

Nov. 5, 1968

T. S. HIGGINS ETAL

3,409,053

FILLING MECHANISM FOR LOOMS

Filed March 7, 1967

3 Sheets-Sheet 1

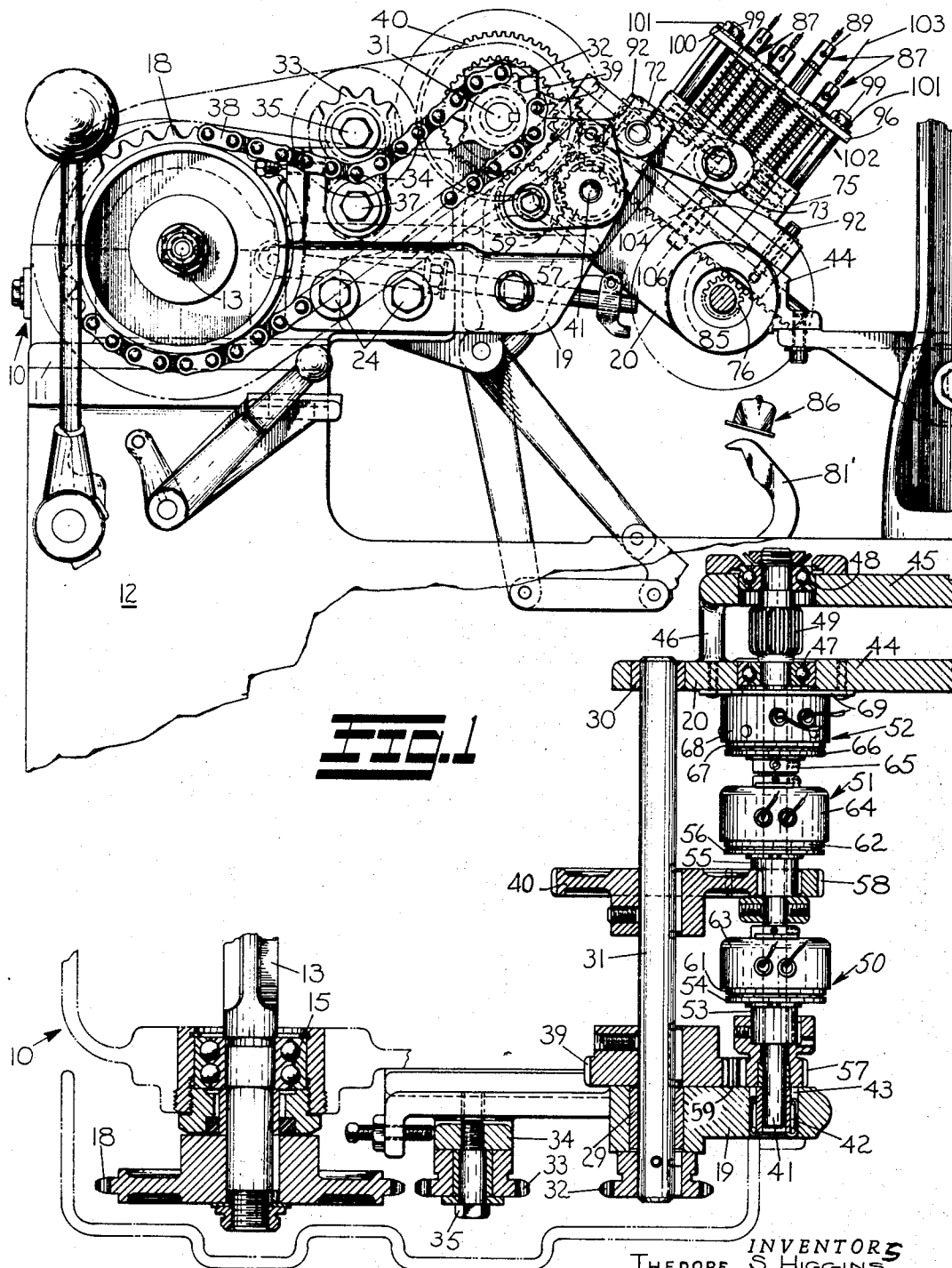


FIG. 1

FIG. 2

INVENTORS
THEODORE S. HIGGINS
DONALD J. LIZOTTE
BY
Albert R. Mahan
ATTORNEY

Nov. 5, 1968

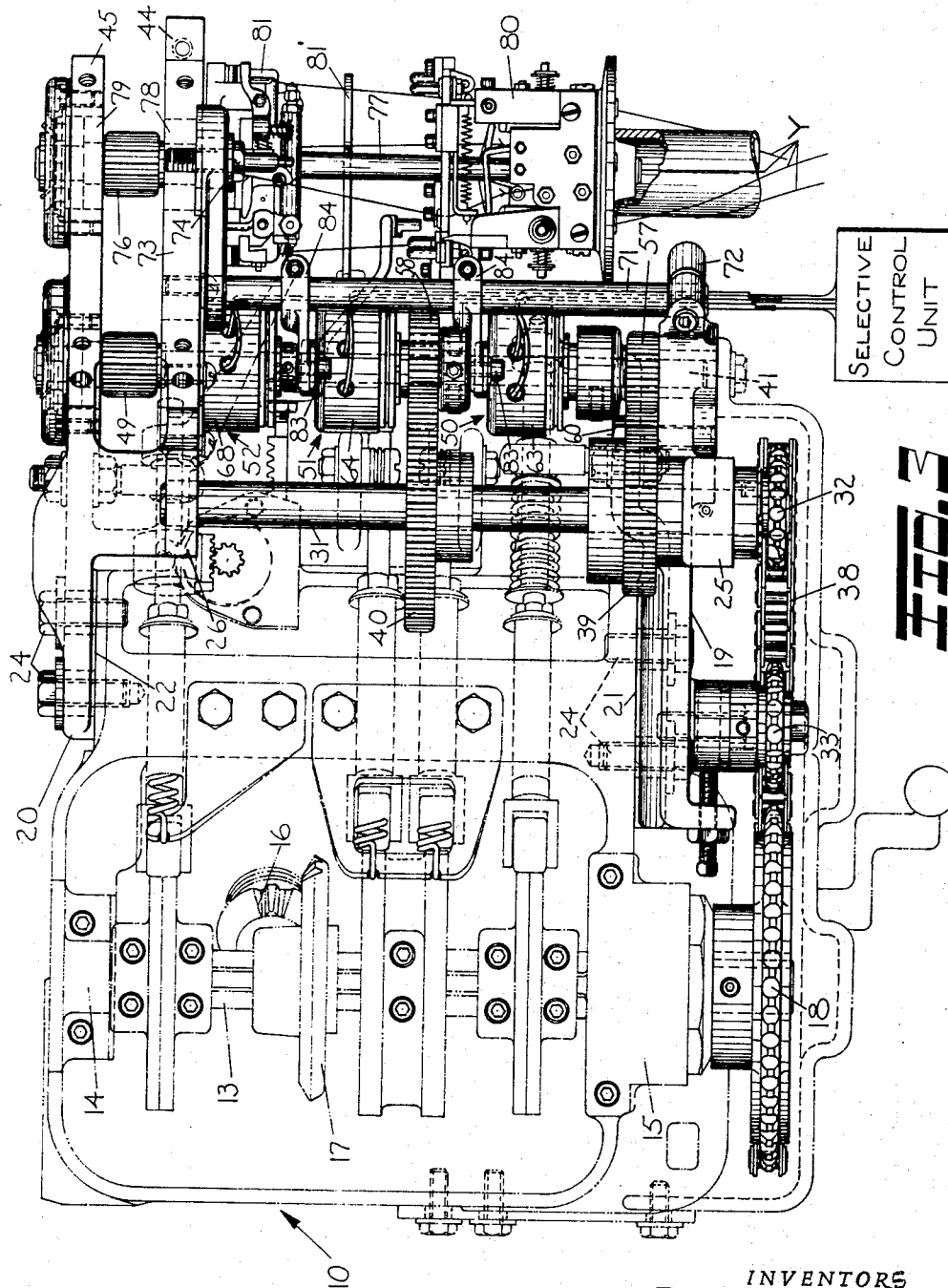
T. S. HIGGINS ET AL

3,409,053

FILLING MECHANISM FOR LOOMS

Filed March 7, 1967

3 Sheets-Sheet 2



SELECTIVE
CONTROL
UNIT

FIG. 2

INVENTORS
THEODORE S. HIGGINS
DONALD J. LIZOTTE
BY
Albert A. Mahanel
ATTORNEY

Nov. 5, 1968

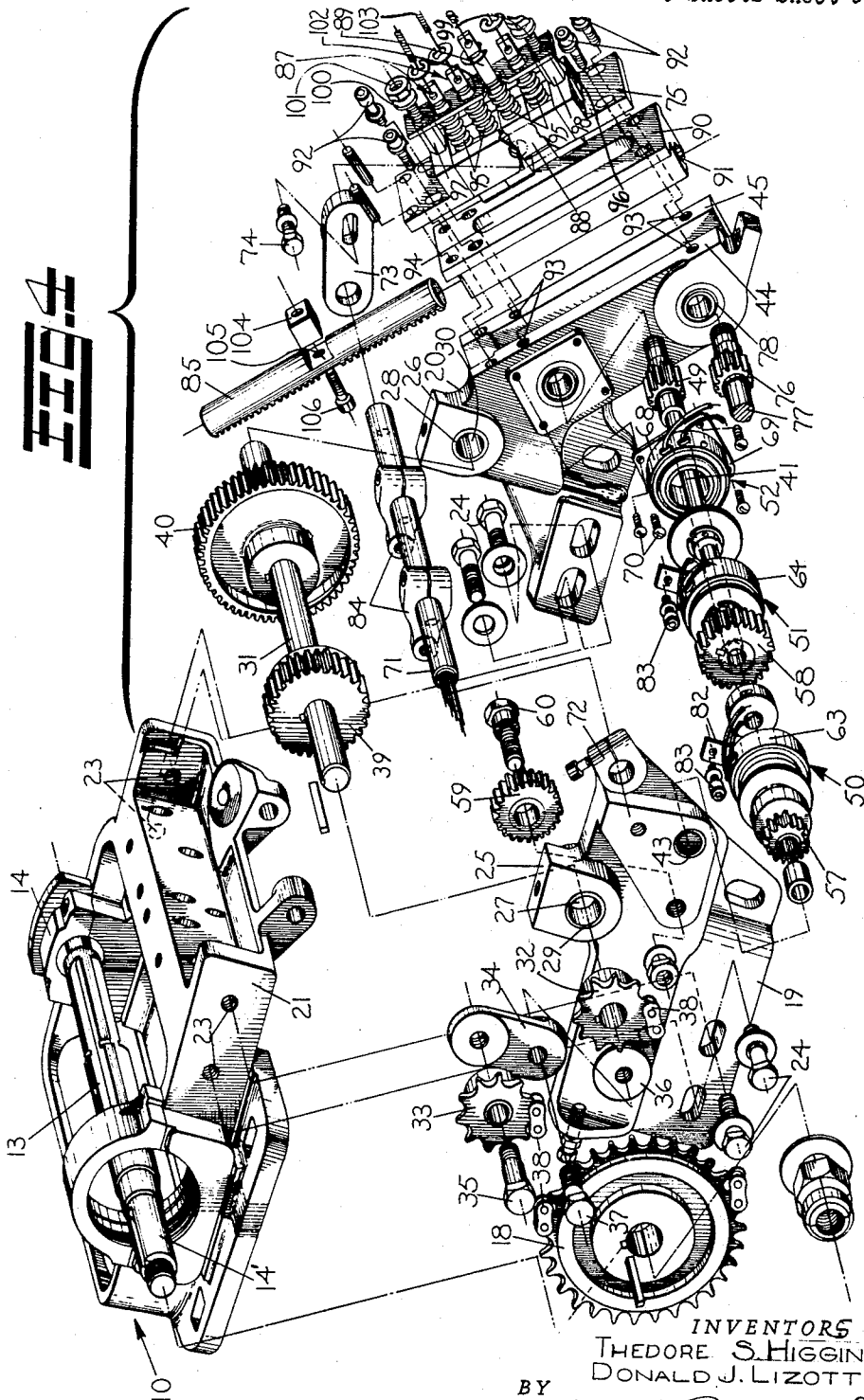
T. S. HIGGINS ET AL

3,409,053

FILLING MECHANISM FOR LOOMS

Filed March 7, 1967

3 Sheets-Sheet 3



INVENTORS
THEODORE S. HIGGINS
DONALD J. LIZOTTE
BY
Albert A. Mahan
ATTORNEY

1

3,409,053

FILLING MECHANISM FOR LOOMS

Theodore S. Higgins, Woonsocket, and Donald J. Lizotte, Smithfield, R.I., assignors, by mesne assignments, to John Donald Marshall and Horace L. Bomar, as trustees of the Carolina Patent Development Trust

Filed Mar. 7, 1967, Ser. No. 621,168

13 Claims. (Cl. 139—122)

ABSTRACT OF THE DISCLOSURE

A filling mechanism for shuttleless looms having a rotatable indexing head for supporting and guiding a plurality of filling yarns at spaced feeding stations about said head, and selectively controllable clutch members for rotating said head to any one of said stations for individual presentation of a filling yarn to the filling carrier element for insertion into the warp shed.

Background of the invention

The invention pertains to a filling motion for shuttleless looms of the type adapted to introduce filling from an outside source into the warp sheds by reciprocating flexible yarn carrying elements.

Shuttleless looms for weaving in the manner described wherein the filling mechanism controls and presents a single end of filling for insertion are shown and described in U.S. Patent No. 2,654,399. The filling control mechanism of this patent has performed satisfactorily in looms weaving from a single source of supply, such as one grade or one color of filling yarn.

In the weaving of certain types of fabrics it is often desirable to form a patterning effect by mixing filling yarns of a different color to form stripes which is accomplished by selecting one color for a given number of picks and subsequently selecting a second then a third and so on. Additionally, such patterning effects are substantially increased by a striped warp wherein unlimited plaid and check patterns can be formed.

A form of selective filling mechanism for shuttleless looms is shown and described in U.S. Patent, Ser. No. 3,323,556, to T. S. Higgins et al., filed June 1, 1965. Similar to the instant invention the disclosure of this application relates to a mechanism for selectively inserting lengths of filling yarn from a plurality of outside sources in accordance with some desired pattern.

The filling mechanism of the present invention receives its dictates from a selective control unit adapted to function in accordance with a predetermined pattern, and with a minimum number of cooperating components and space limitations the mechanism is adapted to rotate the indexing head to position any one of the plurality of filling yarns supported and guided thereby to a position to be received by the filling inserting element. The mechanism further includes selectively controlling indexing head positioner members which are effective in limiting the rotation of said indexing head to the precise position for feeding a selected filling yarn. Additionally, the rapid movement of the indexing head during rotation in one direction and then the other is stabilized by a braking device which receives its indication from the selective control unit.

Summary of the invention

The filling mechanism of the present invention receives its source of drive from and is supported by the filling control housing which as is well known to those familiar

2

with this type of loom, is attached at one end of the upper surface of the loom's breast beam.

The mechanism includes a rotatable shaft on which the filling thread positioner or so-called indexing head is assembled for movement with said shaft. A second shaft is supported for clockwise and anti-clockwise rotation in spaced and parallel relation with the rotatable shaft and is mechanically linked to the latter for transmitting its dictates thereto.

A driving shaft having a pair of fixed gear members thereon is disposed in such a manner that each of the gear members are in driving relation with freely rotatable gear elements supported on the second shaft. The gear elements on the rotatable shaft are arranged to rotate in opposite directions and each functions in cooperation with an electro-magnetic clutch also supported by said second shaft.

The clutches are energized by a selective control unit in accordance with some desired pattern. When one clutch is energized it turns the second shaft in one direction and when the other is energized it turns said shaft in the opposite direction. This motion is transferred to the rotatable shaft and the indexing head being rotatable therewith moves to a position to present one of its filling yarns to the carrier element for insertion within the warp shed. A selectively controlled positioning means functions to limit the amount of rotation of the rotatable shaft and indexing head so as to precisely locate the selected filling yarn in feeding position.

Brief description of the drawing

FIG. 1 is a view in side elevation of a portion of a shuttleless loom showing the mechanism according to the invention applied thereto;

FIG. 2 is a plan view of a portion of the mechanism shown in FIG. 1 showing the relationship between the driving shaft and second shaft which supports the electro-magnetic clutches;

FIG. 3 is a plan view showing by means of full and phantom lines the various components comprising the invention and how the source of drive is obtained from the filling control housing; and

FIG. 4 is a perspective view in exploded form showing further detail of the multiplicity of elements comprising the invention.

Description of the preferred embodiment

Now referring to the figures of drawing, enough of a shuttleless loom is shown in FIG. 1 to serve as a basis for a detailed description of the invention applied thereto.

In FIGS. 1, 3 and 4 there is shown a filling control housing generally indicated by numeral 10 and in FIG. 1 its position on the upper surface of the breast beam 11 which traverses the distance between the loomsides 12 (one only shown) in the well known manner.

A shaft 13 is supported for rotation in the housing 10 with one end of said shaft extending outwardly beyond the limits of said housing as at 14' in FIG. 4. This shaft is journaled in opposed bearings 14 and 15 provided in the sides of the housing 10 and is caused to rotate in a clockwise direction as viewed in FIG. 1 by means of bevel gears 16 and 17 shown in FIG. 3. Bevel gear 17 is fixed on shaft 13 and is in meshing relation with bevel gear 16 which is fixed to a shaft member (not shown) that is connected by gear means to the loom's cam shaft (not shown).

That portion 14 of shaft 13 which extends from housing 10 has a sprocket 18 fixed thereon for rotation with said shaft.

The means for supporting the various components of

the present invention comprises a pair of spaced and horizontally aligned support brackets 19 and 20 which assemble in abutting relation on machined surfaces 21 and 22 (FIGS. 3 and 4) formed on the sides of the housing 10 most remote from the front of the loom. As shown in FIG. 4 each of these machined surfaces is provided with a pair of tapped holes 23 and by means of cap screws 24 bracket 19 assembles to surface 21 and bracket 20 to surface 22. Aligned and integrally formed bosses are provided on the uppermost portion of the support brackets 19 and 20 with that on bracket 19 being identified by numeral 25 and that on bracket 20 by numeral 26. These bosses 25 and 26 are provided with aligned apertures 27 and 28 having bushings 29 and 30, respectively, assembled therein (FIG. 4) which serve to support a driving shaft 31 for rotation in a clockwise direction. One end of the driving shaft 31 extends outwardly beyond the limits of boss 25 and supports on this end a sprocket 32 which is in alignment with sprocket 18, and is rotatable with said shaft. An idler sprocket 33 is adjustably assembled in alignment with the intermediate sprockets 18 and 32.

This idler sprocket 33 is rotatably attached to a supporting arm 34 (FIG. 4) by means of a shouldered bolt 35 and said arm is attached to a base 36 provided on the side of bracket 19 by means of a cap screw 37. Idler sprocket 33 is rotated by a sprocket chain 38 which interconnects sprockets 18 and 32 and the clockwise motion of said sprocket 18 is transmitted to said sprocket 32. Intermediate the support brackets 19 and 20 the driving shaft 31 supports in spaced relation a pair of spur gears 39 and 40 which are in driving relation with a pair of gear elements 57 and 58 rotatably supported on a second shaft 41. One end of shaft 41 is supported and journaled in a bearing member 42 which is assembled in an aperture 43 provided in the support bracket 19. Support bracket 20 is provided with a pair of spaced leg elements 44 and 45 which are interconnected by a web 46 disposed adjacent that surface which abutts the machined surface 22 of the housing 10 when assembled to the latter (FIGS. 2, 3 and 4). Leg elements 44 and 45 include apertures in alignment with aperture 43 in the support bracket 19 and which shaft 41 extending through these openings it is further supported for rotation by bearing members 47 and 48. Bearing 47 is assembled in the aperture provided in leg element 44 and supports the shaft 41 at a point in spaced relation to its end. Bearing 48 is assembled in the aperture provided in leg element 45 and serves to support the end of shaft 41. Within the span between leg elements 44 and 45, shaft 41 is provided with a gear pinion 49 which serves as a means for transmitting the required motion to rotate the indexing head and will be more fully described hereinafter. That portion of shaft 41 which traverses the distance between support brackets 19 and 20 supports in spaced relation a pair of electro-magnetic clutches generally indicated by numerals 50 and 51 and an electro-magnetic brake 52. These electro-magnetic clutches and brake may be of the type manufactured and sold by the Warner Electric Brake and Clutch Co. of Beloit, Wis.

Each of the clutch members is arranged to rotate shaft 41 in a direction opposite to that of the other. Clutch 50 includes an armature hub 53 and armature 54 and these members in clutch 51 are identified by numerals 55 and 56, respectively (FIG. 2). The armature hubs and armatures are rotatably assembled on shaft 41 and each is caused to rotate in opposite directions by means of gear elements 57 and 58 which are fixed on the armature hubs 53 and 55, respectively. Gear element 58 is in driving relation with spur gear 40 on the driving shaft 31 and is caused to rotate in an anticlockwise direction. Gear element 57 is in meshing relation with an idler gear 59 which is rotatably assembled by means of a shouldered stud 60 to the inner side of support bracket 19. This idler gear is in driving relation with spur gear 39 and causes gear element 57 and its respective armature 54 and armature

hub 53 to rotate in a clockwise direction. Each of the clutches includes a rotor which in clutch 50 is depicted by numeral 61 and in clutch 51 by numeral 62 (FIG. 2). These rotors are fixedly attached to shaft 41 and it should now be easily understood that the shaft will turn according to the dictates of the particular clutch selected. Each clutch includes a fixed shell or so-called field and these are identified for clutches 50 and 51 by numerals 63 and 64.

The electro-magnetic brake 52 comprises components similar to the clutches which includes an armature hub 65, armature 66, a rotor 67 and a field 68 (FIG. 1). The field 68 of the brake is provided on one end thereof with a flange 69 and by means of four screws 70 (FIG. 4) the flange is fixedly attached to leg element 44 of the support bracket 20. The electrical leads extending from the fields of the clutches and brake are directed into and extend through a conduit pipe 71 supported above said clutches and brake. One end of this conduit pipe 71 is fixedly held in an integrally formed clamping hub 72 provided on the inner end of the support bracket 19 (FIGS. 3 and 4). The opposite end of the conduit pipe is firmly held by a supporting arm 73 which by means of a cap screw 74 is assembled to the side of a plunger guide 75 that will be further described hereinafter.

The electrical leads from the clutches and brake members are interconnected with a selective control unit (not shown) and said members are activated and deactivated in accordance with some predetermined pattern. To prevent the fields 63 and 64 from rotating with their respective rotors, each is provided with an upwardly directed ear 82 which by means of a screw 83 is attached to positioner elements 84 which are fixedly carried on the conduit pipe 71 in general alignment with each of said clutches.

Intermediate leg elements 44 and 45 of support bracket 20 and in spaced relation to gear pinion 49 a second gear pinion 76 is mounted for rotation with and adjacent one end of a rotatable shaft 77.

This rotatable shaft 77 is journaled in suitable bearing members 78 and 79 assembled in aligned apertures provided in leg elements 44 and 45, respectively, and extends outwardly from the latter in a plane parallel with shaft 41 which supports the clutch and brake members.

That portion of the rotatable shaft 77 which extends from the support bracket 20 supports the filling yarn indexing head elements which includes a unit identified by numeral 80 having the filling yarn guiding members and friction brackets and a second unit identified by numeral 81 (FIG. 3) which includes the thread cutting and clamping members. Four lengths of filling yarns which are identified by the letter Y, each being drawn from a separate source of supply are shown being guided through unit 80 to the second unit 81 where the ends are clamped and held in readiness for selective positioning and presentation to the inserting means by the usual depressor 81'. Further reference to the elements of the indexing head are considered unnecessary for the aforementioned patent application shows and describes these members in complete detail.

A rack gear 85 (FIGS. 1 and 4) is in meshing relation with the gear pinions 49 and 76 and any selective rotation of shaft 41 by the clutch members is transmitted through said rack gear to the rotatable shaft and rotates the yarn indexing head elements to a position to present a chosen yarn to the filling inserting member generally indicated by numeral 86 in FIG. 1.

A means is provided which governs the amount of movement during each selection to assure proper positioning of the indexing head elements and includes a plurality of plunger members generally indicated by numeral 87 equal in number to the number of available yarns capable of being selected for warp shed insertion. These plunger members are in the form of a cube 88 having an elongated necked portion 89 extending therefrom. The plunger mem-

bers are juxtapositioned within a plunger guide 75. A second plunger guide 90 having a lower longitudinal extending recess 91 (FIG. 4) of a configuration to provide clearance for the upper portion of the rack gear 85 assemblies with plunger guide 75 to the upper surface of leg elements 44 and 45 of the support bracket 20. Cap screws 92 (FIGS. 1 and 4) provide the means of assembly for the plunger guides by passing through aligned openings in each end of said guides with the threaded portion of said screws being receivable into tapped holes 93 provided in the leg elements 44 and 45. As shown in FIG. 4 the second plunger guide 90 is provided with a centrally disposed and longitudinally extending opening 94 through which a part of the cube portion 88 of each plunger 87 is adapted to extend to a position in close proximity with the upper surface of the rack gear 85. Each of the plunger members is spring biased in the direction of the rack gear and includes a coil spring 95 assembled on the neck portion 89 which is caused to bear against the cube portions 88 on one end and a retainer plate 96 at the opposite end. The retainer plate is assembled in spaced relation to the plunger guide 75 by means of spacer elements 97 and 98 fixed to the upper and end surfaces of said guide 75. Each spacer is provided with a threaded stud 99 which extends through an aligned aperture in the retainer plate and each is adapted to receive a washer 100 and a nut 101 for the retainment of said plate. Intermediate the studs 99 which extend through the retainer plate, a plurality of openings 102 (FIGS. 1 and 4) are provided which equal the number of plunger members 87 and the necked portion 89 of each extends through and beyond the upper limits of said plate. The upper end of each plunger member is connected to a Bowden wire 103 which receives its dictates from the selective control unit and is caused to function in conjunction with the electro-magnetic clutches 50 and 51.

A plunger positioning block 104 assemblies in a centrally disposed recess 105 provided in the upper surface of the rack gear 85 by means of a screw 106 (FIG. 4) and during its intended function is caused to move with said rack gear within the limits of the longitudinal extending opening 94 in the second plunger guide 90.

In operation, the selective control unit (not shown) is caused to energize and de-energize the clutch members in accordance with a predetermined pattern. The pair of clutches are effective individually in rotating their supporting shaft either in a clockwise or anti-clockwise direction and this motion is transferred through the rack gear to the shaft which supports the indexing head for rotating the latter to a position for presenting one of its yarns to the inserting member.

Immediately prior to sending an indication to one of the clutches, the selective control unit through the Bowden wire connections causes one or more of the plunger members to be pulled upwardly and away from the rack gear. The plunger member individual to a particular chosen yarn remains selected and the positioning block 104 is positioned directly beneath it. The plunger members on each side of a selected plunger are by means of the coil springs 95 maintained in a position of close proximity with the upper surface of the rack gear 85. If a selected plunger should be one of the end plunger members and on the next selection the plunger on the opposite end is to be selected, the intermediate plungers are also pulled upwardly along with the chosen plunger to permit the positioning block 104 to move with the rack gear to a position directly below the latter plunger. After the rack gear has moved the required distance the intermediate plungers are released to move to a position in close proximity with the upper surface of the rack and the selected plunger is firmly positioned until a subsequent selection is made. This same procedure occurs when the rack gear is caused to move in either direction; however, when an adjacent plunger is to be selected only that plunger is pulled outwardly and after the rack gear is

moved, the previously selected plunger is released to assume their close position with the rack gear.

The mechanism is capable of functioning without the assistance of the electro-magnetic brake 52; however, said brake serves to stabilize the movement of the clutch supporting shaft 41 during its sudden movement in one direction and then the other.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

We claim:

1. In a shuttleless loom having means for inserting filling yarns in pairs of interconnected picks each of which is disposed in its separate shed and which includes clamp and cutter means for each of a plurality of filling yarns, means for selectively controlling filling yarns to present them to said filling inserting means while retaining the remainder of said filling yarns inactive which comprises

- (a) an oscillatable indexing head for controllably positioning said filling yarns,
- (b) first means for effecting oscillation of said head in one direction,
- (c) further means for effecting oscillation of said head in the opposite direction, and
- (d) pattern controlled means for determining the degree of oscillation of said indexing head.

2. The structure of claim 1 wherein the means for selectively controlling filling yarns includes a rotatable shaft for supporting said indexing head for oscillating movement to selectively present any one of the plurality of filling yarns carried thereby to said inserting means.

3. The structure of claim 2 wherein said means for selectively controlling filling yarns further includes a second shaft supported for clockwise and anti-clockwise rotation adjacent to and in a plane parallel with said rotatable shaft.

4. The structure to claim 3 wherein said shafts include interconnecting gear means for transmitting the dictates of said second shaft to said rotatable shaft.

5. The structure of claim 4 wherein said means for selectively controlling filling yarns includes a driving shaft disposed in spaced relation to and in a plane parallel with said rotatable and second shafts.

6. The structure according to claim 5 wherein said shaft includes a pair of spaced gear members fixed for rotation therewith.

7. The structure of claim 6 wherein said second shaft includes a first gear element supported for rotation therewith and driven in an anti-clockwise direction by one of said pair of gear members.

8. The structure of claim 7 wherein said second shaft further includes a second gear element supported for rotation therewith and driven in a clockwise direction by the other of said pair of gear members.

9. The structure of claim 8 wherein said second shaft fixedly supports selectively controllable clutch members, one for each of said gear elements for effecting rotation of the latter shaft in a selected direction of rotation thereby rotating said rotatable shaft and indexing head to a position to present one of said filling yarns to said filling inserting means.

10. The structure of claim 4 wherein said interconnecting gear means includes a rack gear in meshing relation with pinion gears provided at one end of said rotatable and second shafts.

11. The structure of claim 9 wherein said second shaft includes a selectively engageable brake member for stabilizing the movement of said shaft as it is caused to rotate first in one direction and then the other.

12. The structure of claim 7 wherein an intermediate gear is provided in driving relation with one of said pairs

of gears and said first gear element for rotating the latter in the same direction as said one gear of said pair.

13. The structure of claim 10 wherein said pattern control means includes a plurality of selectively controlled plunger members one for each of said filling yarns and which are selectively actuated to function in cooperation with and limit the movement of said rack gear whereby said indexing head is rotated a predetermined number of degrees to present the filling yarns individually to the selected plunger in a position to be received by said filling inserting means.

References Cited

UNITED STATES PATENTS

3,040,782	6/1962	Pfarrwaller	139-122
3,192,957	7/1965	O'Neill	139-55
3,237,648	3/1966	Grisay	139-1.4

FOREIGN PATENTS

1,348,241	2/1963	France.
-----------	--------	---------

HENRY S. JAUDON, *Primary Examiner.*