118. In accordance with the usual jacquard, dobby, or equivalent mechanism, each arm has pivotally mounted thereon a lever provided with hook arms adapted to be engaged alternately by sliding bars 113 and 117, but in addition thereto in the machine of the present invention, the right hand arm 107 has pivotally mounted thereon a similar rocking lever 119 pivotally mounted at 120 in the arm 107, and lever 119 is provided with the usual hook arms 121 and 122 adapted to be engaged alternately by sliding bars 113 and 117. Also additional arm 108 has pivotally mounted thereupon a rock lever 123 carrying hook arms 124 and 125 respectively, which are adapted to be alternately engaged by slide bars 113 and 117.

The pattern chain shown is of the pin type in which blocks carry the appropriate pins in accordance with the desired pattern, and as shown in Fig. 4, when a certain pin reaches the top of the travel of pattern chain 106, which is carried by sprocket 126, the appropriate lever 127 is raised causing push rod 128 normally held elevated by the opposite end of lever 127, to drop downwardly, thus permitting the two lock arms of that particular dobby to be engaged by the reciprocating bars 113 and 117. For purposes of illustration a pattern chain has been adopted which carries two complete patterns, but in addition to the pins ordinarily provided for operating the dobby arms which manipulate the warp threads, provision has been made upon the pattern chain for an additional pin 129 (see Fig. 5) which when it reaches the top of its travel, will operate the lever controlling actuation of dobby arm 108, and also in addition thereto the pattern chain is adapted to carry an additional pin 130 at the opposite side of the chain, adapted to actuate the stopping dobby arm 107 as shown in Fig. 3 in a similar manner. As previously explained, these two particular dobby arms 107 and 108 have nothing to do with the operation of the warp thread heddles but cooperate in the automatic stopping of the machine for a hand weaving operation, and the subsequent starting of the machine following each such operation. Pattern chain 106 travels around sprocket 126 which is driven by ratchet wheel 131 engaged by double acting pawls 132 and 133 as shown in Fig. 3, both of which are pivotally mounted upon the lowermost arm of member 105, and by this construction and arrangement, each downward travel of connecting rod 102 moves ratchet 131 one notch, and each upward travel of connecting rod 102 moves ratchet 131 the same distance. In the present embodiment, for illustrative purposes, the machine is adapted to automatically stop at a certain point in the pattern where four figure warp thread heddles are elevated, the dobbies for which are operated by pins 134. When pin 130 of the pattern chain engages its cooperating lever, dobby arm 107 is moved toward the right from the position shown in Fig. 3 which draws cord 135 trained over pulley 136 and cord 135 is connected to one end of bell crank 137, which is pivotally mounted at 138 to the frame of the machine. The opposite end of bell crank 137 has a cam surface 139 which when lowered is adapted to engage upwardly extending projection 140 of spring pressed plunger 141. A clutch hub 142 keyed upon shaft 39 is provided with slots 143 either of which may be engaged by plunger block 140, thus locking clutch hub 142 and cam wheel 82 to cause their rotation in unison. When cam surface 139 of bell crank 137 withdraws block 140 of plunger 141 from engagement in notch 143 of clutch hub 142, the shuttle has commenced travel toward the right, and the momentum of rocking arm 90, and the associated mechanism carries cam wheel 82 until block 140 is spring pressed by spring 144 at the base of plunger 141 into the next succeeding notch 143. In other words block 140 rides upon the lateral surface of clutch hub 142, but when block 140 has thus reached the next succeeding notch 143, the machine ordinarily has been brought to a stop as presently explained. It will be understood that arm 137 is normally held out of engagement by spring 145 and the upward movement of end 139 is also restricted by a stop pin 146 mounted on the frame of the machine. Also, a spring 147 is

preferably provided for normally maintaining cord 135 pulled taut.

When pin 129 mounted at the opposite end of the next succeeding block upon which pin 130 is mounted, coacts with its appropriate lever 127, dobby arm 108 moves toward the right pulling cord 148, the lower end of which has a ring 149 (Fig. 6) through which extends a second cord 150 having a spring connection at each end. The upper end connects at 151 with arm 152 of a bell crank pivotally mounted to the frame of the machine at 153, the other arm 154 of which is provided with a horizontal surface 155. As cord 148 is drawn upwardly, surface 155 is forced into the path-way of pin 156, thus disengaging the main clutch 27 and bringing the machine to a stop. It will be understood that the shuttle operating mechanism has been disengaged just preceding this point. Clutch 27 is adapted to rotate in a clockwise direction, as shown in Fig. 11, when in engagement with pulley 24. Therefore, main clutch 27 is disengaged by surface 155 being brought into engagement with pin 156, causing clutch shoe 31 to be swung slightly in a clockwise direction from the position shown in Fig. 11, which releases the gripping contact of clutch lining 28 against pulley 24. In this position clutch 27 is held stationary, and consequently all of the operating mechanism which derives power from shaft 25 is likewise stopped, although it will be understood that when this operation takes place the shuttle mechanism has already been disengaged. Also, when clutch 27 is held out of engagement, as just described, link 157, and consequently foot treadle 158, are slightly elevated by reason of the engagement of projection 155 with pin 156, and therefore the depression of foot treadle 158 withdraws projection 155 from engagement with said pin 156, causing reengagement of clutch 27 by means of spring 33 pulling arm 32 and in turn clutch shoe 31 in a counter-clockwise direction to expand the clutch arms. It will thus be understood that the disengagement of the shuttle operating mechanism previous to the disengagement of the main drive clutch, makes it possible to stop the shuttle at exactly the right point in accordance with the pattern, and also avoids the extreme shock which would be caused by attempting to stop the shuttle mechanism entirely through the sudden stopping of the main drive clutch. The momentum of the shuttle operating mechanism would cause excessive strain and possible breakage, and in this connection it is also to be noted that the shuttle mechanism disengagement is not a sudden disengagement, but the shuttle continues its throw after the disengagement takes place, by reason of the momentum of rocking arm 90 and the connected parts. Arm 152 of the clutch operating bell crank is pivotally connected to a link 157, the lower end of which is connected to a foot treadle 158 pivotally mounted at 159, and further, the lower extremity of cord 150 is connected at 159. After engagement of surface 155 with pin 156, the machine remains at rest until started at the will of the operator, which is done by depressing foot treadle 158, thus withdrawing surface 155 from engagement with clutch pin 156 whereby the operation of the entire machine is resumed, inasmuch as cam wheel 82 has been brought into operative engagement with clutch hub 142 for operation of the shuttle mechanism.

Referring to Fig. 9, the usual warp threads 162 are guided by means of warp guide 163 and the heddle frames 164 are connected by springs 165 near the bottom of the machine and with the usual elevating cords 166, connected to the pattern chain controlled dobbies. Also the heddle frame wires are provided with the customary warp eyelets 167.

From the above description, it is believed that the operation will be apparent. A typical pattern is shown in Fig. 14, and the hand operation is performed upon the three cords 160 which are intermittently interwoven with certain figure warp threads of the material. This is done by using a bobbin 161 as shown in Fig. 1. When the designated point has been reached, the machine is automatically brought to a stop through the initial operation of pin 130. The operator then passes bobbin 161 through the shed as then present. When this is done, the operator depresses foot treadle 158 causing the machine to assume its automatic loom operation until the point is again reached in the pattern where it is desired to repeat the operation by hand using bobbin 161. From the foregoing, it will also be understood that at each automatic stopping of the machine, shuttle 95 is at the right hand travel of the shuttle race so as to maintain uniformity in the pattern. It will also be understood that a wide variety of patterns may be adopted utilizing the present invention, and a practically unlimited combination of machine and hand loom operations are possible.

For purposes of disclosure, the preferred embodiment of the invention is shown in operative association with a particular type of pattern forming mechanism, but it will be apparent that the invention is adaptable to use in conjunction with any form of pattern mechanism, such as the jacquard, dobby, or cam types, by making the necessary formal changes, and therefore applicant desires not to limit the invention to the particular type of pattern forming mechanism disclosed, or to any particular type.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, it is capable of modi-

fication and variation without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction as set forth, but desire to avail myself of such modifications as come within the scope of the appended claims.

I claim:

1. A machine of the class described comprising, in combination, main drive engaging and disengaging means; shuttle mechanism engaging and disengaging means; automatic weaving means including pattern mechanism; pattern controlled means for disengaging said shuttle mechanism at a predetermined point upon the pattern to cause the shuttle to remain at rest; pattern controlled means for operating said main drive disengaging means while the shuttle is at rest to permit of an independent weaving operation; and manually operated means for actuating said main drive disengaging means following each independent weaving operation.

2. A machine of the class described comprising, in combination, automatic weaving means; a clutch for disengaging the shuttle mechanism; a main drive clutch; pattern controlled means for automatically disengaging said first mentioned clutch at predetermined intervals; and pattern controlled means for automatically disengaging said main drive clutch following each disengagement of said first mentioned clutch, to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement.

3. A machine of the class described comprising, in combination, automatic weaving means; a clutch for disengaging the shuttle mechanism; a main drive clutch; pattern controlled means for automatically disengaging said first mentioned clutch at predetermined intervals; pattern controlled means for automatically disengaging said main drive clutch following each disengagement of said first mentioned clutch to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement; and means for engaging said main drive clutch.

4. A machine of the class described comprising, in combination, automatic weaving means; a clutch for disengaging the shuttle mechanism; a main drive clutch; pattern controlled means for automatically disengaging said first mentioned clutch at predetermined intervals; pattern controlled means for automatically disengaging said main drive clutch following each automatic disengagement of said first mentioned clutch to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement; and means for automatically engaging said first mentioned clutch.

5. A machine of the class described comprising, in combination, automatic weaving means; a clutch for disengaging the shuttle mechanism; a main drive clutch; pattern controlled means for automatically disengaging said first mentioned clutch at predetermined intervals; pattern controlled means for automatically disengaging said main drive clutch following each automatic disengagement of said first mentioned clutch to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement; means for automatically engaging said first mentioned clutch; and means for engaging said main drive clutch.

6. A machine of the class described comprising, in combination, automatic weaving means including a pattern form; a clutch for disengaging the shuttle operating mechanism; an arm actuated by means of said pattern form and adapted to cause disengagement of said shuttle operating mechanism at predetermined intervals, to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement, and means controlled by said pattern form for halting operation of the warp thread mechanism at predetermined intervals.

7. A machine of the class described comprising, in combination, automatic weaving means including a pattern form; a clutch for disengaging the shuttle operating mechanism; an arm actuated by means of said pattern form and adapted to cause disengagement of said shuttle operating mechanism at predetermined intervals to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement; means for causing engagement of said clutch following each intermittent disengagement, and means controlled by said pattern form for halting operation of the warp thread mechanism at predetermined intervals.

8. A machine of the class described comprising, in combination, automatic weaving means, including a pattern form; a clutch for disengaging the shuttle operating mechanism; a main drive clutch; an arm actuated by means of said pattern form and adapted to cause disengagement of said first mentioned clutch at predetermined intervals; and a second arm actuated by means of said pattern form and adapted to cause disengagement of said main drive clutch following each disengagement of said first mentioned clutch, to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement.

9. A machine of the class described prising, in combination, automatic weaving means including a pattern chain; a clutch for

causing disengagement of the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said shuttle mechanism clutch to permit of an independent weaving operation at a predetermined point in the fabric where the warp threads are in definite pattern arrangement; means for engaging said clutch following each intermittent disengagement, and mechanism actuated by said pattern chain for disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said shuttle mechanism clutch.

10. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a clutch for causing disengagement of the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said shuttle mechanism clutch; and means actuated by said pattern chain for intermittently and automatically causing disengagement of said main drive clutch to permit of independent weaving operations at points in the fabric where the weft and warp threads have a definite pattern arrangement due to said pattern controlled mechanism for both said clutches.

11. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a clutch for causing disengagement of the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said shuttle mechanism clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said main drive clutch to permit of independent weaving operations at points in the fabric where the weft and warp threads have a definite pattern arrangement due to said pattern controlled mechanism for both said clutches; and means for automatically causing reengagement of said shuttle mechanism clutch.

12. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a clutch for causing disengagement of the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said shuttle mechanism clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said main drive clutch to permit of independent weaving operations at points in the fabric where the weft and warp threads have a definite pattern arrangement due to said pattern controlled mechanism for both said clutches; means for automatically causing re-engagement of said shuttle mechanism clutch; and manually operated means for causing engagement of said main drive clutch following each disengagement.

13. A machine of the class described comprising, in combination, automatic weaving means actuated by a pattern chain in the fabrication of a pattern; a clutch interposed between the drive mechanism and the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for automatically disengaging said first mentioned clutch at predetermined intervals in the fabrication of the pattern, to permit of independent weaving operations at said predetermined intervals where the weft and warp threads have a definite pattern arrangement due to the automatic action of said pattern chain actuated means, and mechanism actuated by said pattern chain for disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said shuttle mechanism clutch.

14. A machine of the class described comprising, in combination, automatic weaving means actuated by a pattern chain in the fabrication of a pattern; a clutch interposed between the drive mechanism and the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for automatically disengaging said first mentioned clutch at predetermined intervals in the fabrication of a pattern; and means actuated by said pattern chain for automatically disengaging said main drive clutch, immediately following disengagement of said first mentioned clutch to permit an independent weaving operation at each of said intervals in which the warp shed and weft threads have a definite pattern arrangement.

15. A machine of the class described comprising, in combination, automatic weaving means actuated by a pattern chain in the fabrication of a pattern; a clutch interposed between the drive mechanism and the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for automatically disengaging said first mentioned clutch at predetermined intervals in the fabrication of the pattern to permit an independent weaving operation at each of said intervals in which the warp shed and weft threads have a definite pattern arrangement; means for automatically causing reengagement of said first mentioned clutch, and mechanism actuated by said pattern chain for disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said shuttle mechanism clutch.

16. A machine of the class described comprising, in combination, automatic weaving

means actuated by a pattern chain in the fabrication of a pattern; a clutch interposed between the drive mechanism and the shuttle operating mechanism; a main drive clutch; means actuated by said pattern chain for automatically disengaging said first mentioned clutch at predetermined intervals in the fabrication of a pattern to permit an independent weaving operation at each of said intervals in which the warp shed and weft threads have a definite pattern arrangement; means for automatically disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said first mentioned clutch in accordance with the pattern; means for automatically causing reengagement of said first mentioned clutch; and manually operated means for causing engagement of said main drive clutch following each intermittent disengagement.

17. A machine of the class described comprising, in combination, automatic weaving means; pattern controlled means for intermittently and automatically disengaging the driving mechanism to permit of a hand weaving operation; and a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for each intermittent hand weaving operation.

18. A machine of the class described comprising, in combination, automatic weaving means; a main driving clutch; pattern controlled means for intermittently and automatically disengaging the driving mechanism to permit of a hand weaving operation; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for each intermittent hand weaving operation; said pattern controlled means adapted to automatically disengage said main drive clutch following each disengagement of said locking clutch.

19. A machine of the class described comprising, in combination, automatic weaving means; a main drive clutch; means for intermittently and automatically disengaging the driving mechanism to permit of a hand weaving operation; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for each intermittent hand weaving operation; said disengaging means adapted also to disengage said main drive clutch.

20. A machine of the class described comprising, in combination, automatic weaving means; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; means for automatically disengaging said first mentioned clutch at stated intervals; means for automatically disengaging said main drive clutch following each automatic disengagement of said first mentioned clutch whereby the warp shed and weft threads have a definite pattern arrangement; and means for automatically engaging said first mentioned clutch.

21. A machine of the class described comprising, in combination, automatic weaving means; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; means for automatically disengaging said first mentioned clutch at stated intervals; means for automatically disengaging said main drive clutch following each automatic disengagement of said first mentioned clutch whereby the warp shed and weft threads have a definite pattern arrangement; means for automatically engaging said first mentioned clutch; and means for engaging said main drive clutch.

22. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; an arm adapted to be actuated by means of said chain and adapted to cause disengagement of said locking clutch at certain intervals; means for causing engagement of said clutch following each intermittent disengagement, and means controlled by said pattern chain for halting operation of the warp thread mechanism at predetermined intervals.

23. A machine of the class described comprising in combination, automatic weaving means, including a pattern chain; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; an arm actuated by said chain and adapted to cause disengagement of said locking clutch at predetermined intervals; and a second arm actuated by said chain and adapted to cause disengagement of said main drive clutch following each disengagement of said locking clutch, whereby at each said disengagement the warp shed and weft threads will have a definite pattern arrangement due to said pattern chain.

24. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said locking clutch, and mechanism actuated by said pattern chain for disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said shuttle mechanism clutch.

25. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a locking

clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; means actuated by said pattern chain for intermittently and automatically causing disengagement of said locking clutch; and means actuated by said pattern chain for intermittently and automatically causing disengagement of said main drive clutch, whereby upon each said disengagement the warp shed and weft threads have a definite pattern arrangement.

26. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a main drive clutch; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; means actuated by said pattern chain for automatically operating said locking clutch at predetermined intervals in the fabrication of a pattern, and mechanism actuated by said pattern chain for disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said shuttle mechanism clutch.

27. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; means actuated by said pattern chain for automatically operating said locking clutch at predetermined intervals in the fabrication of a pattern; and means actuated by said pattern chain for automatically disengaging said main drive clutch immediately following the disengagement of said locking clutch, to permit of an intermittent hand weaving operation at each interval in which the weft and warp threads have a definite pattern arrangement.

28. A machine of the class described comprising, in combination, automatic weaving means including a pattern chain; a locking clutch adapted to cause the shuttle to come to rest at a predetermined position for an intermittent hand weaving operation; a main drive clutch; means actuated by said pattern chain for automatically disengaging said first mentioned clutch at predetermined intervals in the fabrication of a pattern to permit of an intermittent hand weaving operation at each interval in which the weft and warp threads have a definite pattern arrangement; means for automatically disengaging said main drive clutch at predetermined intervals with relation to the disengagement of said first mentioned clutch in accordance with the pattern; and manually operated means for causing engagement of said main drive clutch following each intermittent disengagement.

29. A machine of the class described comprising, in combination, main drive engaging and disengaging means; shuttle mechanism engaging and disengaging means; automatic weaving means including pattern mechanism; pattern controlled means for disengaging said shuttle mechanism at a predetermined point upon the pattern to cause the shuttle to remain at rest; pattern controlled means for actuating said main drive disengaging means while the shuttle is at rest, to permit of a separate weaving operation; manually operated means for actuating said main drive engaging means following each separate weaving operation; and means for automatically actuating said shuttle mechanism engaging means following the actuation of said main drive engaging means.

30. A machine of the class described comprising, in combination, main drive engaging and disengaging means; shuttle mechanism engaging and disengaging means; automatic weaving means including pattern mechanism; pattern controlled means for disengaging said shuttle mechanism at a predetermined point upon the pattern to cause the shuttle to remain at rest; pattern controlled means for actuating said main drive disengaging means while the shuttle is at a rest, to permit of a separate weaving operation; manually operated means for actuating said main drive engaging means following each separate weaving operation; means for automatically actuating said shuttle mechanism engaging means following the actuation of said main drive engaging means; the final weft thread in the pattern at each stopping operation and the selection of elevated warp threads at each stopping operation being controlled by said pattern controlled means in conjunction with the shuttle mechanism disengaging control and the main drive disengaging control.

In testimony whereof I have signed my name to this specification.

ROBERT E. WALLISER.