Dec. 10, 1946. S. P. PARKER 2,412,355

LOOM

Filed May 1, 1945 5 Sheets-Sheet 1

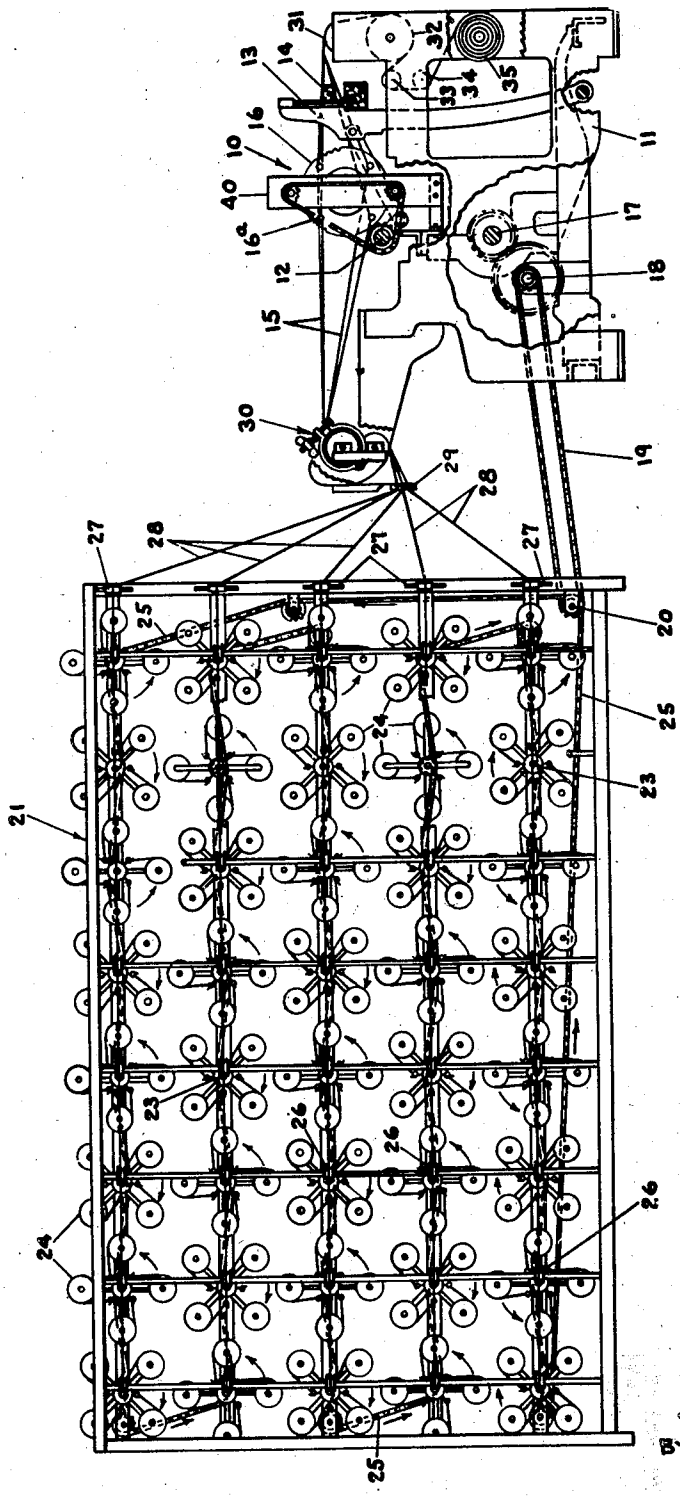


FIG. 1

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LOOM

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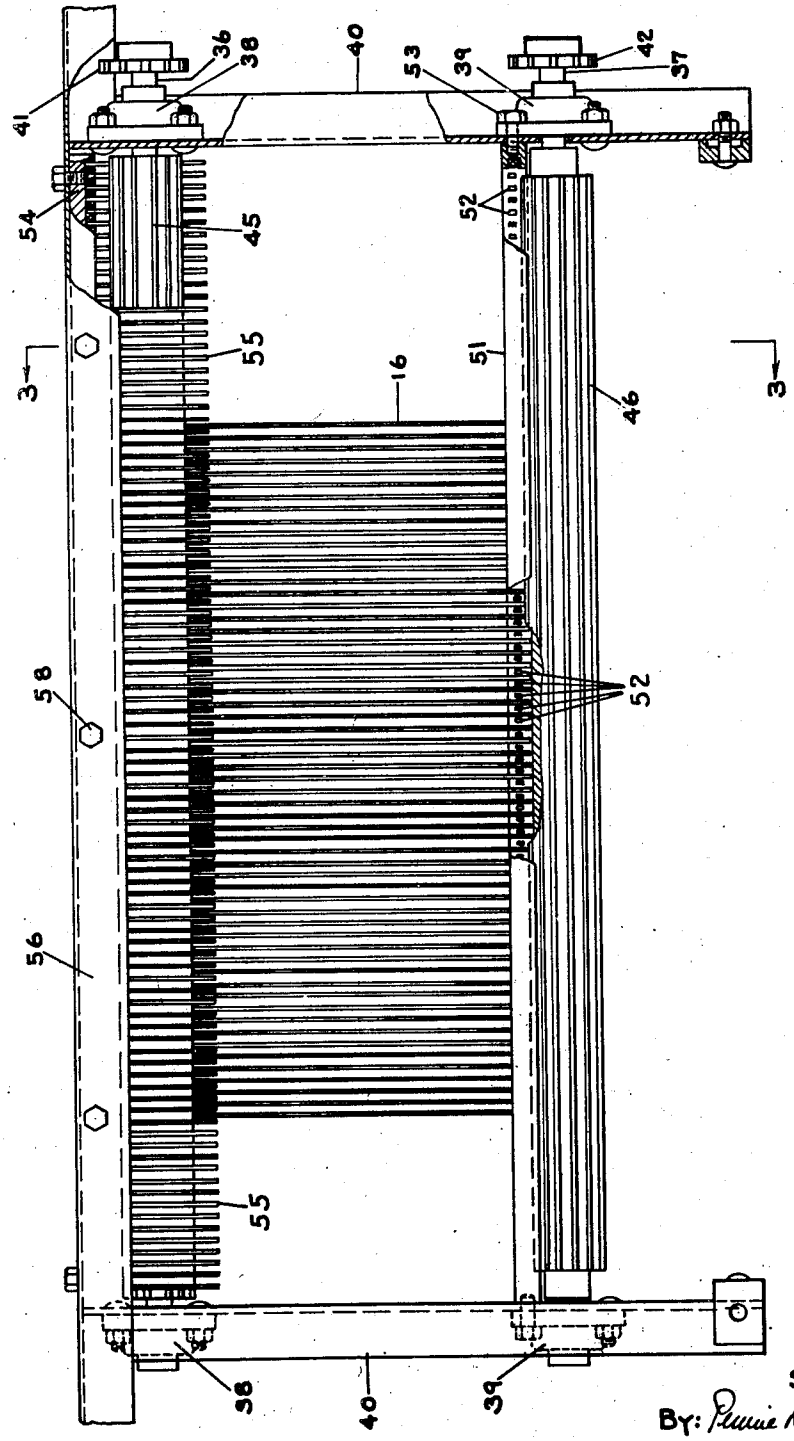


FIG. 2

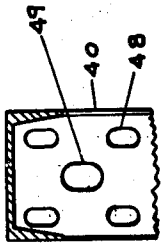


FIG. 7

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LOOM

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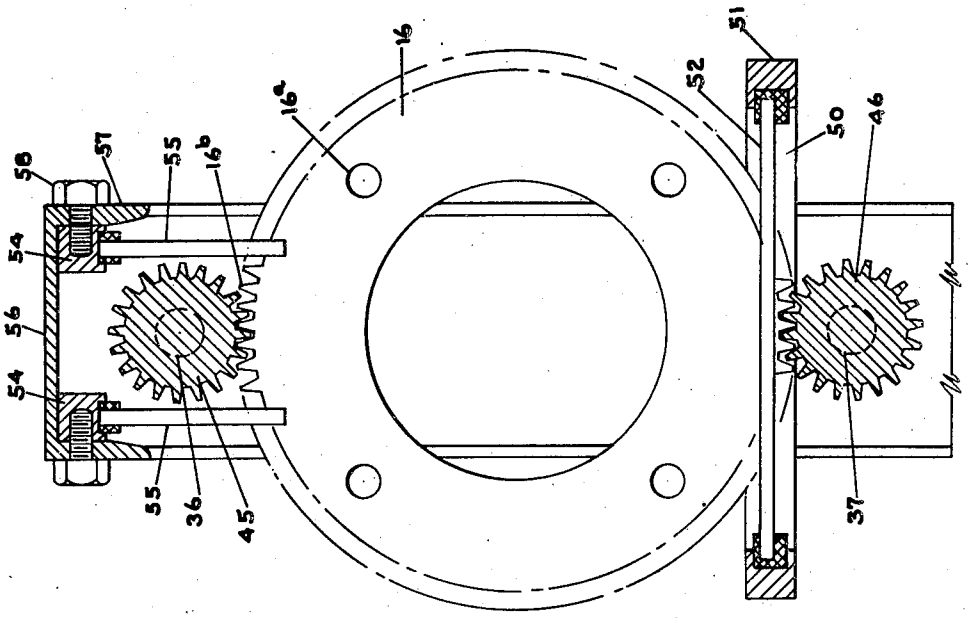


FIG. 3

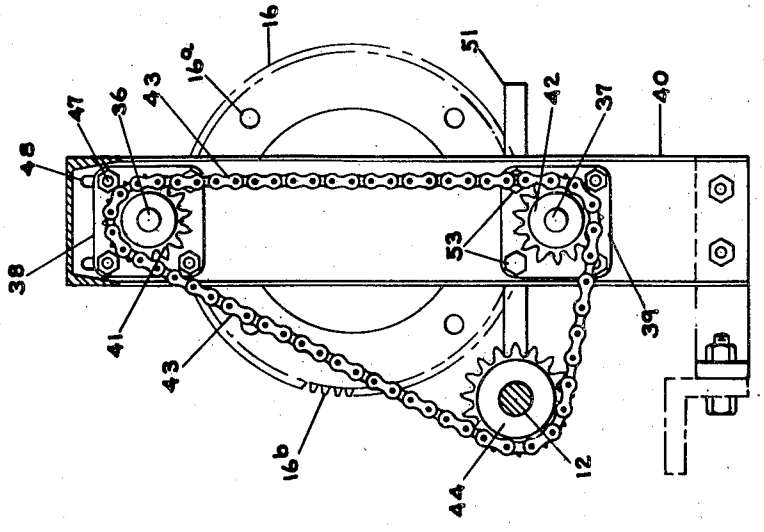


FIG. 4

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LOOM

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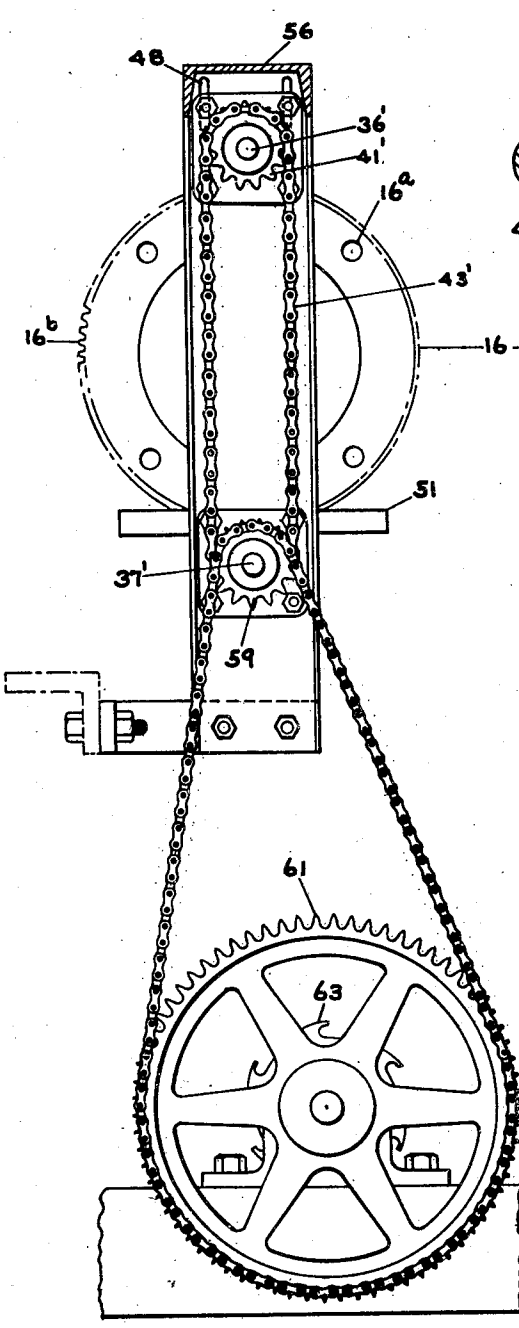


FIG. 5

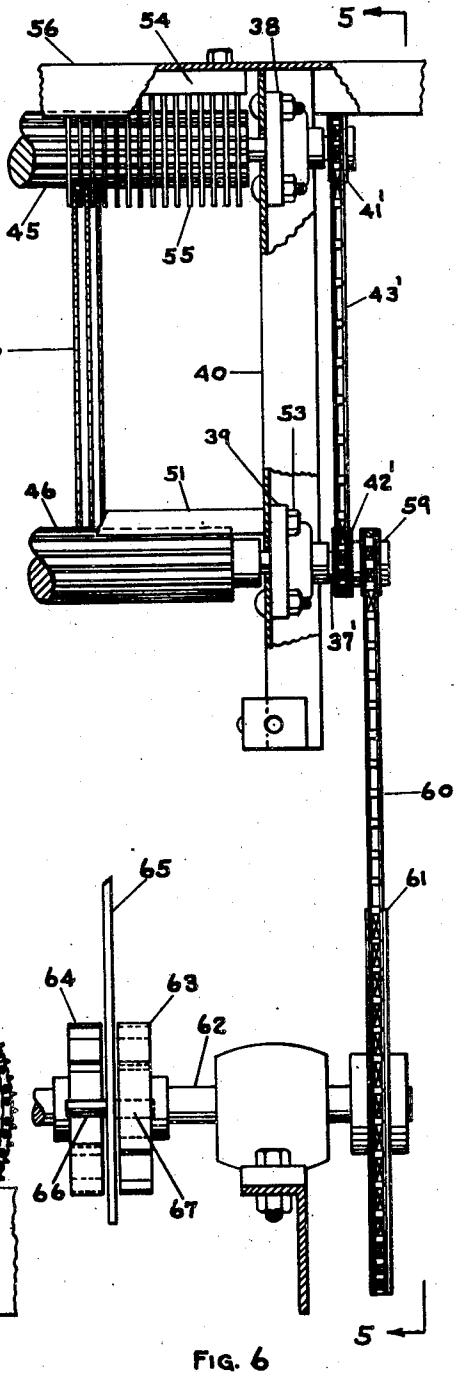


FIG. 6

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LOOM

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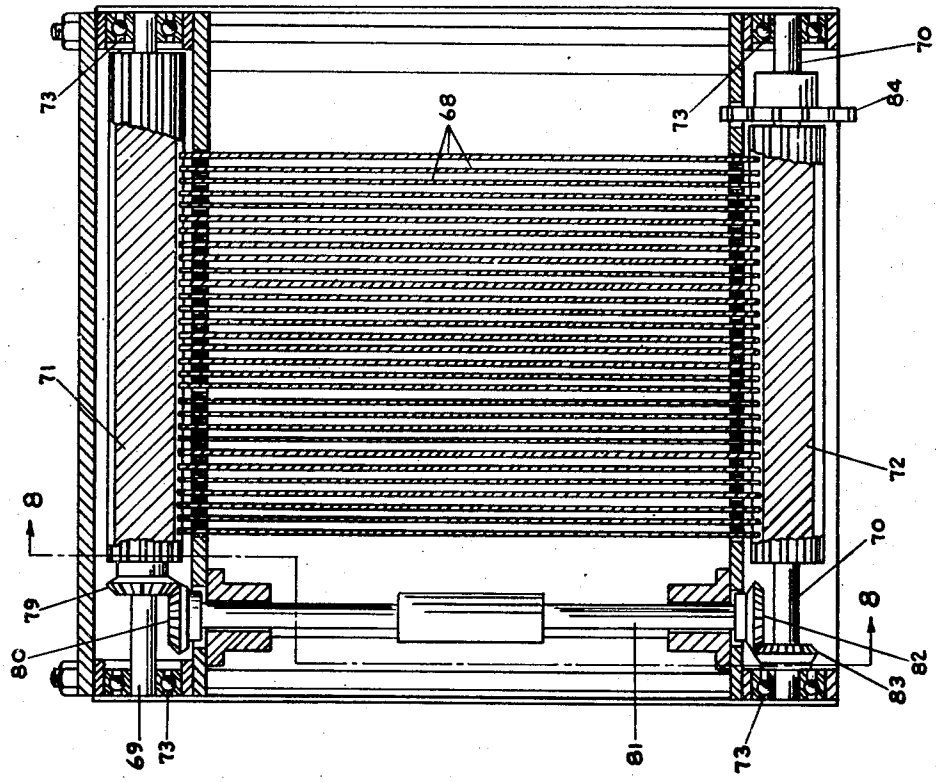


FIG. 9

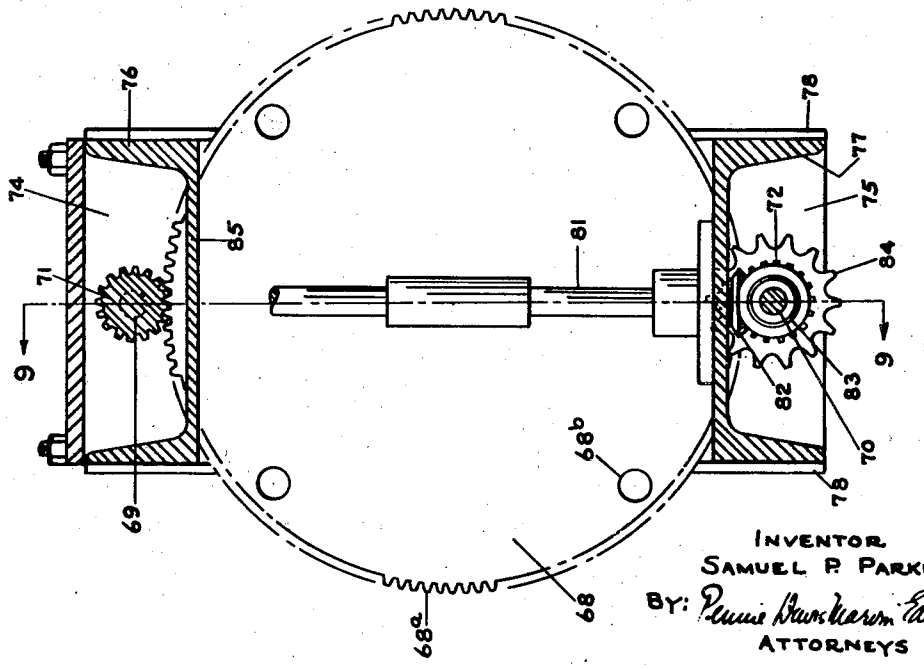


FIG. 8

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UNITED STATES PATENT OFFICE

2,412,355

LOOM

Samuel P. Parker, La Grange, Ga., assignor to Callaway Mills, La Grange, Ga., a corporation of Georgia

Application May 1, 1945, Serial No. 591,267

10 Claims. (Cl. 139—55)

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This invention relates to looms in which warp yarns are manipulated by discs or cards to form sheds into which filling yarn is inserted to produce a fabric. More particularly, the invention is concerned with a novel structure in which the discs are supported in spaced relation and driven in positive timed relation to other parts of the loom. The new structure offers advantages over prior disc assemblies, in that it is of simpler construction and, in its preferred form, it permits easy removal and replacement of the discs, as, for example, when a change is to be made in the number of warp yarns in the fabric.

In disc looms, each disc has openings for the passage of a plurality of warp yarns which are raised and lowered alternately to form sheds as the disc rotates. Since in the operation of the discs, the yarns move up and down across the faces thereof, the discs must be supported and driven at their peripheries, and adjacent discs in the loom must be kept separated to permit free movement of the yarns between them.

In disc looms disclosed in prior patents, various expedients have been proposed for supporting and driving the discs and keeping them separated, as, for example, in the loom of one prior patent, the discs are mounted between pinions on upper and lower shafts and have peripheral teeth meshing with the pinions. The discs are then kept separated by spacing rings mounted on the pinions between adjacent discs, with the ends discs held in position by collars on the pinions. With this arrangement, the changing of discs is quite difficult and time consuming, since, for example, discs can be added only by removing a collar from each pinion, sliding each additional disc endwise between the pinions, and slipping a spacing ring on each pinion after each disc has been put in place. The pinions in the construction referred to extend between the faces of the bearings for the shafts, and, therefore, the collars cannot be removed from the pinions except by removing the shafts from the bearings by moving the shafts endwise through the pinions and bearings. The time and labor required to change discs in such a loom make the loom wholly impractical, except for the production of fabrics having a fixed number of warp yarns.

In other prior constructions, the shedding discs have been mounted between rods having spacing discs thereon, which extend between adjacent shedding discs, and those constructions are complicated and do not provide for easy addition or removal of shedding discs.

The present invention is directed to the provision of a novel shedding disc assembly for use in disc looms, which is superior to prior constructions, in that it is less complicated and, in its preferred form, permits changes in the number of discs by simple adjustments of parts of the mechanism. In the new assembly, the discs are provided with peripheral teeth and are mounted between upper and lower shafts having pinions, the teeth of which mesh with the teeth on the discs. The discs are kept separated by a number of means, each of which includes a fixed mounting and a plurality of bars attached thereto and extending between adjacent discs. One such means may take the form of a reed, such as is commonly used in looms, the reed being so mounted that its bars extend generally horizontally and lie between adjacent discs. The other means may then take the form of combs having teeth which extend into the spaces between adjacent discs. One of the shafts, preferably the upper one, is mounted in bearings, which can be moved toward and away from the periphery of the discs, and whenever a change in the number of discs is to be made, the bearings are moved to shift the shaft and its pinions away from the discs, whereupon the latter may be readily removed from between the shafts.

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For a better understanding of the invention, reference may be had to the accompanying drawings, in which

Fig. 1 is a view in side elevation, with parts broken away, of a loom equipped with the new disc assembly and also a creel, from which the warp yarns are supplied to the loom;

Fig. 2 is a view of the disc assembly in rear elevation with parts broken away;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is an end elevational view with parts shown in section of a drive for the disc shafts;

Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 6 showing a different type of drive for the discs;

Fig. 6 is a fragmentary elevational view with parts broken away showing the structure illustrated in Fig. 5;

Fig. 7 is a sectional view showing a portion of one of the standards on which the shaft bearings are mounted;

Fig. 8 is a sectional view on the line 8—8 of Fig. 9, showing a modified construction; and

Fig. 9 is a sectional view on the line 9—9 of Fig. 8.

In Fig. 1, the new disc assembly, generally designated 10, is shown mounted in a loom gen-

erally similar to that disclosed in my copending application Serial No. 551,830, filed August 30, 1944, of which this application is a continuation-in-part. The loom includes the usual sides 11, between which extends a crankshaft 12 by which a lay 13 is operated. A shuttle 14 is driven along the race plate of the lay by the usual means and serves to introduce filling yarn into sheds formed by warp yarns 15 manipulated by discs 16. The loom includes the usual cam shaft 17, which is connected to the crankshaft 12 and is also connected by gearing to shaft 18 which is connected by a chain 19 to shaft 20 in a creel structure, generaly designated 21.

Within the creel are a plurality of shafts 23, on each of which are mounted supports which carry four yarn packages 24. Shafts 23 are driven from shaft 20 by a chain 25, and the creel is provided with suitable yarn guides 26 and 27. As each shaft 23 is rotated in unison with discs 16, the warp yarns from the packages 24 rotated by each shaft 23 are twisted together into cables 28, each cable containing four strands of warp yarn. From the guides 27, the cables pass to guide 29, and thence through means, generally designated 30, for applying drag to the cables. The drag applying means may be of the construction shown in my copending application Serial No. 591,265, filed May 1, 1945.

Each disc has four openings 16a for the passage of warp yarns, and as the discs are continually rotated in one direction, the yarns are twisted together. The twist runs in both directions from the discs, and the back twist is just sufficient to counteract the twist imparted to the yarns in cables 28 by the rotation of shafts 23. Beyond the discs, the twist runs forward, so that the four yarns issuing from each disc are again twisted into a cable with the picks of filling passing between the strands in the cable. The fabric produced in the loom passes over rolls 31, 32, 33, and 34, to a driven take-up roll 35, and the pull of the take-up roll on the warp yarns against the resistance of the drag applying device 30, insures that all the yarns will be under equal tension at the weaving point.

The discs 16 are mounted between an upper shaft 36 and a lower shaft 37 supported for rotation in bearings 38, 39 carried by standards 40 forming upward extensions from the loom sides. Shaft 36 carries a sprocket wheel 41 at one end, which is connected to sprocket wheel 42 on shaft 37 by a chain 43. Chain 43 is trained about a sprocket wheel 44 on crankshaft 12, and the shafts 36, 37 are, accordingly, driven in unison by the crankshaft throughout the operation of the loom.

Long pinions 45, 46 are mounted on shafts 36, 37, respectively, and each disc is formed with peripheral teeth 16b, which mesh with the teeth of the pinions. Bearings 38 for the upper shaft 36 are secured to standards 40 by bolts 47 passing through elongated slots 48 in the standards, and shaft 36 also passes through elongated openings 49 in the standards. With this arrangement, shaft 36 can be raised relative to shaft 37 by disconnection of chain 43 and the loosening of the nuts on bolts 47. By thus separating the shafts, the discs can readily be inserted between shafts 36, 37 or removed.

A plurality of separating devices are employed for keeping the discs properly spaced along the pinions, and each such means includes a mounting and a plurality of bars attached to the mounting and lying between adjacent discs. In the

construction shown in Figs. 2 and 3, three such spacing means are employed, and the lower spacing device may take the form of a conventional reed 50 consisting of a rectangular frame 51 and thin bars 52 anchored at opposite ends in the frame. The reed can be held in position in any desired way between standards 40, and in the construction shown, the upper bolts 53 of bearings 39 are threaded into openings in the end members of the reed. The reed is disposed close to the lower shaft 37, so that its bars 52 lie outside the circle described by openings 16a in the discs as the latter rotate.

The discs may be kept separated at the top by another reed similar to reed 50, but since such a reed would have to be raised to clear the discs, when changes in the number of discs are to be made, it is preferable to keep the discs separated at the top by means of a pair of combs, each of which consists of a back 54 and a plurality of teeth 55. Such a comb may be made by cutting an ordinary reed lengthwise along its median line. The combs may be secured in place in any desired manner, and in the construction shown, the standards 40 are connected by a cross bar 56 having downwardly extending edge flanges 57, and the combs are secured against the inner faces of the flanges by bolts 58.

With the arrangement described, the discs rest on pinion 46 on the lower shaft 37, and may be readily placed in position after shaft 36 has been raised. Since shafts 36, 37 are rotated in unison and the discs are positively driven by the engagement of their peripheral teeth with the teeth on pinions 45, 46, the discs rotate with the shafts and cannot move laterally from between the shafts. In the insertion of the discs, each disc is placed in a dent in reed 50 and lies between pairs of adjacent teeth on the two combs.

In the construction described, the upper shaft 36 is movable relatively to lower shaft 37, in order that the discs may be inserted and removed. With that arrangement, reed 50 is disposed above and close to shaft 37 and the combs lie on opposite sides of shaft 36. The entire arrangement, however, may be reversed with shaft 37 made movable and shaft 36 mounted in fixed bearings. In such a construction, reed 50 will be mounted near the fixed shaft. The arrangement illustrated, however, is preferred and is the more convenient.

The construction shown in Figs. 5 and 6 is the same as that shown in the preceding figures, except that the upper and lower shafts 36', 37' carry sprocket wheels 41', 42' connected directly by chain 43'. Shaft 37' carries another sprocket wheel 59 which is connected by chain 60 to a sprocket wheel 61 on shaft 62 carrying oppositely disposed ratchet wheels 63, 64. The ratchet wheels are actuated by a bar 65 provided with pins 66, 67 and operated by suitable means, such as are shown in my copending applications, Serial No. 551,830, filed August 30, 1944, and Serial No. 591,266, filed May 1, 1945. Shaft 62 is rotated by bar 65 and the ratchet wheels first in one direction and then in the other, throughout the operation of the loom. The discs are similarly rotated, first in one direction and then the other, and with this arrangement, it is not necessary to twist together, in a preliminary operation, the groups of warp yarns manipulated by the respective discs.

In Figs. 8 and 9, there is disclosed another form of disc mounting, in which the discs 68 formed with peripheral teeth 68a lie between upper and

lower shafts 69, 70, respectively, with their teeth meshing with the teeth of pinions 71, 72 on the respective shafts.

The shafts run in bearings 73 in end plates 74, 75 closing the ends of upper and lower channel members 76, 77, respectively. The channel members are mounted between vertical supports 78 attached in pairs to the loom frame at opposite sides thereof. Shaft 69 carries a bevel gear 79 meshing with a similar gear 80 on a vertical shaft 81, and shaft 81 carries a bevel gear 82 meshing with a similar gear 83 on shaft 70. Shaft 70 is provided with a sprocket wheel 84, by which the shaft can be driven from the loom crankshaft by a chain.

The discs 68 are kept separate by upper and lower spacing means, each of which includes a plurality of horizontal bars 85 extending transversely of the axis of rotation of the discs. The bars may be mounted in any desired way, and in the construction illustrated, the bars are formed by slotting the horizontal webs of channel members 76, 77. The bars extend across the faces of the discs 68 near the shafts 69, 70, and lie outside the circle defined by openings 68b in the discs.

While the arrangement shown in Figs. 8 and 9 provides a simple structure, in which the discs are mounted in properly spaced relation and driven in unison, changes in the number of discs require removal of the upper member 76 from between vertical supports 78. The construction is, therefore, less desirable in some respects than those shown in the other figures of the drawings.

In the foregoing, the loom has been illustrated and described as equipped with discs having four openings, so that each disc handles four yarns or multiples of four yarns. It is to be understood that the discs may have other numbers of openings, if desired, in which case, the creel, if one is used, will be constructed to provide for rotating groups of supplies of yarns, each group containing as many yarns as are supplied to openings in each disc.

I claim:

1. In a disc loom, the combination of upper and lower shafts operatively connected for rotation in unison, pinions fast on the shafts, a plurality of discs having peripheral teeth, the discs lying between the shafts with their teeth meshing with those of the pinions, and a plurality of means for keeping the discs separated, each means including a fixed mounting and a plurality of bars attached thereto and extending between adjacent discs, the bars of at least one set extending across the discs adjacent one shaft.

2. In a disc loom, the combination of a pair of standards, upper and lower shafts mounted for rotation in the standards and operatively connected for rotation in unison, pinions fast on the shafts, a plurality of discs having peripheral teeth, the discs lying between the shafts with their teeth meshing with those of the pinions, and a plurality of means for keeping the discs separated, each means including a fixed mounting supported by the standards and extending lengthwise of the shafts and a plurality of bars attached to the mounting and extending between adjacent discs, the bars of at least one set extending across the discs adjacent one shaft.

3. In a disc loom, the combination of upper and lower shafts operatively connected for rotation in unison, pinions fast on the shafts, a plurality of discs having peripheral teeth, the discs lying between the shafts with their teeth meshing with those of the pinions, and a plurality of means for keeping the discs separated, each means including a fixed mounting and a plurality of bars attached thereto and extending between adjacent discs, the bars of at least one set extending across the discs adjacent one shaft and being supported by their mounting at both ends.

4. In a disc loom, the combination of upper and lower shafts operatively connected for rotation in unison, pinions fast on the shafts, a plurality of discs having peripheral teeth, the discs lying between the shafts with their teeth meshing with those of the pinions, a reed mounted at one side of the axis of rotation of the discs with its teeth lying between adjacent discs and keeping them separated, and means lying at the opposite side of the axis of rotation of the discs for keeping them separated and including a comb having teeth lying between the discs.

5. In a disc loom, the combination of a pair of spaced standards, an upper shaft mounted in vertically adjustable bearings in the standards, a lower shaft mounted in bearings in the standards, means connecting the shafts to cause them to rotate in unison, a pinion on each shaft, a plurality of discs between the shafts, the discs having peripheral teeth meshing with the teeth of the pinions, and a plurality of means for keeping the discs separated, each means including a mounting and a plurality of bars attached to the mounting and extending between adjacent discs.

6. In a disc loom, the combination of upper and lower shafts mounted for rotation and operatively connected to rotate in unison, pinions fast on the shafts, a plurality of discs between the shafts, the discs having peripheral teeth meshing with the teeth of the pinions and a plurality of openings lying equidistant from the axis of rotation of the discs, and a plurality of means for keeping the discs separated, each means including a mounting and a plurality of bars attached to the mounting and extending between adjacent discs, the bars lying wholly outside the circles defined by the openings in the discs as the discs rotate.

7. In a disc loom, the combination of upper and lower shafts mounted for rotation and operatively connected to rotate in unison, pinions fast on the shafts, a plurality of discs between the shafts, the discs having peripheral teeth meshing with the teeth of the pinions and a plurality of openings lying equidistant from the axis of rotation of the discs, and a plurality of means for keeping the discs separated, each means including a mounting and a plurality of bars attached to the mounting and extending between adjacent discs, the bars lying wholly outside the circles defined by the openings in the discs as the discs rotate.

8. In a disc loom, the combination of a pair of spaced standards, upper and lower shafts mounted for rotation in the standards and connected together for rotation in unison, a cross bar connecting the standards above the upper shaft, pinions on the shafts, a plurality of discs between the shafts, the discs having peripheral teeth meshing with the teeth of the pinions, a rectangular frame mounted between the standards and lying between the shafts adjacent one shaft, a plurality of bars connecting opposite members of the frame and extending transversely of the shafts, the bars lying between adjacent discs to keep them separated, and two sets of spaced elements mounted on the cross bar on op-

posite sides of the axis of rotation of the discs, said elements extending between adjacent discs to keep them separated.

9. In a disc loom, the combination of a pair of spaced standards, upper and lower shafts mounted for rotation in the standards and connected together for rotation in unison, a cross bar connecting the standards above the upper shaft, pinions on the shafts, a plurality of discs between the shafts, the discs having peripheral teeth meshing with the teeth of the pinions, a rectangular frame mounted between the standards and lying between the shafts adjacent one shaft, a plurality of bars connecting opposite members of the frame and extending transversely of the shafts, the bars lying between adjacent discs to keep them separated, and a pair of combs secured to the cross bar on opposite sides of the axis of rotation of the discs, the teeth of the combs extending between adjacent discs to keep them separated.

10. In a disc loom, the combination of a pair of spaced standards, upper and lower shafts mounted for rotation in the standards and connected together for rotation in unison, a cross bar connecting the standards above the upper shaft, pinions on the shafts, a plurality of discs between the shafts, the discs having peripheral teeth meshing with the teeth of the pinions, a reed mounted on the standards between the shafts and lying with its bars extending generally horizontally and between adjacent discs to keep them separated, and a pair of combs detachably mounted on the cross bar on opposite sides of the axis of rotation of the discs, the teeth of the combs lying between adjacent discs to keep them separated.

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