March 30, 1965 P. B. GOVE, JR., ETAL 3,175,587

TAPE MOTION FOR SHUTTLELESS LOOMS

Filed Aug. 2, 1963 2 Sheets-Sheet 1

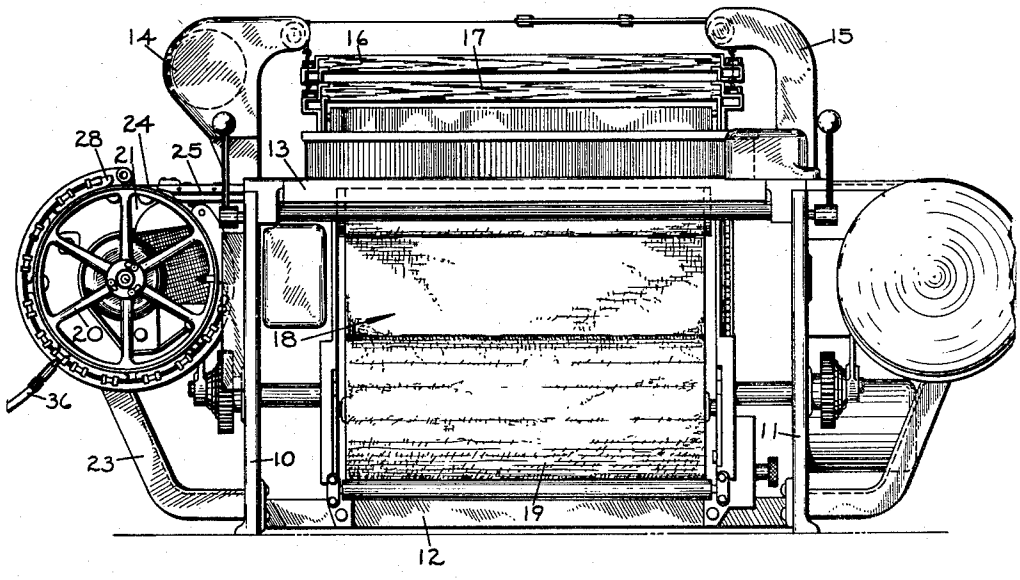

FIG. 1

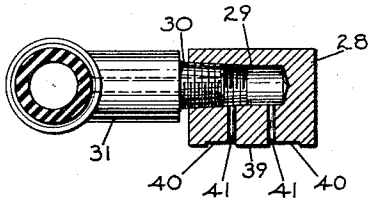

FIG. 3

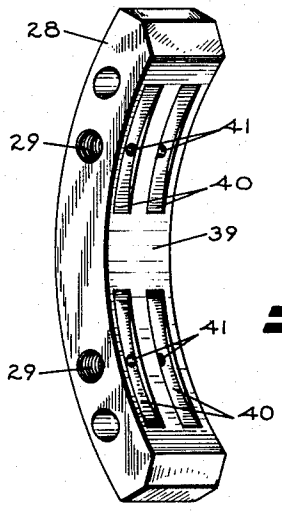

FIG. 2

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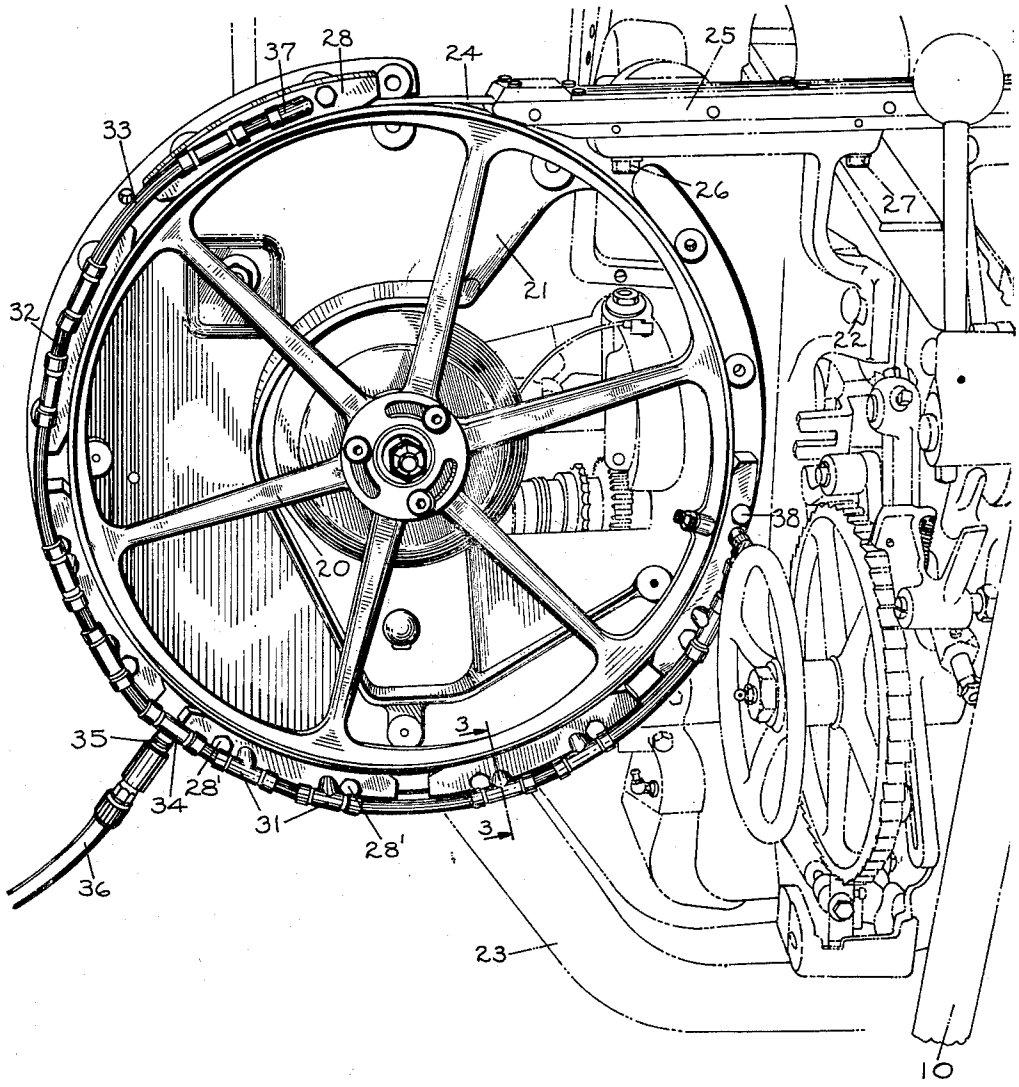

FIG. 4

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TAPE MOTION FOR SHUTTLELESS LOOMS

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This invention pertains to shuttleless looms of the type that utilizes a flexible filling inserting member or tape which is alternately wound upon and unwound from the outer periphery of an oscillating wheel, and more particularly, the invention relates to a novel means of maintaining said flexible inserting member in close proximity with said wheel as it is actuated thereby.

It is a general object of the invention to provide an air cushion means for maintaining the flexible filling inserting member in its proper operating position during its filling inserting function.

It is a further object of the invention to provide an air cushion means for controlling the tape member which requires considerably less power to perform its filling insertion function than the means utilized to control said tapes in mechanisms of the prior art.

It is a further and more specific object of the invention to provide an air cushion tape control means which will not heat, scuff, or wear the flexible inserting member as it is wound onto and extended from the oscillating wheel, and which will eliminate the need for lubrication between said inserting member and wheel.

Further objects and advantages of the invention will become apparent from the following more detailed disclosure.

Shuttleless looms of the type to which the instant invention pertains have reciprocable filling carriers which are alternately wound upon and unwound from oscillating wheels disposed at the sides of the loom. This type of loom utilizes an outside source of filling, that is, the supply is not carried to and fro through the warp shed by a shuttle or the filling inserting member itself. The filling yarn is measured and cut to the required length for extending across the width of the fabric being woven. A first carrier inserts the filling into the warp shed to a point adjacent the center thereof where it is then transferred to a second carrier member which extends it through the remaining portion of said shed to complete the laying of a single pick.

The reciprocable filling carriers are of a type involving flexible tapes and as heretofore described are caused to enter and to be withdrawn from the fabric shed by being wrapped and unwrapped from oscillating wheels or so-called tape wheels which are oscillated throughout slightly less than a full revolution.

A number of United States patents describe and clearly illustrate the looms and mechanism for actuating the filling carriers which form a part of the instant invention and it is considered unnecessary at this point to insert herein a detailed description of these mechanisms. Attention is hereby drawn to United States Patents 2,604,123 and 2,810,403.

The flexible tapes when being withdrawn from the shed are wrapped tightly against the rim or outer periphery of their respective tape wheel, but when they are being unwrapped from the wheel and inserted into the shed, a guide means is required to hold them radially inward and in close proximity with said rim. Such guide means have included a plurality of rollers such as shown and described in United States Patent 2,604,123.

Numerous tape restraining devices preceded the instant invention which included rollers, magnets, and arcuated shoe members made of such materials as impregnated wood or plastic. These devices all worked with some

degree of success but none proved to be a completely satisfactory means of radially restraining the tapes during their filling insertion function. In many cases considerable wear of the tapes and parts associated therewith is introduced. The power requirements are increased on some of the devices which is an objectional feature, and the frictional contact between the tapes and their restraining means requires some form of lubrication. The known forms of lubrication are inadequate due to the excessive heat generated by the frictional contact of the various components.

The tape restraining means according to the instant invention performs its intended function under a condition which requires considerably less power to actuate the flexible tapes than any of the known tape restraining means of the prior art. This novel means of restraining the tapes requires no lubrication and has reduced considerably the amount of wear said tapes were subjected to with the older and known restraining means.

The instant invention utilizes a plurality of hydrostatic air bearings which are circumferentially disposed throughout a considerable extent, at least, of the circumferential extent of the tape wheel. Each of these bearings is provided with air inlets which are all interconnected and permit all of the bearings to be activated simultaneously from a single air pressure supply line. The bearing members are arcuated to conform to the outer periphery of the tape wheel and the inner side of each bearing is provided with a plurality of formed pockets each of which has an air outlet orifice which is interconnected with the air inlet of its respective bearing member.

The flexible tape is disposed intermediate the rim of the tape wheel and the inner surfaces of the air bearings with a small amount of clearance which is slightly more than the thickness of said tape.

During the filling insertion function, compressed air is emitted from each of the air outlet orifices and forms an air cushion against which the flexible tape is caused to bear as it is unwrapped from the tape and inserted into the fabric shed.

With this form of restraining the tape in its desired operating position, the tape is virtually floating with a minimum of contact with its guiding components. The elimination of frictional contact between the flexible tape and the associated parts adjacent thereto prevents a heating-up condition which was prevalent in tape restraining mechanisms of the prior art.

The invention will hereinafter be described in greater detail by reference to a specific embodiment thereof as illustrated in the accompanying figures of drawing, wherein:

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

FIG. 2 is a perspective view of one of the plurality of hydrostatic air bearings utilized to restrain the flexible tape in its proper operating position;

FIG. 3 is a view partially in section taken along line 3—3 in FIG. 4;

FIG. 4 is a perspective view of a portion of a shuttleless loom as seen looking from the front thereof showing the various components of the invention and their relationship to the flexible tape and tape wheel.

Referring now to the figures of drawing, enough of a shuttleless loom is illustrated in FIGS. 1 and 4 to serve as a basis for a detailed description of the invention as applied thereto.

The filling yarn in a loom of this design is drawn from a source of supply at the side of the loom and is inserted into the fabric shed by flexible members such as tapes made of spring steel.

The loom includes among other parts loomsides 10

and 11, a front girt 12, breast beam 13, and a top motion as depicted by numerals 14 and 15 from which depend harness frames 16 and 17.

The fabric which is generally indicated by numeral 18 is taken up in a roll 19 as it is formed.

At each end of the loom (one only shown in FIG. 1) there is provided an oscillating wheel or so-called tape wheel 20 which is preferably made from a lightweight material such as aluminum. These wheels are oscillated to and fro slightly less than a full revolution by a means such as disclosed and fully described in United States Patent 2,888,956.

The invention is shown in FIGS. 1 and 2 as applied to one side of a loom only; however, it should be understood that the invention is equally applicable to both sides of the loom and that the opposite side is provided with similar components to make it function in a like manner.

The tape wheel 20 is mounted in a housing 21 the inner side of which is provided with an integrally formed bolting surface that attaches it to the loomside as at 22 (FIG. 4). Housing 21 is further supported by a supporting arm 23 which attaches to the lower portion of said housing and extending in a generally downward direction the opposite end attaches to the lower portion of the loomside.

The tape wheel includes an outer rim of substantially the same width as the tape and has fixedly attached thereto one end of a flexible inserting member or tape 24 which is of tempered steel and which is also provided at its free end with either an inserting carrier or an extending carrier depending upon the side of the loom at which it is used.

The flexible tapes are guided into and from the fabric shed by a straight horizontal guide member 25 which assembles to the upper surface of housing 21 by means of bolts 26 and 27.

The mechanism according to the invention includes a plurality of hydrostatic air bearings 28 which are attached to the front and adjacent the outer surface of housing 21 by means of cap screws 28' and are circumferentially disposed throughout a considerable extent, at least, of the circumferential extent of the tape wheel 20 (FIGS. 1 and 4).

The flexible tape 24 is positioned intermediate the rim of the tape wheel 20 and the inner surfaces of the air bearings 28 which are arcuated to conform to the outer periphery of said tape wheel.

A small amount of clearance is provided between the outer surface of the tape 24 and the inner surfaces of the air bearings 28 for the purpose of maintaining an air cushion for retaining said tape in close proximity with the outer periphery of the tape wheel 20.

Each of the air bearings 28 is provided with two air inlet apertures 29 which are internally threaded and are adapted to receive the threaded stem portion 30 of individual T fittings 31 (FIGS. 2, 3, and 4). All of these T fittings 31 are interconnected one with the other by means of flex-lines 32 and 33, thereby forming a single continuous air feed line to all of the bearings 28.

At a point approximately the center of the line which distributes compressed air to the bearings there is provided in place of a flex-line 32, a T fitting 34 which directs the air to the bearings disposed on either side thereof. The stem portion 35 of this T fitting 34 is directed outwardly from the feed line and is connected to an air pressure supply line 36 which in turn is interconnected with any suitable source or means of obtaining air under pressure. The air inlet apertures 29 situated at each end of the feed line are provided with elbow fittings 37 and 38 in place of T fittings 31 for directing air into the first and last apertures of the air bearings most remote from the T fitting 34 which receives the source of compressed air.

As shown in FIG. 2 the inner arcuated surface 39 of the air bearing 28 is provided with a plurality of formed pockets 40 about 15 thousandths of an inch in depth and are disposed in pairs along the length of said surface. Each of these pockets has a centrally located air outlet orifice 41 which is in general alignment with and interconnected with its respective air inlet aperture 29 (FIG. 3).

The outer rim of the tape wheel being of substantially the same width as the tape prevents an excess spill of air by serving to maintain an air cushion between the air bearings and said rim during that portion of the picking cycle when the tape is extended into the shed or in other words, when it is unwrapped from the rim of the wheel.

In operation, the tape wheels at the sides of the loom are caused to oscillate through a predetermined arc to insert the flexible inserting members into the fabric shed to a point where the filling yarn is transferred from one carrier member to the other. After reaching this transfer point in the shed, the wheels reverse their direction of travel to withdraw the inserting members wrapping the same about the rims of the tape wheels.

During the withdrawal of the flexible inserting members from the shed, said members are properly guided and controlled by being wrapped about the rim or outer periphery of their respective tape wheel. During the unwrapping of the flexible inserting member from the tape wheel and the insertion of the same into the shed, said members have a natural tendency to move outwardly from the rims of their respective wheels.

The compressed air preferably at about 3–4 p.s.i. being emitted from all of the air outlet orifices against the outer surface of the flexible tape forms an air cushion against which said tape is caused to bear thereby restricting its outward movement and maintains said tape in its proper and desired operating position.

The air cushion effect of the instant invention as a means for restraining and guiding the flexible inserting members eliminates the need for lubrication of said members and the associated components adapted to function therewith.

The elimination of friction between the various components which with mechanisms of the prior art created a heating problem, has reduced considerably the power requirements necessary to perform the filling insertion function.

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 of the type having means to insert filling from an outside source of supply which includes an oscillating wheel, a flexible tape member one end of which is fixed to said wheel and which is alternately wrapped about the said wheel and unwrapped from it during its filling inserting function, air cushion means for maintaining said tape member in close proximity with the outer periphery of said wheel during oscillation of the latter which includes a plurality of hydrostatic air bearings circumferentially disposed throughout a considerable extent, at least, of the circumferential extent of said wheel, each of said air bearings being provided with at least one air inlet aperture, all of said apertures being interconnected whereby said bearings are activated simultaneously by a single air pressure supply line, each of said bearings being arcuated to conform to the outer periphery of said wheel and having a plurality of formed pockets on the inner side thereof, an air outlet orifice in each of said pockets interconnected with said air inlet aperture.

2. In a shuttleless loom of the type having means to insert filling from an outside source of supply which includes an oscillating wheel, a flexible tape member one end of which is fixed to said wheel and which is alternately wrapped about the said wheel and unwrapped from it during its filling inserting function, air cushion means for maintaining said tape member in close proximity with the outer periphery of said wheel during oscillation thereof which includes an air bearing means circumferentially disposed throughout a considerable extent, at least, of the circumferential extent of said wheel and positioned in close proximity therewith, for metering compressed air to said tape from spaced points on said bearing means.

3. In a shuttleless loom of the type having means to insert filling from an outside source of supply which includes an oscillating wheel, a flexible tape member one end of which is fixed to said wheel and which is alternately wrapped about the said wheel and unwrapped from it during its filling inserting function, air cushion means for maintaining said tape member in close proximity with the outer periphery of said wheel during oscillation of the latter which includes a plurality of hydrostatic air bearings circumferentially disposed throughout a considerable extent, at least, of the circumferential extent of said wheel.

4. In a shuttleless loom of the type having means to insert filling from an outside source of supply which includes an oscillating wheel, a flexible tape member one end of which is fixed to said wheel and which is alternately wrapped about the said wheel and unwrapped from it during its filling inserting function, air cushion means for maintaining said tape member in close proximity with the outer periphery of said wheel during oscillation of the latter which includes a plurality of hydrostatic air bearings circumferentially disposed throughout a considerable extent, at least, of the circumferential extent of said wheel, each of said air bearings being provided with at least one air inlet aperture, all of said apertures being interconnected whereby said bearings are activated simultaneously by a single air pressure supply line.

References Cited by the Examiner

UNITED STATES PATENTS

2,604,123	7/52	Budzyna et al.	139—127
2,963,268	12/60	Smile et al.	308—122

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