S. S. JACKSON.

LOOM.

APPLICATION FILED DEC. 8, 1909.

1,040,203.

Patented Oct. 1, 1912.

4 SHEETS—SHEET 1.

Fig. 2.

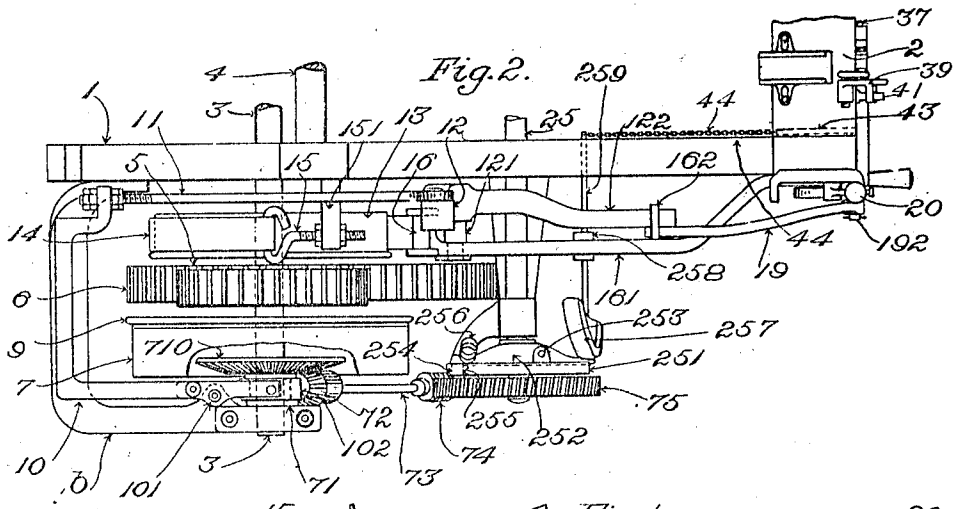
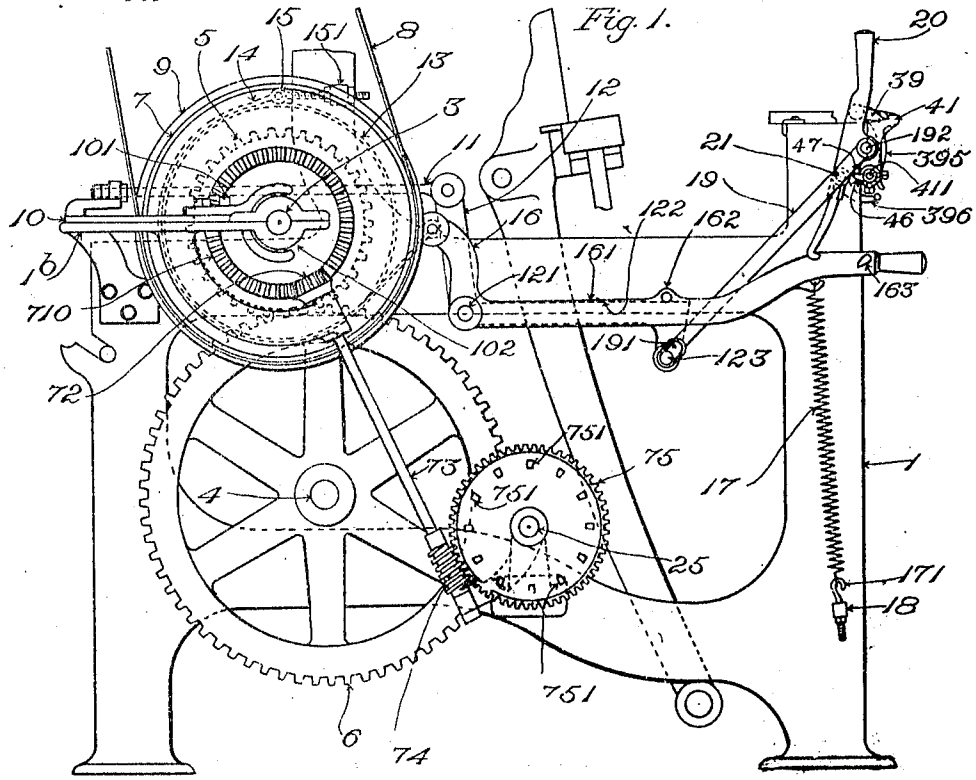


Fig. 1.



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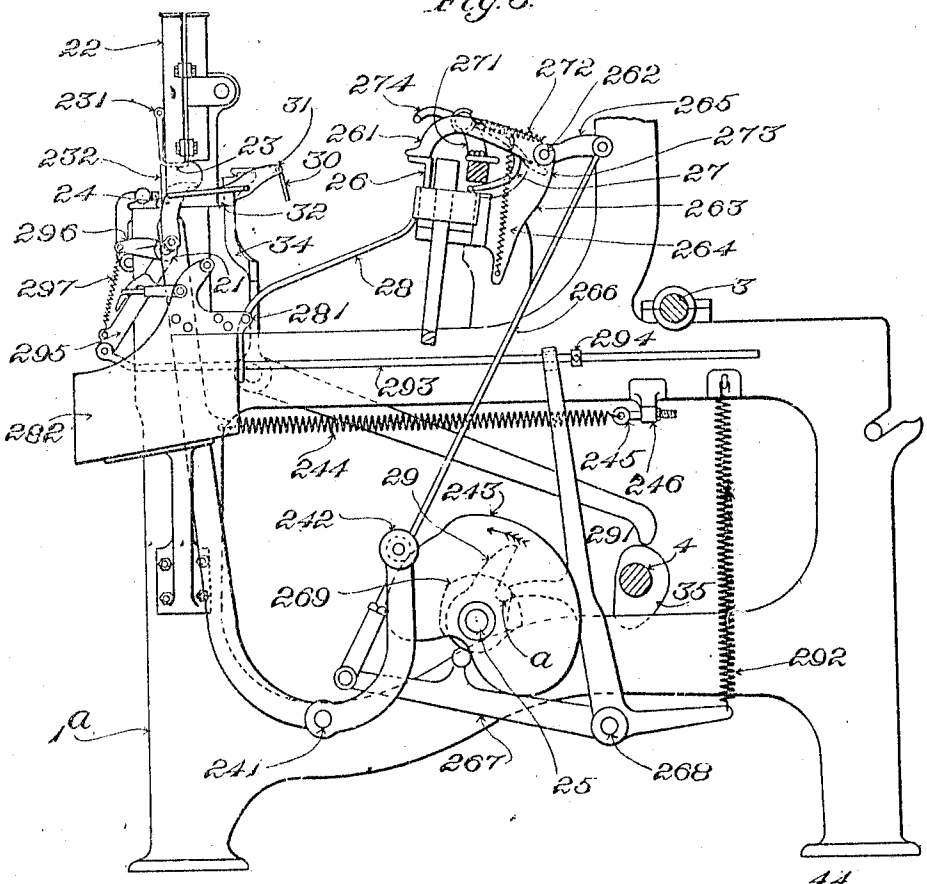
4 SHEETS—SHEET 2.

Fig. 3.



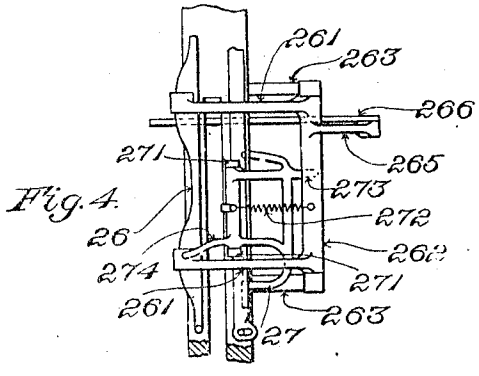


Fig. 4.

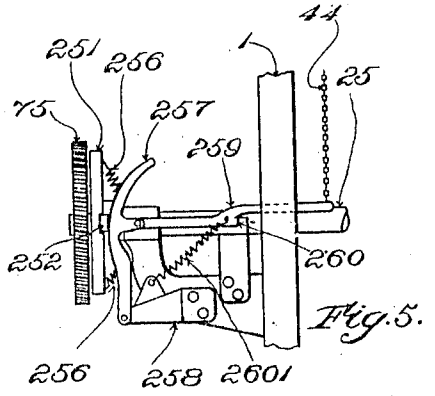


Fig. 5.

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4 SHEETS—SHEET 3.

Fig. 6.

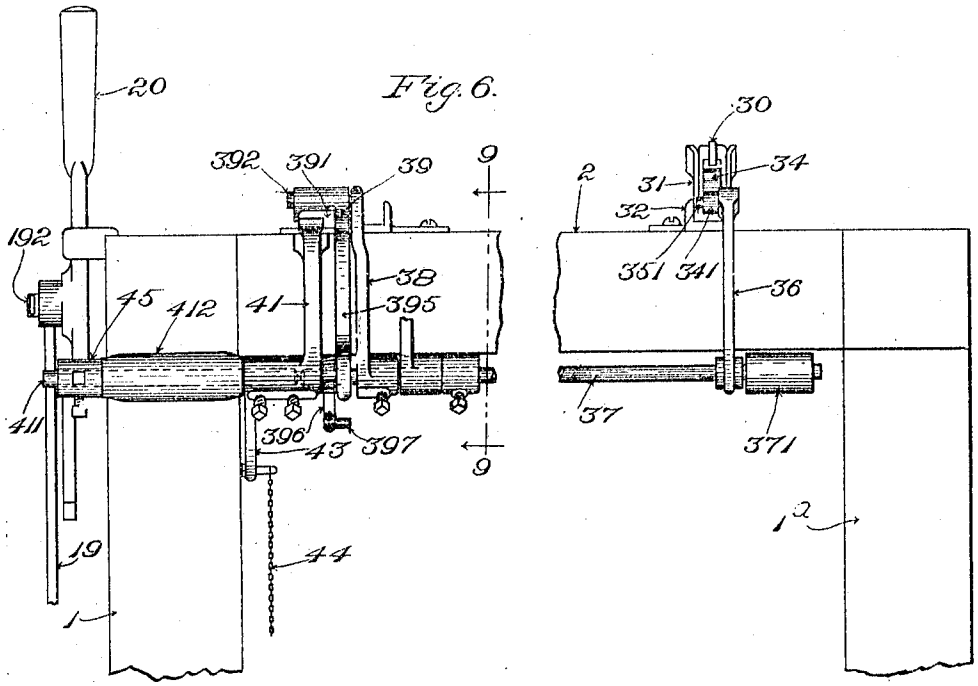
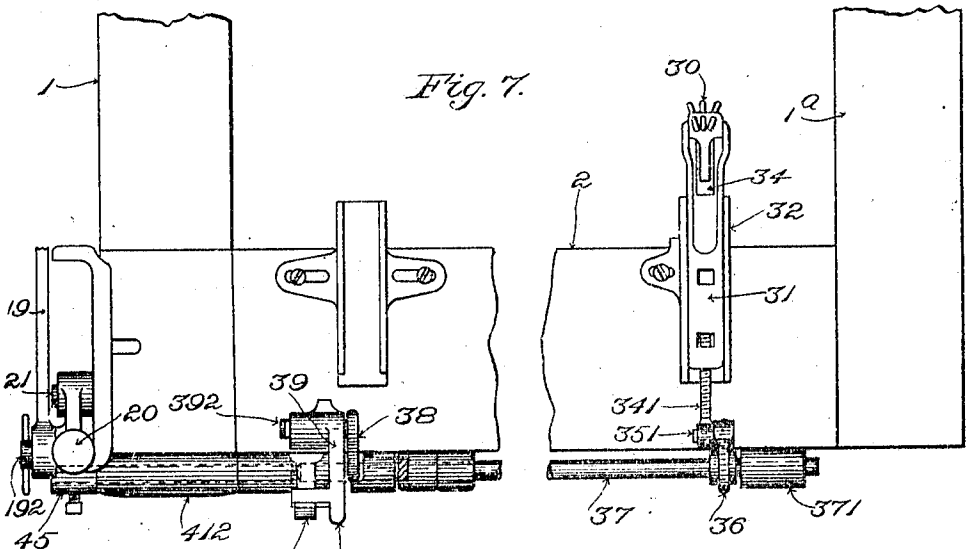


Fig. 7.



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4 SHEETS—SHEET 4.

Fig. 8.

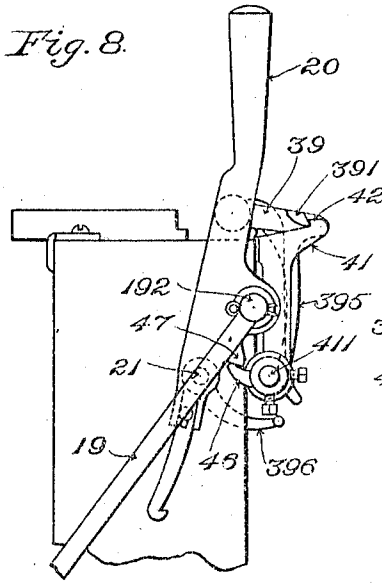
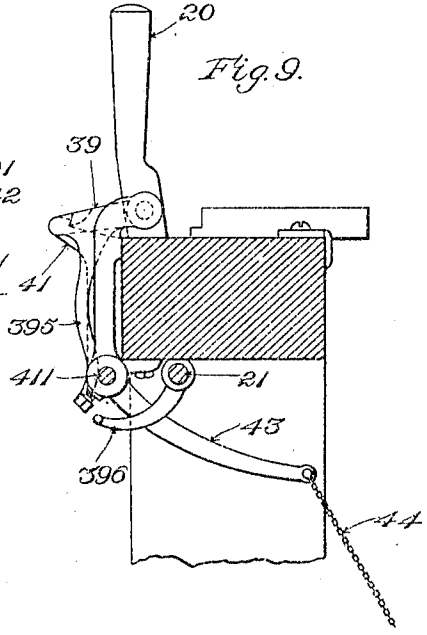


Fig. 9.



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UNITED STATES PATENT OFFICE.

SIMEON SCHOON JACKSON, OF READVILLE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE STAFFORD COMPANY, OF READVILLE, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

LOOM.

1,040,203. Specification of Letters Patent. Patented Oct. 1, 1912.

Original application filed May 19, 1909, Serial No. 496,975. Divided and this application filed December 8, 1909. Serial No. 531,971.

To all whom it may concern:

Be it known that I, SIMEON SCHOON JACKSON, a subject of Great Britain, residing at Readville, in the county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention is a division of that of my application for United States Letters Patent filed May 19, 1909, Serial No. 496,975, the latter being in turn a division of that of my application filed October 20, 1905, Serial No. 283,615.

In the drawings,—Figure 1 is an elevation of the driving end of a loom, with certain parts broken away, showing chiefly the driving and stopping arrangements. Fig. 2 is a plan of the parts which are represented in Fig. 1, omitting the lay. Fig. 3, Sheet 2, is a partial elevation of the replenishing end of the loom, certain parts being in section. Fig. 4, Sheet 2, is a partial plan of the lay and the parts which are mounted thereon at the replenishing end. Fig. 5, Sheet 2, shows in front elevation a portion of the actuating mechanism and controlling connections for the change-shaft. Fig. 6, Sheet 3, shows in front elevation the breast-beam and portions of the opposite side-frames, and certain parts which are mounted thereon more immediately involving the invention, the middle portion of the breast-beam being broken out. Fig. 7, Sheet 3, shows in plan the parts of Fig. 6. Fig. 8, Sheet 4, is a view in side elevation of the parts at the left in Fig. 6. Fig. 9, Sheet 4, is a view in section on line 9, 9, of Fig. 6.

Having reference to the drawings,—at 1, Figs. 1, 2, etc., is the side-frame at the driving end of the loom, 1^a in Figs. 3, 6 and 7 being the side-frame at the replenishing end.

At 2, Figs. 2, 6, 7, etc., is the breast-beam. The crank-shaft of the loom is shown at 3, Figs. 1, 2 and 3, and the cam-shaft at 4, the usual gears by which motion is transmitted from the crank-shaft to the cam-shaft being shown at 5, 6. Having reference to the driving connections, and to the shipper and brake devices of Figs. 1 and 2, a loose band-pulley 7 is mounted upon crank-shaft 3, driving-power being transmitted to the said band-pulley by means of a suitably-actuated driving-band 8, Fig. 1, passing around the same, while 9 is a wheel fixed upon the crank-shaft, the two wheels 7 and 9 being provided with or constructed to constitute the interengaging members of a friction-clutch.

At 10 is a clutch-operating lever which is pivoted at 101 upon a stand 1^b, Figs. 1 and 2, attached to loom-side 1 and extending outward therefrom, the said lever having a fork which engages with a yoke 102 in connection with the hub 71 of the loose band-pulley 7. A rod 11 connects the clutch-operating lever 10 with the upwardly-extending arm of a bell-crank 12 which is mounted upon a stud 121 carried by and projecting outward from the loom-side 1, it having a forwardly-extending arm 122 by means of which it may be operated for the purpose of actuating the lever 10 to move the band-pulley 7 toward and from the wheel 9 as required in order to close and open the friction-clutch.

13 is a brake-wheel which is fixed upon the crank-shaft 3, and 14 is a brake-band which extends partly around the periphery of the said brake-wheel, one end of the said brake-band being connected to an adjustable eye-bolt 15 that is carried by a stand 151 projecting from the loom-arch, while the other end of the said brake-band is connected with the upwardly-extending arm of a bell-crank 16 that is mounted upon the said stud 121, the said bell-crank having a forwardly-extending arm 161, the forward extremity of which constitutes a handle whereby the bell-crank 16 may be manually operated when desired. To the said arm 161 is connected one end of the strong contracting spiral spring 17, the other end of which is connected to an eye-bolt 171 that is carried by a stand 18 projecting from the loom-side 1. Normally the arm 161 of bell-crank 16 is held upraised with the bell-crank occupying a position in which the brake-band is slack around the brake-wheel 13. When the bell-crank 16 is freed to the control of the said spring 17, the latter operates the bell-crank to tighten the brake-band 14 upon the periphery of the brake-wheel. In order that the movement of the bell-crank 16 under the action of the spring may also transmit movement to the clutch-operating lever 10, to open the clutch and thereby disconnect the driving power, the arm 161 is-

furnished with a pin 162, which projects transversely from the said arm across the top of the arm 122 of bell-crank 12. When bell-crank 16 is operated by its spring 17, the descent of arm 161 causes the arm 122 of bell-crank 12 to be pressed down by the said pin 162, thereby transmitting to the clutch-operating lever 10 movement in the direction to separate the clutch-members and thus discontinue the application of driving-power. For the purpose of enabling the bell-cranks 12 and 16 to be operated simultaneously in starting a loom, so as to throw off the brake and effect the clutching of the band-pulley 7 to the crank-shaft, the arm 122 of the bell-crank 12 is furnished with a laterally-projecting pin 123, Fig. 1, which extends through a slot 191 formed in the lower end of a rod 19, the said slot extending in the direction of the length of the rod, the upper end of which latter is pivoted at 192 to the shipper-handle 20, which last is fixed upon one end of the horizontal stopping rockshaft 21, the said rockshaft extending across the loom beneath the breast-beam, and being mounted in suitable bearings with which the side-frames 1, 1^a, are provided. Movement of the shipper-handle forward causes the rod to move endwise, and by engagement of the wall at the lower end of slot 191 with the pin 123 the bell-crank 12 is turned to clutch the band-pulley 7 to the crank-shaft, the engagement of the arm 122 of the said bell-crank with pin 162 on arm 161 of bell-crank 16 causing the latter bell-crank to be turned so as to slacken the brake-band. In the position normally occupied by the shipper-handle during the running of the loom, the point of connection 192 between the rod 19 and the shipper-handle is slightly forward of the center of the stopping rock-shaft 21, whereby the parts are locked in working position. When the shipper-handle is moved reversely so as to carry the said point of connection to the rear side of the center of rock-shaft 21, the spring 17 acts to move the bell-cranks to apply the brake and disconnect the driving-power. Other constructions and arrangements of driving, shipping, and braking devices may be employed in practice.

Figs. 3 and 4 show the weft replenishing instrumentalities. In the said figures, 22 is a hopper for fresh or reserve shuttles, the said hopper being supported adjacent the end of the breast-beam at the replenishing end of the loom. 23 is a shuttle-support, which is mounted pivotally at 231 in connection with the hopper, and furnished with rearwardly projecting fingers that normally occupy a position beneath the bottom shuttle in the hopper, supporting such shuttle and the others which rest upon the latter. 24 is the injector, its supporting lever being mounted pivotally at 241 upon the lower part of the loom frame. The short arm of the said lever is provided with a roll 242, which latter is held pressed in contact with the periphery of an edge-cam 243 that is carried by the change-shaft 25, by the tension of a contracting spiral spring 244 having one end thereof engaged with the injector-lever and the other end thereof engaged with the eye of a bolt 245 applied to a bracket 246 which is attached to the loom-frame. Normally, the change-shaft, together with the cams which are fast thereon, stands motionless in the position represented in Fig. 3, and the injector occupies the position beneath the hopper which it occupies in such figure. When the change-shaft is caused to rotate, a preliminary movement of the injector toward the front of the loom occasioned by cam 243 carries the injector against a downwardly-extending finger 232 of the shuttle-support, moving the latter forward so as to withdraw its rearwardly-extending fingers from beneath the bottom shuttle in the hopper and permit the contents of the hopper to drop until the bottom shuttle rests upon the horizontal shuttle-supporting portions of the injector. The spring 244 next operates to move the injector with yielding force rearward toward the lay, under the control of the cam 243, to place the shuttle which is held thereby within the shuttle-box at the replenishing end of the loom, after which the said cam acts to communicate positive movement to the injector in the opposite direction, namely forward toward the breast-beam, and thereby restores the injector to its normal position shown in Fig. 3.

At 26 is the front-plate of the shuttle-box at the replenishing end of the loom, it being movable to enable the same to be withdrawn from its normal position at the front of such shuttle-box, to open the box to permit the spent working shuttle on the lay to be discharged from the shuttle-box and a fresh or reserve shuttle to be inserted into the latter through the action of the injector. The front-plate 26 is carried by forwardly-projecting arms 261, 261, forming part of a rocker 262, the rockshaft of which last is pivotally mounted in bearings that are provided in brackets 263, 263, which are attached to the lay-beam and rise at the rear thereof. Normally the front plate 26 is held depressed in its working position, so as to keep the shuttle-box closed, by means of a contracting spiral spring 264, Fig. 3, having one end thereof connected to one of the forwardly projecting arms 261 of the rocker and the other end thereof connected to one of the brackets 263. For the purpose of operating the rocker to raise the front-plate to open the shuttle-box to permit of the discharge of the spent working shuttle and the introduction of a fresh or reserve

shuttle, the rocker is provided with a rearwardly projecting arm 265 having connected therewith one end of a connecting rod 266, the opposite end of which is connected to an arm 267, which is pivotally mounted at 268 and provided with a projection that is engaged by the periphery of an edge-cam 269 which is fast upon the change-shaft. In the rotation of the change-shaft, the cam 269 transmits movement through the arm 267 and connecting rod 266 to the rocker to raise the front-plate from its normal closed position and thereby open the shuttle-box. The spring 264 acts to move the rocker in the reverse direction under the control of the cam 269, to lower the front-plate to its normal position and thereby close the shuttle-box again. An ejector 27 is mounted by means of brackets 271, 271, upon the back of the shuttle-box, the said ejector being formed as a rocker having journals which are fitted to bearings in the said brackets, and having fingers which project into openings at the rear of the shuttle-box as indicated in Figs. 3 and 4. The ejector is held retracted normally by the tension of the contracting spiral spring 272, the latter having one extremity thereof engaged with a screw or the like projection carried by the rockshaft of the ejector, while the other end of the said spring is connected with a strap that wraps part way around the rockshaft of the ejector and is attached by its inner end to the said rockshaft. A finger 273 projecting from the ejector takes against the under side of the rockshaft of the rocker 262 and serves to limit the extent of the retraction of the ejector under the action of the spring 272. A finger 274 projecting forwardly from the ejector is pressed against by one of the arms 261 of the rocker 262 in the movement of the rocker by which the front-plate of the shuttle-box is raised, and thereby the ejector is actuated to eject the spent working shuttle from the opened shuttle-box.

At 28 is a flexible apron onto which the ejected shuttle falls, the said apron being connected at its upper end with the front of the lay-beam and passing forward over a transverse rod 281 which is supported at the rear of the shuttle-receiving box 282, the latter being attached to the adjacent side-frame of the loom. The shuttle slides from the apron into the said box. The apron plays back and forth over the rod 281 as the lay vibrates, and thereby accommodates itself to the varying positions of the lay, it serving to conduct the ejected shuttle into the box 282 whatever may be the position of the lay at the time of the ejection.

The change-shaft normally stands at rest. For the performance of the replenishing operations the change-shaft with its various cams is called into action. A dwell in the working of the weaving instrumentalities is brought about by causing the braking devices to unclutch the band-pulley 7 from the wheel 9, and by also causing the braking devices to apply the brake. On the conclusion of the replenishing operations the said weaving instrumentalities are restarted by again clutching the band-pulley to the wheel 9 and taking off the friction of the brake, after which the change-shaft comes to rest.

The means of communicating rotary motion at the proper time to the change-shaft, and subsequently discontinuing such motion, is shown in Figs. 1, 2 and 5. In Figs. 1 and 2 the loose band-pulley 7 has fast therewith a beveled gear 710 meshing with a bevel pinion 72 which is fast upon the upper end of an inclined shaft 73, the said shaft at its lower end being furnished with a worm 74 meshing with a worm-gear 75 that is mounted upon the change-shaft 25 with capacity to turn freely thereon. Through the driving connections between the loose pulley 7 and the worm-gear 75 the latter is constantly rotated. During the ordinary running of the loom, this rotation of the worm-gear is unaccompanied by motion of the change-shaft. When the change-shaft and its cams are required to act, the worm-gear is clutched to the change-shaft. To enable the clutching to be effected, a disk 251, Figs. 2 and 5, is fixed upon the change-shaft, with the outer face thereof close to the inner face of the worm-gear. To the inner face of the said fixed disk 251 a clutching-lever 252 is pivoted at 253, Fig. 2. Said lever extends diametrically with relation to the disk 251, and swings toward and from the disk. One arm of the said lever is furnished with a projection 254 working in a hole 255 that is made through the disk. In the worm-gear 75 is formed a circular series of holes 751, 751, etc., Fig. 1, each adapted to receive the projection 254 when in line with the latter. The lever 252 is acted upon by a spring 256, the latter tending to turn the lever into a position in which the projection 254 shall project through the disk 251 and enter into one of the holes 751, 751, of the worm-gear 75. In the present instance a single spring, 256, is employed, it having its ends engaged with opposite portions of the disk 251, and its intermediate portion passing back of the tail portion of the clutching-lever 252 so as to draw by its coils against the back of the said tail-portion with a tendency to press the said tail-portion toward the disk. So long as the lever occupies a position with its projection withdrawn from the worm-gear 75 into the hole 255 the worm-gear is free to turn upon the change-shaft, independently of the latter, and the change-shaft remains motionless. The lever is held normally in its withdrawn or disengaged position, against the tendency of the spring 256 to

turn the same so as to carry the projection 254 toward the worm-gear 75, by means of an unclutching arm 257, Figs. 2 and 5, which is pivoted at its lower end upon a fixed stand 258, its upper end being obliquely disposed with relation to the plane of rotation of the disk 251 and somewhat rounded. To the said arm is pivotally connected a latch 259 that is adapted to engage with a shoulder 260 on a bracket connected with stand 258, the said latch being held normally in engagement with the said shoulder by means of a contracting spiral spring 2601 having one end thereof joined to the latch and the other end thereof joined to the outer portion of stand 258. The said spring is arranged to cause its action to take place along a line inclined downward and outward, the result of which is to force the unclutching arm 257 outward toward the disk 251 and also draw the latch downward and hold it in engagement with the shoulder 260. Normally, the acting portion of the arm 257 remains in engagement with the tail of the lever 252, holding the said lever turned into the inoperative position thereof, with its projection 254 withdrawn from engagement with the worm-gear 75. When, in the working of the loom, the latch is raised so as to disengage the same from the fixed shoulder, at which time the action of the lay and other weaving instrumentalities has been arrested by causing the shipping rock-shaft 21 to be so turned so as to bring about the action of the shipping and brake-mechanism to unclutch the loose band-pulley and apply the brake, the spring 256 acts to turn the lever 252, pressing back the arm 257 against the resistance of the weaker spring 2601, and carrying the projection 254 toward worm-gear 75 and into that one of the holes 751 which first arrives in line with the projection. Thereby the worm-gear is clutched to the change-shaft and the latter is caused to begin to rotate. As soon as the rotary motion of the change-shaft has carried the tail end of lever 252 away from the engaging portion of the unclutching arm 257, the spring 2601 restores the said arm to its outer or normal position, and causes the latch 259 to engage again with the fixed shoulder 260 so as to hold the arm against tendency to movement inward. As the change-shaft approaches the completion of one rotation thereof, the replenishment having been effectuated, the tail of lever 252 is carried into contact with the engaging portion of the arm 257, which arm at this time is latched firmly in position, and by such contact the lever is turned to disengage its projection 254 from the worm-gear, thereby unclutching the change-shaft from its driving mechanism.

The devices for restarting the weaving instrumentalities after replenishment has been completed are shown in Fig. 3, and comprise the cam 29 on the change-shaft 25, the lever 291 pivoted at 268 and having a projecting portion which is held pressed against the periphery of the said cam by the action of the contracting spiral spring 292, a rod 293 which is provided with an adjustable collar 294 to be engaged by the said lever 291 in the movement of the latter that is produced by the action of the prominence of said cam, an arm 295 which is mounted loosely upon one end of the shipper rock-shaft 21 and with which the forward end of the rod 293 is connected pivotally, an arm 296 which is fast upon the said rockshaft, and a stiff spring 297 connecting the said arms with each other and serving to transmit motion with yielding force from arm 295 to arm 296. The said spring yields to avoid breakage in case the shipper rock-shaft is prevented from being turned by the restarting mechanism at a time when the dagger of the protector mechanism is in engagement with the frog. The cam 29 acts, through the connections which have been described, to turn the shipper rockshaft in the direction to replace the shipper-handle in the position which it occupies during the regular running of the loom, and also operate the shipping mechanism to clutch the band-pulley 7 with the fixed wheel 9, as well as relieve the pressure of the brake 14 upon the brake-wheel 13. As the unclutching of the worm-gear 75 takes place, the projection of arm 291 enters a notch *a* in the periphery of the cam 29, thereby locking the change-shaft against accidental motion, with the tail of the clutching lever 252 remaining in engagement with the unclutching arm 257, whereby the said clutching lever is retained in inoperative position.

The weft detector devices which are shown in the drawings comprise a weft-fork 30 which is located at the replenishing end or side of the loom, the slide or carrier 31 on which the said weft-fork is pivotally mounted, the guide 32 for said slide or carrier secured by a screw 33 to the breast-beam 2, the weft-hammer or gooseneck 34 cooperating with the said weft-fork 30, and the cam 35 upon cam-shaft 4 by means of which the weft-hammer or gooseneck is actuated. For the purpose of tripping the weft-replenishing instrumentalities into action or detection of weft-failure by the weft-fork 30, the slide or carrier 31 of such fork has applied to the front end thereof a stud 341 projecting forward and provided in its forward end with a transverse hole or slot receiving a stud or pin 351 projecting laterally from an arm 36 rising from a rod 37 on which such arm is fixed. The rod 37 is supported in position adjacent the lower front edge of the breast-beam, and extends crosswise to the loom. At one end thereof

it is fitted to a bearing 371, Figs. 6 and 7, which is attached to the breast-beam. The other end of the rod enters the central eye of the hub of arm 41 hereinafter described, and fits loosely therein, whereby such end is supported. Upon the latter end an upwardly extending arm 38 is fixed, the upper end of said arm being provided with a lateral projection or stud 392 upon which is pivotally mounted a dog 39 having a lateral engaging projection 391. The said projection extends over the upper end of the arm 41, the latter rising from a short rod 411 which is supported in line with rod 37 by a fixed bearing 412, the arm 41 being fixed upon the inner end of the said rod 411. The said upper end of arm 41 is provided with a shoulder 42 with which the projection 391 is adapted to engage. When the rod 37 is turned or rocked forward in consequence of the advance of the weft-fork slide or carrier 31, the result of such engagement of projection 391 with shoulder 42 is to rock the arm 41 and rod 411. For the purpose of controlling the replenishing instrumentalities, the rod 411 is furnished with an arm 43 projecting rearwardly therefrom and joined by a flexible or other connection 44 with the latch 259, so that when the parts are rocked as just mentioned the said latch is disengaged from the fixed shoulder 260 and the unclutching arm 257 is unlatched or unlocked, allowing the spring 256 to turn the clutching lever 252 and clutch the worm-gear 75 to the change-shaft. For the purpose of transmitting movement to the shipper-handle 20 to bring about the stoppage of the weaving instrumentalities with the shuttle in the shuttle-box at the replenishing end of the loom, the rod 411 has fixed thereon a hub 45 having a projection 46 for engagement with a projection 47 of the shipper-handle. When rod 411 is turned as aforesaid, the action of projection 46 against projection 47 operates to turn the shipper-handle to carry the line of draft that is transmitted by means of the rod 19 from the brake-lever 12 to the shipper-handle 20 over to the rear of the center of shipper-rock-shaft 21, unlocking the shipper-devices, whereupon the spring 17 acts to effectuate the unclutching of the band-pulley 7 and the application of the brake.

In accordance with the invention, I make provision against accidental starting-up of the change-shaft during an ordinary stoppage of a loom. The reason for this is the fact that the worm-gear 75 is driven constantly from the band-pulley 7 so long as the driving-band 8 which passes around said band-pulley is in motion. It is important to provide against starting-up of the change-shaft in consequence of the action of the weft-fork mechanism while the loom is being turned by hand during stoppage, as frequently is the case in practice. In this embodiment of my invention I furnish the dog 39 with a prolongation or extension 395, Figs. 6, 7, 8 and 9, extending downward therefrom, and I mount upon the shipper-rock-shaft an arm or finger 396 which is set-screwed to the said rockshaft and provided at its free extremity with a transverse projection 397 suitable to make contact with the said prolongation or extension 395 when the said rockshaft is turned for the purpose of occasioning a stoppage of the loom mechanism. The action of the arm or finger 396 against the prolongation or extension 395 turns the said dog 39 upon its pivotal stud 392 on the arm 38, raising the engaging projection 391 of the said dog above the shoulder 42 of the arm 41. The rod 37 may now be turned, as in consequence of the action of the weft-fork mechanism, without affecting the arm 41 and rod 411, and consequently without bringing about the disengagement of the latch 259 from the fixed stop 260.

What I claim is:—

1. In a loom, the combination with a shipper-handle, a normally-stationary change-shaft, means whereby to actuate the said change-shaft, to effectuate replenishment and automatically restart the loom, a weft-detector, devices, including a dog, intermediate said detector and said shipper-handle, and actuating means for throwing off the shipper handle and calling the change-shaft into operation, and a rockshaft operated by the said shipper-handle, of a finger operated by the said rockshaft, whereby when the shipper-handle is in "off" position and the driving-power of the loom unshipped the dog is controlled to prevent the said change-shaft from being called into operation by the weft-detector.

2. In a weft-replenishing loom, the combination with normally stationary change-shaft filling-changing instrumentalities, and loom-restarting devices operatively controlled by said change-shaft, weft-fork devices, a dog actuated thereby, a member actuated by said dog and serving to occasion the throwing off of the shipper-handle and call the change-shaft into action, a shipper-handle, and a rockshaft on which the said handle is fixed, of a finger operated by the said rockshaft to render said dog inoperative to actuate the said member when the shipper-handle is in "off" position and the loom driving-power unshipped.

3. In a weft-replenishing loom, the combination with the change-shaft, driving devices therefor including a clutch, weft-detector devices, a dog actuated thereby, an arm actuated by said dog and serving to trip the clutch of the said driving-devices into action to actuate the change-shaft, and a shipper-handle, of means operated by the shipper-handle, when it is moved to unship

the loom driving-power, to render said dog inoperative to actuate the said arm.

4. In a loom, in combination, a weft-fork, a weft-fork carrier, a tripping member, a dog through which the said tripping member is actuated from the said carrier, said dog having a downward extension, a shipper, a shipper-rockshaft, and a finger carried by the said rockshaft for engaging with the said extension of the dog for preventing actuation of the tripping member through such dog while the shipper is unshipped.

In testimony whereof I affix my signature in presence of two witnesses.

SIMEON SCHOON JACKSON.

Witnesses:

CHAS. F. RANDALL,

NATHAN B. DAY.