This invention relates to Axminster tube frames, such as are commonly suspended in carrier chains in a numerous series and which are successively brought into position thereby, one after another, to be carried into the loom for inserting a row of tuft yarns between the warp threads to form the pile of an Axminster or similar carpet.

The present improvement is concerned with means for locking the yarn-supply spools against accidental rotation as the tube-frames follow their deviant and jerky course around the loops of the carrier-chains as they advance toward and pass away from the delivery point of the tube-frames immediately above the loom.

In prior practice it has been the practice to rely upon the friction brakes engaging the spools to prevent this accidental rotation of the spool, but as the principal function of the brakes is to put only a comparatively light friction on the spool, sufficient to give the desired yielding resistance to the unwinding of the yarn from the spool, the action of such brakes is not sufficiently reliable to insure against the accidental rotation of the spool, while being carried around the path of travel of the chains, and the result is either that the tuft yarns may be drawn up into the tuft-tubes so as to leave no projecting ends of yarn, or may be unwound so as to leave a lot of slack yarn without the requisite tension resistance to its withdrawal from the tuft-tubes. To the extent of either of these things happening imperfect and unsatisfactory weaving results.

The present invention overcomes these difficulties by providing a simple and convenient means for positively locking the yarn-spool against accidental rotation so long as the tube-frame remains suspended from the chains, but which automatically releases the yarn-spool for rotation to permit unwinding of the yarn when the tube-frame is seized by the transfer mechanism which carries it into the loom for the purpose of inserting the yarn-tufts between the warp threads of the fabric being woven. At the same time provision is made for applying frictional retardation or braking action to the yarn-spool when the yarn-spool is released from such positive locked engagement.

Generally speaking, the invention comprises a movable dog that normally forms an interlocking engagement with a head of the yarn-spool when the tube-frame is suspended from the chains, said dog being releasable by the action of the transfer mechanism when gripping the tube-frame to withdraw it from the chains. Another feature of the invention embraces the combination, with such locking jaws, of frictional brake members which are brought automatically into frictional engagement with the spool-head when the positive locking member is withdrawn from its engagement with the spool-head.

These and other features of the invention will be particularly described in the following specification and will be defined in the claims hereto annexed.

In the accompanying drawings I have illustrated a simple and convenient construction and arrangement embodying the principles of this invention, in which:

Figure 1 is a front elevation of a complete tube-frame, the spool-locking mechanism being shown in dotted lines.

Figure 2 is a greatly enlarged view showing the end heads of an end spool and of a middle spool of a multiple spool tube-frame, like that shown in Figure 1, a portion of the tube-frame and spool-heads being broken away to show an interior construction.

Figure 3 is an end elevation of a tube-frame similar to that shown in Figure 2.

Figure 4 is a plan view in horizontal section showing the end portion of the tube-frame and the lower portion of a spool-head with the locking dog in interlocking engagement with the latter.

Figure 5 is a side elevation of one of the improved transfer clutches arranged with relation to the tube-frame shown in Figure 2 in position to move inwardly and grip the tube-frame to release the suspension latch from the overhead carrier-chain.

Figure 6 is a horizontal section through the lower portion of the clutch just above the spring-pressed plungers of the clutch.

According to well-known practice the tube-frame shown in Figure 1 embraces a longitudinal carrier-bar 1 along one side of which project a row of tuft-guiding and delivering-tubes 2, and to whose opposite ends are secured the end brackets or ears, so-called, comprising the chain-penetrating tuft-guiding tubes.
arm 2, the chain-latch 3, pivotally mounted therein and normally spring-pressed outward into suspension engagement with the chain in addition to the spool-bearing arm 4, has been previously described to the main or chain-penetrating arm 2. This assembled bracket is secured to the end of the tube-frame by means of laterally projecting parallel spaced attaching wings 23 and 29, telescoped inside of the end of the tubular carrier-bar 1.

At any suitable point near the end of the carrier-bar is provided a transverse fulcral pin 9 which, in this case, is seated in a transverse depression formed in the upper attaching wing 29. On this fulcral pin 9 is supported a pivotal member 10 which, as indicated in Figure 3, has its upper arm formed into a U-shape so as to have two points of engagement with the fulcral pin 9 for greater stability, and which has one of its arms extending downward well toward the bottom of the carrier-bar 1, the top wall of the tubular carrier-bar being slotted, as shown at 15, to allow the upwardly projecting arm of this lever to project through and swing in the longitudinal plane of the tube-frame.

Secured to this U-shaped or reversely bent upper arm of the lever is an upward extension 12, provided with inwardly projecting teeth 13a, the whole forming a pivotal dog whose teeth are positioned and dimensioned to interlock with a toothed ring 7a secured inside of the flanged head 7 of the yarn-spool 6.

It will be understood that the two end brackets embracing the spool-bearing arms 4, form the outer bearings for the multiple aligned spools 6, while very narrow intermediate uprights or bearing brackets 5 form the bearing support for the inner journals of the spools, and the adjacent journals of adjacent spools being placed in abutting relation, according to usual practice.

While the spools of a multiple spool often have their journals intermatched to secure uniform and equal rotation of all the spools, yet frequently it is preferred to allow the spools of a series independent rotation in order that if one of the pattern yarn-spools becomes exhausted in advance of the others a full spool of the same pattern may be substituted therefor and be permitted to deliver the same quantity of yarn as do the adjacent spools in the further progress of the weaving. Provision, therefore, is made for interlocking the intermediate spool as both rigidly and as spools of the tube-frame.

To this end, adjacent to one of the middle stands or bearing brackets 5, is pivotally mounted on a fulcral pin 20, a dog 21, to whose upper end is secured a projecting toothed catch 22 adapted to engage a toothed ring 7a, secured inside of the head 7 of the intermediate spool, in all respects like that previously described for the end-spool. The upper end or arm of the bracket 21 extends through longitudinal slots in the top-wall of the carrier-bar, and if need be in the angle foot of the bearing bracket 5. Furthermore, the bearing bracket 5 is slotted, as shown at 5a, to allow the toothed dog to rock away from the spool-head to provide sufficient clearance to allow rotation of the spool when desired.

Each of the locking dogs 12 and 22 are normally pressed into locking position by actuating springs 13 and 23, respectively.

To release the dog 12 from locking engagement with the spool there is pivotally connected to its lower end a short plunger or pin 11, which projects loosely through a bearing opening formed in the bracket-arm 2. A similar actuating pin or rod 24 is pivotally connected with the lower end of the dog 21 and extends through an opening in the bracket arm 2 alongside of the opening through which projects the actuating pin 11. This pin or rod 24, of course, extends from the end of the frame to the first middle bearing bracket 5 and, consequently, is slightly longer than the over-all length of the end spool.

The transfer clutch 30 comprises a vertical member 31 having lateral lugs 32 to engage against the front and rear sides of the tube-frame carrier-bar, and a lifting cam 33 projects inwardly and is inclined somewhat downwardly to pass underneath the carrier-bar and raise it as it moves inward. The clutch also has the usual rearwardly projecting supporting studs 34 and 35 by which it is supported in its actuating and carrying arms. So much of the clutch is of old construction.

As in the form illustrated in the drawings, spool-retarding friction pads 16 and 26, respectively, are secured to the dog-carrying elements 10 and 21, to rock into frictional engagement with the periphery of the spool head; it is desirable, in such case, to insure a continued pressure of the brake pads upon the spool heads during the interval that the spools are released from engagement with the dogs. With this end in view I provide the transfer clutch with a pair of side by side plungers 36 and 37, provided with stop collars 36a and 37a against which compression springs 45 exert an inward thrust, and to secure any desired degree of tension upon these springs 45 I provide a set of adjusting means for each plunger spring comprising a pair of side by side projecting screws 42 underlying each plunger and each carrying a perforated block or carrier 40, having two apertures, one to receive the outer end of the plunger and the other to receive the outer end of the underneath screw. Milled cap nuts 43, having internal threaded engage...
ment with the threaded ends of the screws or studs serve to adjust this traveler or thrust-block inwardly or outwardly to increase or lessen the compression of the spring. The two plungers 36 and 37 are mounted in the clutch member 31 so as to align, respectively, with the longitudinal actuating pins 11 and 24, that project out beyond the end bracket when the dogs are in interlocking relation with their respective spools.

As the transfer clutch raises to the relative position indicated by Figures 2 and 5 of the drawings, preparatory to moving inward against the end of the tube-frame, these spring pressed plungers 36, 37 are in position to engage and force inwardly the pins 11 and 24 as the clutch moves inward against the tube-frame to gripping position. As the plungers are spring-pressed they will maintain a continuous pressure against these pins which will be transmitted to the brake pads which are forced yieldingly into contact with the periphery of the spool heads, thereby giving the desired braking or retarding pressure upon the spools to provide the right degree of resistance to the unwinding of the yarn to produce the desired tension on the yarn.

While the above-described details of construction and arrangement are subject to modification, it will be seen that the underlying principle involves the positive locking of the yarn-spools while they are suspended from the carrier-chains, while automatically releasing them through the medium of the transfer clutches when in gripping engagement with the opposite ends of the tube-frame to permit the rotation of the spool as the ends of the yarn tufts are drawn off to supply the pile threads for the fabric being woven. At the same time the retarding brake is applied to the spools to prevent too free rotation, such a braking action as to each spool being subject to proper adjustment to give the best results.

The alternate action of the locking dogs 12 and 22 and of the brake pads 16 and 26 is due to the position of the transfer clutches. When the clutches grip the opposite end of the tube-frame the brake pads are forced into frictional engagement with the desired degree of pressure obtained by the adjustment of the springs 45, while as soon as the clutches are removed the springs 13 and 23, which are much weaker than the springs 45, return the spool-locking dogs to active position. Obviously this principle of arrangement is applicable to either a narrow or single width spool tube-frame or to a multiple spool tube-frame having any number of aligned yarn-spools. The parts are easily applied without substantial retardation of the tube frame and the existing transfer clutches may be readily changed to provide the necessary dog-releasing and the brake-actuating members.

What I claim is:

1. In an Axminster tube-frame embracing spool-bearing brackets and chain-engaging suspension members, the combination with a rotatable yarn-spool, a spool-locking dog releasably held in spool-locking engagement therewith to prevent spool rotation while the tube-frame is traveling with the supporting carrier-chains, and coordinated means for releasing the suspension members from the chain and for releasing the dog from locking engagement with the spool to permit rotation of the spool for the delivery of yarn after the tube-frame is withdrawn from its carrier-chains.

2. In an Axminster tube-frame having suspension members releasably engaging the carrier-chains of a loom, the combination with spool-bearing brackets secured to the tube-frame, a yarn-spool rotatably mounted in said brackets, spool-locking dogs mounted on the tube frame and yieldingly held in locking engagement with the spools, dog-releasing devices arranged to be engaged by the tube-frame transfer member that releases the suspension member from the carrier-chains in order to permit rotation of the spool to deliver yarn when the tube frame has been released from its suspended relation to the carrier-chains.

3. In an Axminster tube frame having spool bearing brackets arranged to rotatably support a yarn spool, a spool-locking dog pivotally mounted in proximity to an end head of the yarn spool and normally pressed into locking relation to said spool, a dog-releasing pin connected at one end with the dog and having its opposite end arranged to be shifted by a part of the tube-frame transfer mechanism to release the dog from locking relation to its spool.

4. In an Axminster tube-frame having spool-bearing brackets disposed to rotatably support a plurality of yarn-spools arranged end to end, the combination with pivoted dogs mounted on the tube-frame in position to interlockingly engage their respective spools to normally hold them against rotation, dog-releasing means projecting beyond the tube-frame in position to be actuated by the tube-frame transferring mechanism when the latter is carrying the tube-frame into the loom, the dog-releasing means being connected with the several dogs to release them from locking engagement with the respective spools when the releasing means is actuated by the transfer mechanism.

5. Spool-locking and retarding means for a tube-frame embracing movable spool-locking and spool-retarding members, in combination with means actuated by the tube-frame transfer devices by which the spool-locking member is released and the spool-re-
tarding member is set to operative position
by the transfer mechanism when the latter
is in active engagement with the tube-frame.

6. Spool-locking and retarding means for
a tube-frame embracing interconnected
spool-locking and spool-retarding members
mounted for alternate engagement with a
yarn-spool, means for normally maintain-
ing the locking member in spool-locking
position while the tube frame is suspended
from its carrier chains, and means actuated
to release locking means and shift the retarding
means to spool-retarding position when
the tube-frame is supported in its transfer
mechanism.

7. The combination with a tube frame
and its rotatable yarn-carrying spool, of
spool-locking dogs and spool-retarding
brake members interconnected to have alter-
native engagement with the yarn spool for
the performance of their respective func-
tions, and a transfer element having a
spring-pressed actuator to cause the release
of the dog and the application of the brake
when the transfer member is in supporting
engagement with the tube-frame.

8. The combination with a tube-frame
and its rotatable yarn-carrying spool, of
spool-locking dogs and spool-retarding
brake members interconnected to have alter-
native engagement with the yarn spool for
the performance of their respective func-
tions, and a transfer element having a
spring-pressed actuator to cause the release
of the dog and the application of the brake
when the transfer member is in supporting

In witness whereof, I have subscribed the above specification.

EDGAR F. HATHAWAY.