June 28, 1932. E. W. STONE 1,865,221

TUFT PILE FABRIC LOOM

Filed June 26, 1930 2 Sheets-Sheet 1

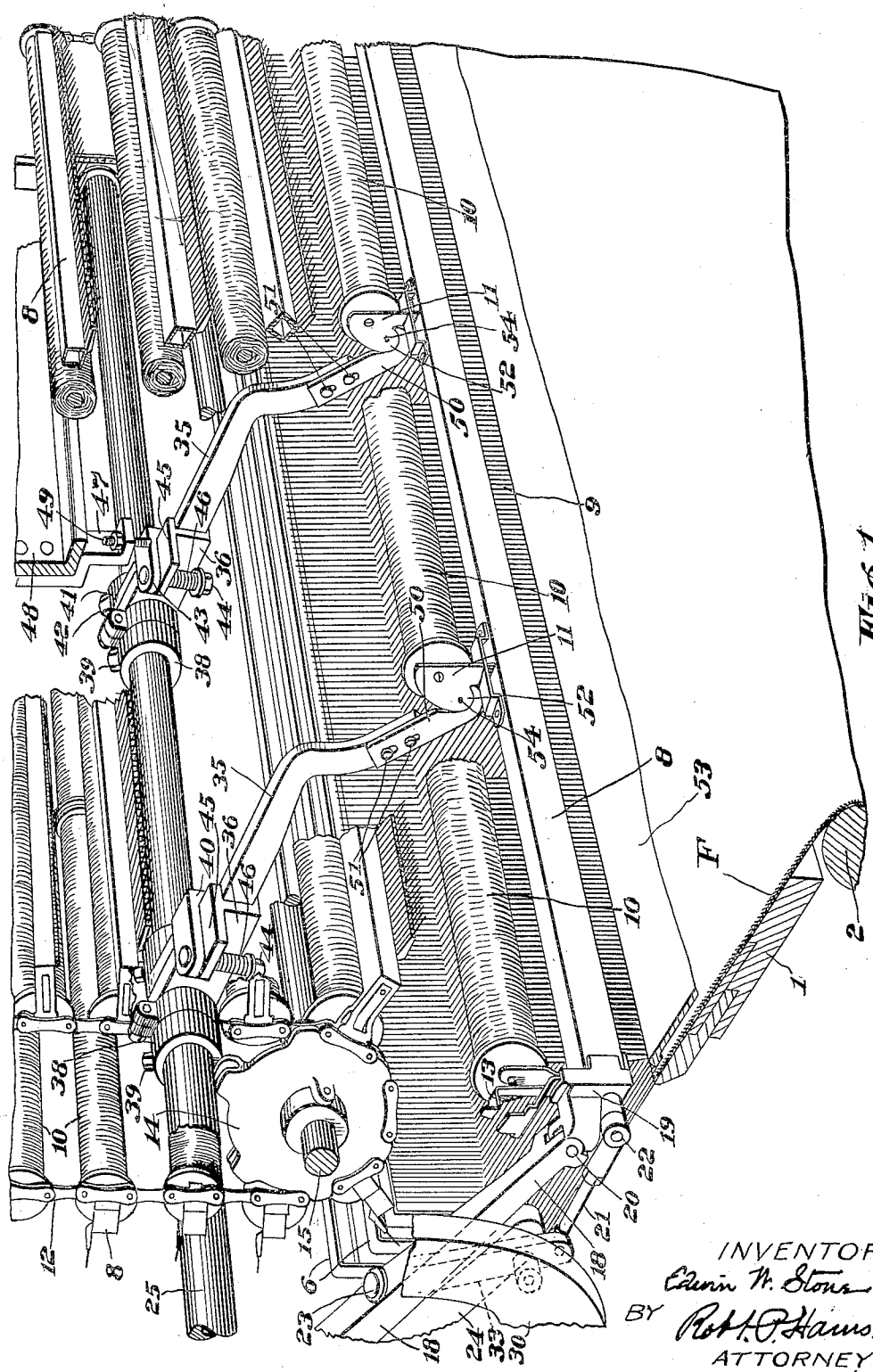


Fig. 1

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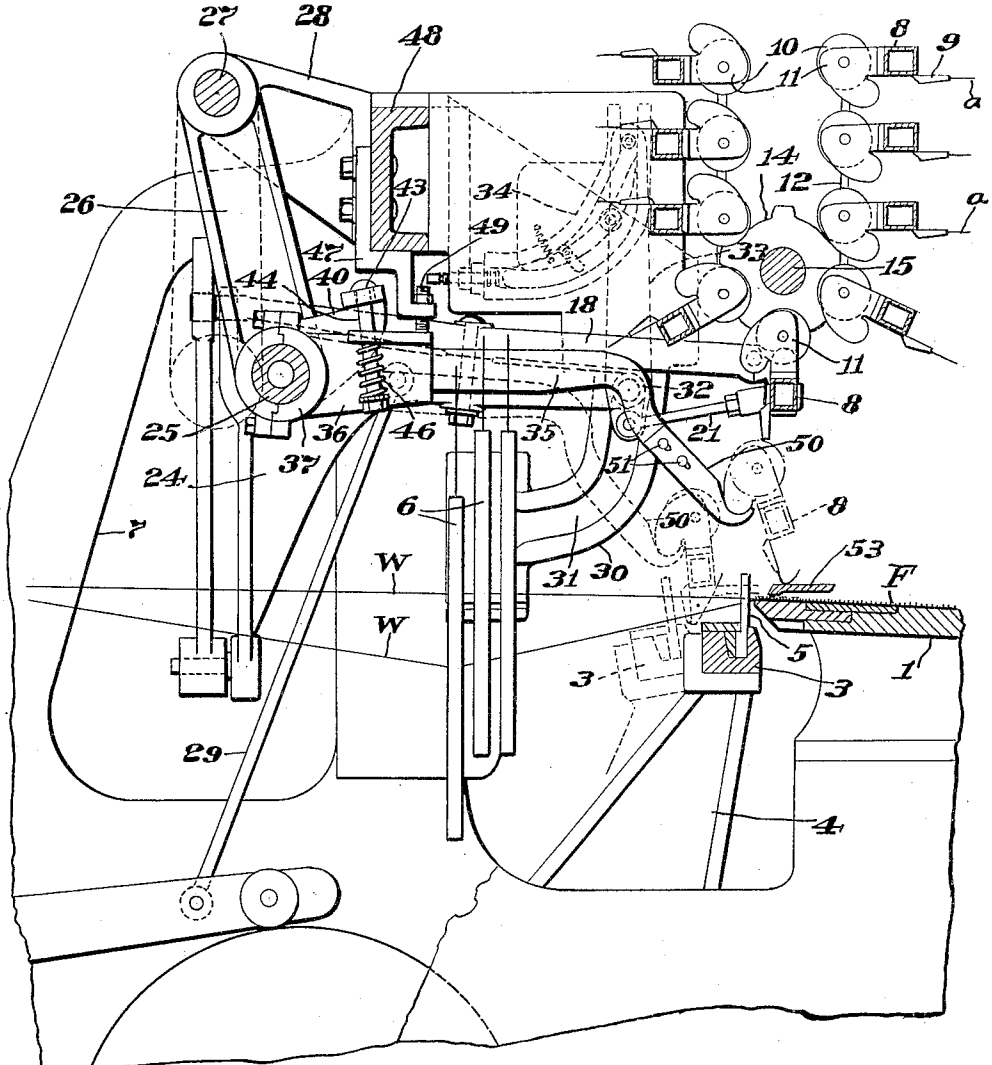


Fig. 2

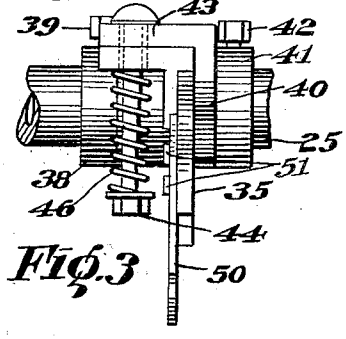


Fig. 3

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UNITED STATES PATENT OFFICE

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TUFT PILE FABRIC LOOM

Application filed June 26, 1930. Serial No. 464,051.

This invention relates to tuft pile fabric looms having tube frames, and more particularly to mechanism for supporting the tube frames to prevent sagging thereof while in the tuft inserting position.

In weaving Axminister rugs and carpets, tube frames are employed to present the tuft yarns to the fabric in accordance with a predetermined pattern. The series of tube frames are usually carried by transporting chains in a well known manner, and as each tube frame reaches a predetermined position above the fabric being woven it is engaged at its opposite ends and transferred to a position to introduce the tuft yarns between the warp threads.

The tube frames employed should be long enough to supply the tuft yarns entirely across the fabric being woven, and in weaving relatively wide tuft pile fabrics difficulty has been experienced heretofore due to the tendency of the tube frames to sag or bend intermediate their ends while supported in the tuft inserting position. The tube frames are necessarily of light construction to facilitate their manipulation, and this sagging or bending of the long frames during the tuft inserting operation is objectionable as it causes an uneven presentation of the tuft yarns to the fabric.

This tendency of relatively long tube frames to sag while in the tuft presenting position has been one of the difficulties encountered heretofore in attempting to increase the width of looms employing tuft yarn tube frames.

The present invention therefore relates to a simple form of mechanism for supporting each tube frame intermediate its ends while in the tuft inserting position, to thereby present the tuft yarns evenly and uniformly to the weaving point.

A more specific feature of the present invention resides in one or more arms adapted to support an intermediate portion of a tube frame as the frame is moved into and out of the tuft inserting position and while in this position, to prevent the tube frame from sagging while the tuft yarns are supported thereby in position to be bound to the fabric.

Other features of the invention and novel combinations of parts in addition to the above will be hereinafter described in connection with the accompanying drawings, which illustrate one good practical form of the invention.

In the drawings:—

Fig. 1 is a perspective view of a portion of a pile fabric loom provided with tube frame supporting mechanism constructed in accordance with the present invention;

Fig. 2 is a vertical sectional view through the loom construction of Fig. 1; and

Fig. 3 is a front view of a tube frame supporting arm to be described.

Looms for weaving tuft pile fabrics and employing tuft tube frames are well known in construction and operation, and as the present invention does not relate to the loom proper but only to the mechanism for transferring the tube frames to and from the tuft inserting position and for supporting them while in this position, it has been deemed necessary to illustrate and describe only that portion of the loom with which the invention is associated.

In the construction shown in the drawings the woven pile fabric F is supported by the surface 1 as it is advanced towards the take-up roll 2 at the front of the loom. The loom is shown as having the usual lay 3 supported by the swords 4 for rocking movement and extending upwardly from the lay 3 is the usual reed 5.

The warp threads W are shifted by the harness frames 6 in a well known manner to open and close the shed and the operating parts of the loom are supported by the loom frame 7.

The tuft tube frames 8 may for the most part be constructed as usual and are provided with the individual yarn receiving tubes 9 adapted to receive the tuft forming yarns a supplied by one or more tuft yarn spools 10, mounted upon the tube frame 8.

The spools 10 are rotatably supported upon the frames 8 in alignment with each other by the upstanding brackets 11, and these brackets are mounted between the ends of the longitudinally extending bar of the tube frame and

have sufficient movement to permit the insertion and removal of the spools.

The series of tube frames 8 are advanced to the position in which they are transferred to the weaving point by the transporting chains 12 that operate in a well known manner and are spaced a sufficient distance apart to receive the tube frames between them and to be engaged by the usual hooks 13 provided at the opposite ends of the tube frames. A looped portion of each of the chains 12 extends downwardly from supporting means, not shown, and passes about a sprocket 14 mounted upon the sprocket shaft 15. The arrangement is such that the conveying chains 12 are advanced with a step-by-step movement to successively advance the tube frames to the transferring position in which the lowermost tube frame is shown in Fig. 2. Whereupon the tube frame is transferred to the tuft inserting position in which it is shown in dotted lines in Fig. 2 to present the tuft yarns to the fabric being woven in a well known manner. After each row of tuft yarns is secured to the fabric the yarns are severed from the source of yarn supply by cooperating knives (not shown) but which operate in a well known manner.

The tube frames 8 are transferred from the transporting chains 12 to the tuft inserting position and are returned to the transporting chains by the swinging arms 18. Each of these arms 18 is provided at its outer end with a box-like carrier 19 that is pivotally secured to the arm 18 by a pivot pin 20, and each of the carriers is shaped to receive an end portion of the tube frame 8 to be transferred.

It is found desirable to tilt or rock each tube frame 8 while the same is adjacent the fabric to facilitate the laying of the tuft yarns in place, and it is also desirable to impart a slight rearward movement to the tube frame away from the fell of the cloth while it is adjacent the fabric. The rocking movement just mentioned is imparted to the carriers 19 by the links 21 that are pivotally connected to the carriers at 22. These links are shifted in the direction of their length by mechanism to be described.

The transferring arms 18 in the construction shown are pivotally mounted by the pivot pins 23 upon the movable supports 24 which are clamped or otherwise rigidly secured to the long shaft 25. This shaft is supported for bodily movement by the links 26 which extend downwardly from the shaft 27 that is supported by the brackets 28 secured to the loom frame. The arrangement is such that the links 26 may be swung from the full line position of Fig. 2 to the dotted line position thereof to move the rocking shaft 25 and parts carried thereby rearwardly and shift the tube frame from the position in which it is shown in the dot and dash line in Fig. 2 to the position in which it is shown in dotted lines.

The transferring arms 18 are pivotally secured to the movable support 24 by the pivots 23 so that these arms may be moved laterally when it is desired to engage the carriers 19 with the ends of the tube frames 8 or to disengage the carriers therefrom, and such movement may be imparted to the arms 18 in a well known manner. The rocking movement which serves to raise and lower the transferring arms 18 may be imparted to the shaft 25 by the link 29 and cam operated mechanism shown, or by any other suitable means to this end.

In the construction shown the means for operating the links 21 to tilt the tube frames 8 consist of the fixed brackets 30 rigidly secured to the loom frame adjacent the opposite sides of the loom. These brackets are provided with the cam slots 31 adapted to receive rollers or the like 32 secured to the outer end of the movable supports 24, the arrangement being such that the cam slots 31 will serve to move the shaft 25 and parts connected thereto rearwardly as the rollers 32 are moved downwardly in the cam slots 31 under the rotative movement imparted to the shaft 25. One end of each link 21 is pivotally secured to a lever 33 which is pivotally supported intermediate its ends by the support 24 and the upper end of each lever 33 is provided with a roller or the like adapted to follow the curved path or cam-way formed in the upper guiding bracket 34, the arrangement being such that a pronounced rocking movement is imparted to the levers 33 each time the transferring arms 18 are depressed.

As above pointed out difficulty has been experienced heretofore in employing tube frames upon relatively wide looms, due to the tendency of the tube frames to sag between their ends while supported by the carriers 19 in the tuft inserting position. The sagging of the relatively long tube frames is prevented in accordance with the present invention by supporting these frames at one or more points intermediate their ends. This is accomplished in the embodiment of the invention shown by pivotally mounting on the shaft 25 between the spaced transferring arms 18 one or more tube frame supporting arms 35. The number of arms 35 employed may vary in accordance with the number of points at which it is desired to support the tube frame, or with the number of brackets 11 with which the tube frame is provided.

The arms 35 are connected with the shaft 25 to be rocked therewith through a shorter stroke than that imparted to the arms 18. To this end each arm 35 is bolted or otherwise secured to a supporting bracket 36 having a hub portion 37 that is rotatably mounted upon the shaft 25, and the hub 37 is held from movement in one direction along the

shaft 25 by a collar 38 rigidly secured to the shaft by a set screw 39. Movement of the hub 37 along the shaft 25 in the opposite direction is prevented by a bracket 40 having a hub portion 41 which is rigidly secured to the shaft 25 by the set screw 42.

In the construction shown each tube frame supporting arm 35 is yieldingly secured to its operating bracket 40, by a laterally extending ear 43 which is provided with a downwardly extending bolt 44 that passes through an opening in a laterally extending plate 45 formed upon the arm supporting bracket 36. The bolt 44 is provided with a coiled spring 46 confined between the lower face of the plate 45 and the nut of the bolt. The arrangement is such that the face plate 45 is normally held in abutting engagement with the ear 43 of the bracket 40, as will be apparent from Fig. 1, but permits relative movement between the brackets 36 and 40, as will be apparent from Fig. 2.

The construction and operation of the parts just described are such that rocking movement of the shaft 25 will serve to rock the arms 35 as well as the arms 18, but through the yielding connection between the arms 35 and operating means therefore, a shorter stroke may be imparted to the arms 35 than to the arms 18. In other words it is desirable to hold the arms 35 sufficiently depressed to prevent them from interfering with the tube frames that are being advanced by the chains 12, and this is accomplished by providing abutments such as the brackets 47 which may be secured to the horizontal beam 48 of the loom frame, and each of these brackets is provided with an adjustable bolt 49 constituting a stop adapted to engage the face plate 45 to arrest the upward movement of the arm 35 when the arms 18 are elevated to their uppermost position as will be apparent from Fig. 2.

As a result of the construction just described the outer end of the arm 35, which is bent downwardly as shown, is disposed well below the tube frames 8 as long as these frames are supported by the chains 12, the arrangement being such that the arms 35 for supporting the intermediate portions of the tube frames do not perform their supporting operation until the tube frame is moved downwardly to a position adjacent the fabric, as will be apparent from Fig. 2, in which the arm 35 is shown in full lines in its uppermost position.

Each arm 35 is preferably provided with an adjustable end portion 50 having a hook end constructed as shown to form a nose receiving seat, and the end portion 50 may be adjustably secured to the arm 35 by the bolts 51.

In accordance with the present invention the engagement between the tube supporting frame 8 and the sag preventing arms 35 is effected by providing each of the spool supporting brackets 11 with a laterally extending nose 52, which is shaped to engage the nose receiving seat just described for rocking movement therein. It is important to note that the pivotal axes of the noses 52 lie in alignment with the pivotal support 20 for the carriers 19, so that the sag preventing arms 35 support the tube frame intermediate its ends without interfering with the rocking or tilting movement which is imparted to the tube frame while adjacent the fabric. As a result of this construction the mechanism of the present invention for supporting a tube frame intermediate its ends while adjacent the fabric may be readily applied to the looms employed heretofore. Furthermore, the projecting nose 52 provided upon the spool supporting bracket 11 does not interfere with the placing of the spools 10 in supporting engagement with these brackets, and as above pointed out permits the links 21 to operate as heretofore to tilt a tube frame to the dot and dash position of Fig. 2 to thereby engage the tuft yarns with the positioning plate 53 and then swing the tube frame about the aligned pivot pins 20 of the transferring arms 18 and the points 54 of the noses 52.

It will be clear from the foregoing that the mechanism of the present invention effectively prevents long tuft yarn tube frames from sagging intermediate their ends while in or adjacent the tuft inserting position, and that the construction is such that the sag preventing mechanism does not in any way interfere with the normal operation of the transferring arms 18 and parts associated therewith.

It will also be seen that as a result of the present invention tube frames of greater length than those employed heretofore may be successfully used upon looms, without danger of the tube frames sagging during their tuft yarn inserting operation.

What is claimed is:

1. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, a rocking shaft, spaced rocking arms mounted on said shaft for carrying a tuft yarn tube frame to and from the weaving point, and an arm mounted on said rocking shaft between said spaced arms to rock with the shaft and spaced arms and provided with an end portion adapted to engage and support the tube frame between the ends thereof as the tube frame is bodily moved to the weaving point to prevent sagging of the tube frame while in the tuft inserting position.

2. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, a rocking shaft, spaced rocking arms mounted on said shaft for carrying a tuft yarn tube frame to the

weaving point, a sag preventing arms mounted on said rocking shaft between said spaced arms for rocking movement by said shaft through a shorter stroke than said spaced arms, to support the tube frame intermediate its ends and prevent the frame from sagging while in the tuft inserting position.

3. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, a rocking shaft, spaced rocking arms mounted on said shaft for carrying a tuft yarn tube frame to the weaving point, a sag preventing arm mounted on said shaft between said spaced arms for movement with said spaced arms about a common centre to the weaving point and preventing the tube frame from sagging while presenting the tuft yarns to the fabric and means for rocking the tube frame about a longitudinal axis while supported by the spaced arms and sag preventing arm.

4. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, spaced rocking arms for carrying a tuft yarn tube frame to the weaving point, an arm pivotally mounted between said spaced arms, means for yieldingly imparting the movement of said spaced arms to the intermediate arm whereby the upward movement of the latter may be arrested without arresting the upward movement of said spaced arms, and means upon the intermediate arm adapted to be engaged by the tube frame as the latter is moved towards the fabric and prevent the tube frame from sagging between its ends while in the tuft inserting position.

5. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, a rocking shaft, spaced rocking arms mounted on said rocking shaft for carrying a tuft yarn tube frame to the weaving point, a sag preventing arm mounted on said rocking shaft between said spaced arms and provided with an end portion disposed adjacent but out of the path of the tube frame, and a lateral projection on the tube frame intermediate its ends adapted to engage said end portion so that the latter will support the tube frame intermediate its ends while the frame is in the tuft yarn inserting position.

6. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, a rocking shaft, spaced rocking arms mounted on the rocking shaft for carrying a tuft yarn tube frame to the weaving point, a sag preventing arm mounted on said rocking shaft between said spaced arms to support a tube frame between its ends, yielding means between the sag preventing arm and rocking shaft, and a stop adapted to be engaged on upward movement of the sag preventing arm to limit the raised position of the sag preventing arm.

7. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, spaced rocking arms for carrying a tuft yarn tube frame to the weaving point, a sag preventing arm mounted between and for movement to the weaving point with said spaced arms and provided with a tube frame supporting end, and means for rocking the tube frame about a longitudinal axis while engaged by the spaced rocking arms and sag preventing arm adjacent the weaving point.

8. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames each adapted to support a plurality of yarn supply spools, an upstanding bracket mounted on each tube frame between the ends of the frame to support a spool, a rocking shaft, spaced rocking arms mounted on the rocking shaft for carrying a tuft yarn tube frame to the weaving point, a sag preventing arm mounted on said rocking shaft between said spaced arms to support an intermediate portion of a tube frame, and a lateral projection upon said bracket adapted to engage the sag preventing arm to support a tube frame from sagging while in the tuft yarn inserting position.

9. In a tuft pile fabric loom, the combination of shed forming mechanism, a series of tuft yarn tube frames, spaced rocking arms for carrying a tuft yarn tube frame to the weaving point and adapted to support the tube frame for tilting movement, an arm mounted between said spaced arms and provided with a tube frame supporting end, a bracket mounted on each tube frame between the ends of the frame, and a rounded nose portion on the side of each bracket adapted to engage said end to cause the latter to support the tube frame from sagging and for tilting movement, and means for tilting the tube frame at the weaving point while supported by said arms.

10. In a loom having a plurality of tube frames, a rocking shaft, spaced arms mounted on said shaft for moving the tube frames successively to and from the weaving point, a sag preventing arm between the spaced arms, connections between the sag preventing arm and rocking shaft permitting movement of the sag preventing arm with the spaced arms as a tube frame is moved to the weaving point and yieldable on upward movement of said arm, and a stop to limit the upward movement of the sag preventing arm as said arms are moved from the weaving point.

11. In a loom having a plurality of tube frames, spaced arms for moving a tube frame to and from the weaving point, a carrier pivotally connected to each spaced arm for engaging a tube frame, a sag preventing arm between the spaced arms, a bracket on the tube frame between the ends thereof and provided with an arcuate nose the centre of which

is in axial alignment with the pivotal connection between the carriers and tube frame, and means for tilting the tube frame about an axis passing through the pivots and nose centre adjacent the weaving point.

12. In a loom having a plurality of tube frames, a carrier for the tube frames, spaced arms for taking a tube frame from the carrier and transferring it to and from the weaving point, a sag preventing arm between the spaced arms, and means for mounting the spaced arms and sag preventing arms for movement about a common axis as a tube frame and sag preventing arm are moved to and from the weaving point.

13. In a loom having a plurality of tube frames, spaced arms for moving a tube frame to and from the weaving point, a sag preventing arm between the spaced arms, and means for mounting the spaced arms and sag preventing arms for movement about a common axis as a tube frame is moved to and from the weaving point, and means for restricting the upward movement of the sag preventing arm about said common axis to a less arc than the spaced arms.

In testimony whereof I have signed my name to this specification.

EDWIN W. STONE.