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KNITTING MACHINE ELEMENTS

Filed July 10, 1963

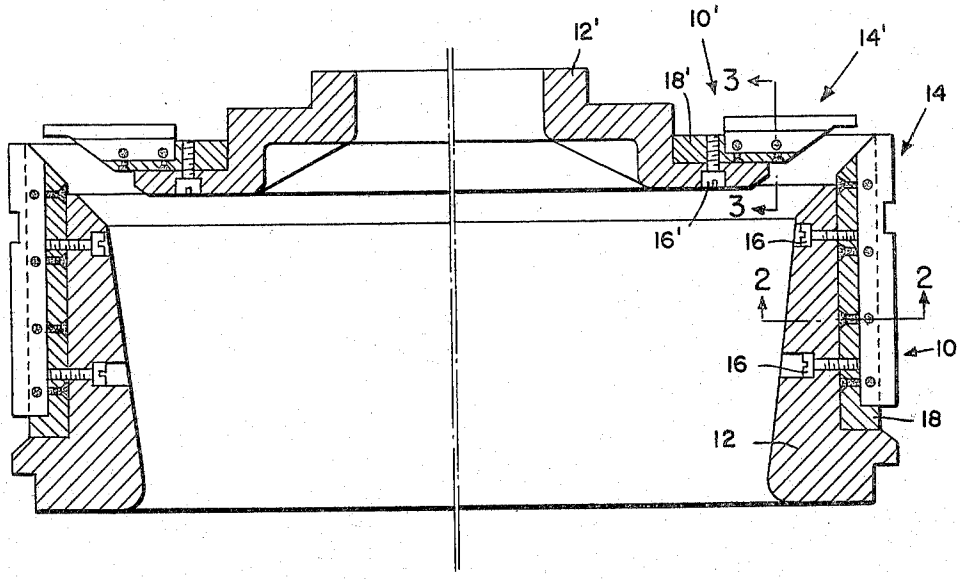


FIG. 1.

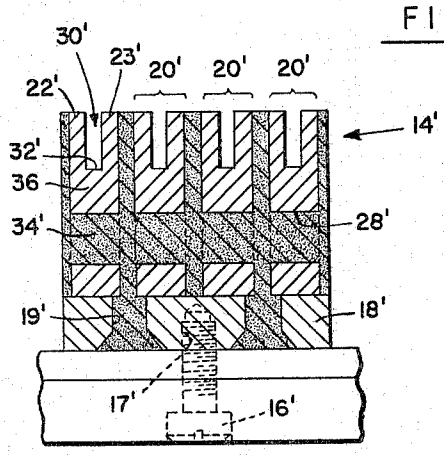


FIG. 3.

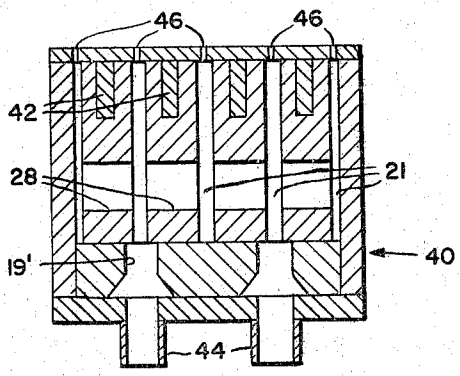


FIG. 4.

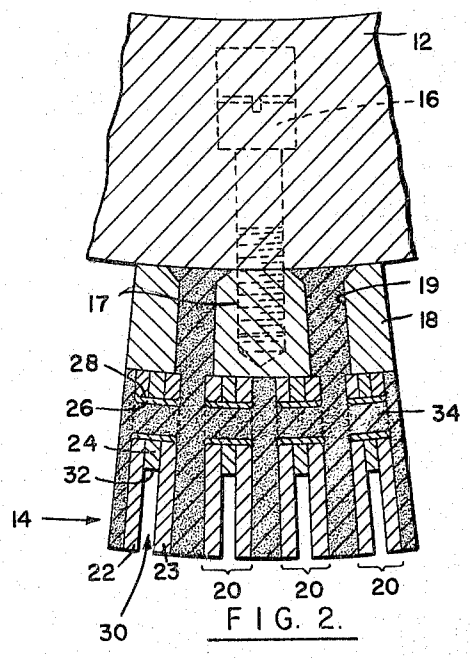


FIG. 2.

INVENTOR.

RICHARD H. WHITEHEAD

BY

Brisco, Smith & Hamburg

ATTORNEYS

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KNITTING MACHINE ELEMENTS

Richard H. Whitehead, Laconia, N.H., assignor to Scott & Williams, Incorporated, Laconia, N.H., a corporation of Massachusetts

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This invention relates to knitting machines and, more particularly, to slotted beds of circular knitting machines adapted to mount needles or other movable stitch handling elements. Beds of this type are well exemplified in the application of Lindsay H. Browne, Serial No. 220,755, filed on August 31, 1962, now abandoned, which discloses a large diameter machine to which the invention is particularly applicable. Due to the fact that the beds and cylinders of the large type disclosed in said application may have diameters of the order of 70 inches or more, with each bed and cylinder possibly having, for example, 850 slots, the usual methods of milling individual slots either for the movable elements or for insertion of walls to provide slots may become excessively costly and time consuming.

It is therefore a principal object of the present invention to provide an improved type of beds and cylinders together with an improved method for fabricating such elements wherein the cost and time factors of fabrication are substantially reduced.

It is a further object of the present invention to provide a method of forming such slotted members wherein the dimensions of the individual slots may be of equal or increased accuracy and uniformity without requiring precision milling. Since the problems of such precision machining are much greater in the case of smaller diameter members wherein each individual slot may be ten times smaller than the slots in the large type of machines referred to above, it will be apparent that the objects of the present invention particularly relate to large machines, through the invention is applicable to small machines as well.

The foregoing objects as well as others relating to structural details and to the method of fabrication will become more readily apparent from the following description taken with the accompanying drawing in which:

FIGURE 1 is a sectional view of a jack bed and cylinder of the type employed in circular knitting machines and incorporating the subject matter of the invention;

FIGURE 2 is an enlarged sectional view of the needle cylinder taken on the plane indicated at 2—2 in FIGURE 1;

FIGURE 3 is an enlarged sectional view of the jack bed taken on the plane indicated at 3—3 in FIGURE 1; and

FIGURE 4 is an enlarged sectional view of a section of the jack bed during an intermediate step in the fabrication process.

As will become evident, the invention is applicable generally to the formation of slotted beds for reception of slidable tiltable, or otherwise movable knitting machine elements such as needles, sinkers, jacks, web holders or the like; but for uniformity of description reference will be made to a machine comprising a needle cylinder and a dial for mounting tiltable jacks.

The structural form of the needle cylinder and the dial will first be described with reference to FIGURES 1 through 3 and, thereafter, the details of the method of fabricating each of these elements will be set forth with particular reference to FIGURE 4.

Needle cylinder **10** is composed of a one-piece, annular ring **12** to which a plurality of individual segments **14** are secured by means of bolts **16**, one of such segments being shown in FIGURE 2. Each of segments

14 is identical in construction and includes a plurality of individual slot elements or assemblies **20** together with an arcuate member **18** having an L-shaped cross-section as shown in FIGURE 1. Member **18** is provided with threaded bores **17** for receiving bolts **16** and is also provided with passages **19** adapted to be filled with a bonding material as will be described hereinafter in more detail.

Each one of assemblies **20** is composed of a pair of side plates **22**, **23** of sheet metal accurate as to thickness secured to opposite sides of an accurately dimensioned spacer plate **24** by means of a plurality of hollow rivets **26** passing through holes or passages **28**. It will be noted that opposite ends of holes **28** have countersunk edges so as to accommodate the enlarged head portions of the rivets and make them flush with the outer surfaces of plates **22**, **23**. Such countersinking of the rivet heads is of particular importance in the case of small diameter machines wherein there is very little space between adjacent assemblies. On the other hand, where the assemblies may be circumferentially spaced a greater distance apart, as in the case of coarse gauge machines, the countersinking obviously may be omitted.

From the foregoing description it will be apparent that each one of assemblies **20** forms a single slot **30** the sides of which are defined by the mutually facing inner surfaces of plates **22** and **23**, the bottom of the slot being defined by the edge **32** and spacer **24**. Each arcuate segment **14** is composed of a plurality of assemblies **20** which are secured to each other and to a common member **18** by means of a bonding material **34**, the method of producing such bonding being deferred at this point.

Reference is now made to FIGURES 1 and 3 wherein primed numerals indicate those components of the jack bed which are similar to the needle cylinder elements just described.

Bed **10'** includes a one-piece annular ring **12'** to which a plurality of segments **14'** are secured by means of bolts **16'**. Each of segments **14'** is identical in structure and includes a plurality of slot elements **20'** together with a single backing member **18'** having an L-shaped cross-section as shown in FIGURE 1. Member **18'** is provided with threaded bores **17'** and passages **19'** which are adapted to receive bolts **16'** and bonding material **34'**, respectively.

Each one of the slot elements **20'** is formed as an integral unit having a pair of walls **22'**, **23'** extending outwardly from a base portion **36**. Thus, each assembly **20'** forms a single slot **30'** which is defined by the inner facing surfaces of portions **22'**, **23'** and the surface **32'** of base portion **36**. Each slot element includes a bore or passage **28'** extending transversely through base portion **36** although this bore does not contain a rivet since the elements are individually formed as integral units; for example as extrusions.

From the foregoing description it will be apparent that the two forms of slot elements **20** and **20'** are fully interchangeable so that both the bed and cylinder may be formed of assemblies having either form. Alternatively, the needle cylinder may be composed of riveted elements and the needle bed may be composed of integral elements as illustrated or the two forms of slot elements may be reversed in the bed and cylinder, respectively.

The method of fabrication is as follows. First, the individual slot elements **20** or **20'** are individually formed. In the case of assemblies **20**, the individual plates **22**, **23** and **24** may be stamped out of suitable gauge metal, being perforated in the stamping operation, so that each plate is preshaped and merely requires riveting to form each assembly. Alternatively, the plates may be riveted together in strip form to provide long assemblies which are then cut into individual lengths, final shaping being

accomplished after the complete ring is assembled as will be described hereinafter.

In the case of slot elements 20', each element may be individually extruded and shaped or, alternatively, a long strip of U-shaped cross-section may be extruded followed by cutting into individual pieces. In either event, bores 28' may be drilled subsequent to the extrusion process.

Rings 12 and 12', as well as the arcuate members 18 and 18', may be suitably fashioned, for example, by casting and/or conventional machining methods.

Upon completion of the individual members and slot elements, one arcuate member and a plurality of slot elements are inserted in a jig such as that shown in FIGURE 4. This jig may comprise a simple frame structure 40 having a plurality of projections 42 adapted to enter and fill slots 30 and thereby hold the plurality of slot elements separated by spaces 21. The jig is further provided with a plurality of injection ports 44 through which the bonding material 34 may be injected so as to fill passages 19, spaces 21 and bores 28. For example, the bonding material may be molten hard solder or other known matrix-forming metal which is preferably injected under pressure so as to completely fill the above spaces, air and excess bonding material being permitted to flow outwardly through ports 46.

Upon hardening of the bonding material, the jig is removed and the completed section 14 or 14' is bolted to the appropriate ring 12 or 12' to form a complete slotted member which may then be turned if required to the desired circumferential outline if that is not fully achieved in the assembly operation.

From the foregoing description it will be apparent that the disclosed construction and method results in the fabrication of slotted members within a substantially reduced period of time and at a substantially reduced cost due to the fact that each individual step is extremely simple and inexpensive. In addition, the above method permits the simultaneous construction of multiple elements as opposed to the time consuming method of milling each slot in succession.

Besides having the advantages in fabrication and assembly already outlined, the slotted beds provided in accordance with the invention are highly advantageous from the standpoint of the finished products. When the bed is of the type shown in FIGURE 2, the individual plates 22, 23 and 24 which are established may be formed of cold rolled steel or other wear-resisting material available to a high degree of uniformity in thickness so that the slots 30 are very accurately dimensioned both as to width and depth. The careful machining and indexing required in the case of milling of slots is thus avoided, and the slots themselves are completed merely by the assembly. The bonding of the parts may be accomplished by the use of a relatively soft solder-like material since this is not called upon to resist wear and must only have the strength, which is not critical, to withstand stresses in use. The solder or similar material used will ordinarily have sufficient dimensional stability, and this becomes a relatively unimportant factor because of the assembly in segments held inividually to the supporting angular member.

The same situation is true in the case of an assembly of extruded elements such as 20' of FIGURES 3. Extrusion may be presently carried out to provide high accuracy of dimensions. As to the indexing of the slotted elements of each segment, that may be readily achieved to a high degree of accuracy by the jig which is used at the

time of formation of the assembling matrix. In many instances machining may be entirely avoided, though, as indicated, after a complete assembly is made simple turning may be used to provide the circumferential outline desired.

It will also be readily apparent that the disclosed method and structure may be employed to form slotted members other than the specific type of cylinder and bed which have been selected merely for the purpose of illustrating the principles of the invention. Obviously, other types of slotted members such as sinker dials, rib needle dials or the like may be fabricated in the same manner without departing from the scope of the invention as specifically set forth in the following claims.

What is claimed is:

1. A slotted member for supporting and guiding movable stitch handling elements in a knitting machine comprising, means forming individual slot elements, means defining a passage through each said slot element, means defining spaces because said slot elements, said spaces and passages being interconnected, and means forming a matrix of bonding material filling said spaces and passages, to secure said slot elements to one another and to maintain said slot elements in a fixed space relationship with one another.

2. The slotted member as claimed in claim 1 wherein each one of said individual slot elements comprises a plurality of plates secured together to form a single slot.

3. The slotted member as claimed in claim 2 wherein said plurality of plates are riveted together to form each of said slot elements.

4. The slotted member as claimed in claim 1 wherein each one of said individual slot elements comprises a one-piece unit having a single slot therein.

5. A slotted member for supporting and guiding movable stitch handling elements in a knitting machine comprising, means forming individual slot elements, means defining a passage through each said slot element, means defining spaces between said slot elements, said spaces and passages being interconnected, a plurality of backing members, each of said backing members supporting a group of individual slot elements forming an individual section of said slotted member, each said backing member having at least one passage connected with said spaces and passages between and through said slot elements, and means forming a matrix of bonding material filling all said spaces and passages, to secure said slot elements to one another and to said backing member and to maintain said slot elements in a fixed space relationship with one another.

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MERVIN STEIN, *Primary Examiner.*

W. CARTER REYNOLDS, *Examiner.*