

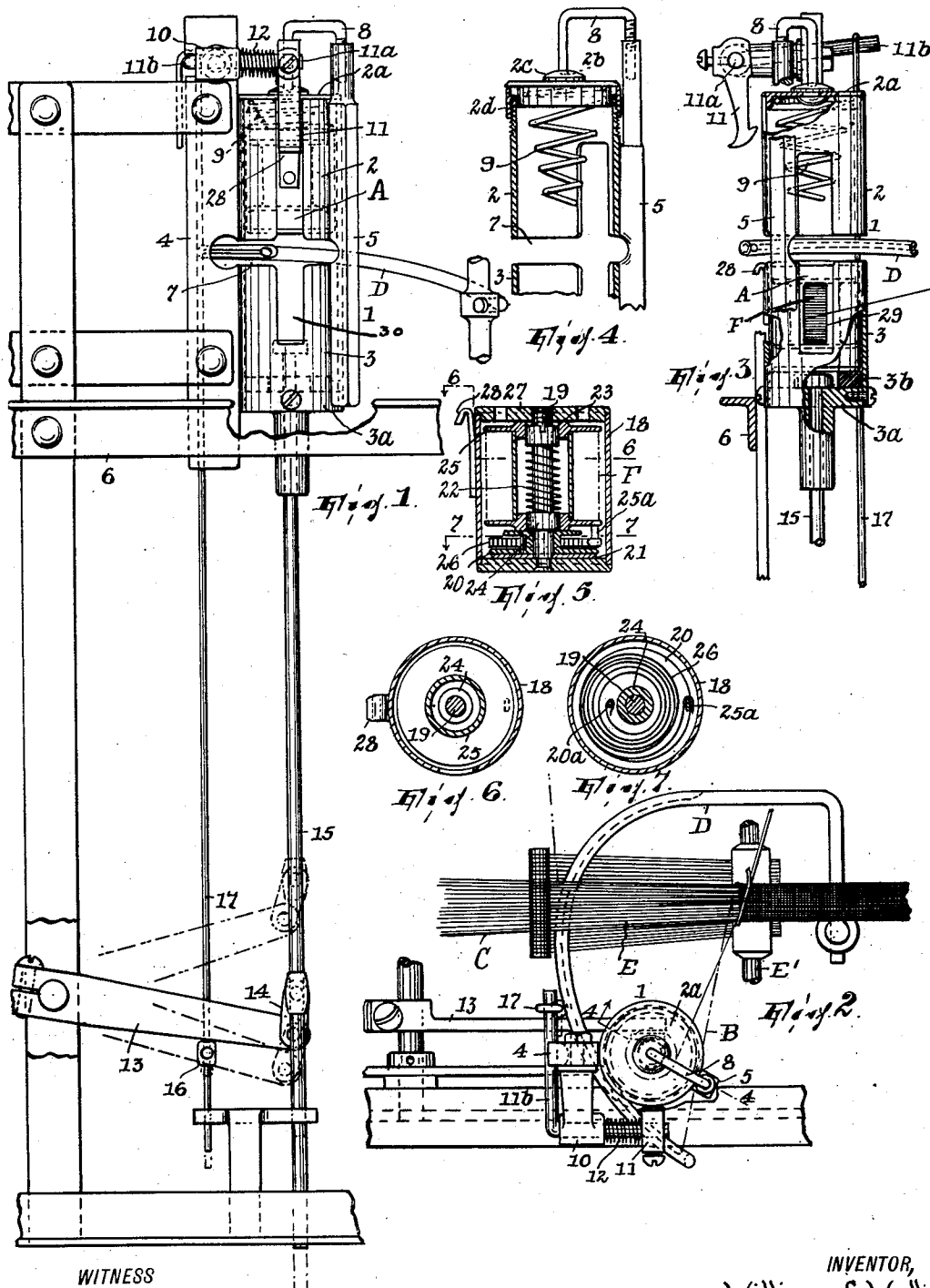
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W. S. WELLS

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SHUTTLE OPERATING MECHANISM

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WITNESS

*Wm. J. Ball.*

INVENTOR,  
William S. Wells,  
BY  
*John S. Edwards,*  
ATTORNEY.

## UNITED STATES PATENT OFFICE

WILLIAM S. WELLS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WONDER WEAVE, INC., OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

## SHUTTLE-OPERATING MECHANISM

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This invention relates to looms and in particular to the means whereby a wound package, with the thread or yarn trailing therefrom, is impelled back and forth and the yarn delivered from the package. The improved means is herein shown and described in an adaptation which is the same as that set forth in my application Serial No. 310,160, to wit, where the yarn or thread is passed through and so binds in loops of filling placed in the sheds of a warp, but I do not wish to be limited to its application in that specific connection, as will appear. The principal object is to provide means of this class which, while simple in construction and requiring little skill and attention to keep it in proper working order, shall be adapted for operation at very high speed.

In the drawing,

Fig. 1 is a side elevation of said means and certain other mechanism;

Fig. 2 is a plan thereof;

Fig. 3 an elevation, partly in section, of a portion of said means and a part of said mechanism as viewed from the right in Fig. 1;

Fig. 4 is a fragmentary vertical sectional view, on line 4—4, Fig. 2, of a modification of the upper part of said means;

Fig. 5 is a vertical sectional view of the carrier; and

Figs. 6 and 7 are sectional views on lines 6—6 and 7—7, respectively, of Fig. 5.

Let A in Figs. 1 and 2 represent a shuttle or carrier for the wound package which, in some operation in or incident to weaving, has to be passed back and forth, with the yarn trailing therefrom, to be crossed by other yarn. The latter yarn may be, as in my said application Serial No. 310,160, filling formed in successive loops, as B, in successive sheds in a warp C by an oscillated looper D, the passing of said shuttle or carrier (through such loops—see Fig. 2) resulting in binding them in the fabric produced when they have been beaten up by the reed E fulcrumed at E'. But this is only an example of one application of the invention.

A substantially tubular structure 1 affords a guide for the carrier the guide proper of

which is afforded by two spaced tubes 2 and 3 in alinement with each other, being so held by flanges 4 and 5 of which the former is secured to the loom frame 6. The space 7 between the two tubes permits the yarn, as B, which is to assume the crossing relation to the package yarn to be shifted across the line of travel of the carrier in the guide. The relatively outer (here the lower) end of the tube 3 is closed by a head 3<sup>a</sup> secured therein, and this head may be equipped with an interior rubber or other cushion 3<sup>b</sup>. The relatively outer end of the tube 2 has a cap 2<sup>a</sup> which may be removably held in place by a rebent keeper 8 having one arm screwed and hence revoluble in the part 5 and the other end adapted to seat in a recess 2<sup>b</sup> in the rounded knob or protuberance 2<sup>c</sup> on the cap; this keeper may be sprung out of the recess and turned to permit removal of the cap and hence of the contained carrier A.

Secured to the under side of the cap is a spiral spring 9. Gravity, as will be apparent, is in the present instance a force normally urging the carrier A when in the tube 2 to move into the tube 3, but it is preferable to augment this force by some other force, as that of spring 9.

When the carrier is in the tube 2 releasable means is provided to restrain it (temporarily) from movement into tube 3. In a bearing 10 projecting from member 4 is fulcrumed a pawl 11 adapted to be held normally engaged, by a spring 12, coiled about the pivot 11<sup>a</sup> of the pawl and attached at its ends to the latter and the bearing, with a lug or abutment 28 on the carrier; spring 9 will at such time of course be compressed, as in Fig. 1.

For alternately causing carrier-releasing movements of the pawl and returns of the carrier, impelled into the lower tube, to the upper tube 2 the following mechanism may be employed: 13 is an arm or crank constantly vibrated in the frame 6 by any suitable means (not shown). This is linked at 14 to a plunger 15 which penetrates the head 3<sup>a</sup> of the tube 3 and its cushion 3<sup>b</sup>. Said arm in its movement in the direction to retract the plunger, and near the end thereof, is adapted to en-

counter a collar 16 on a link 17 which may be guided in the frame and connected to an arm 11<sup>b</sup> of the pawl. Near the end of such movement the arm effects carrier-releasing movement of the pawl, at which time the plunger is substantially fully depressed, so that the carrier is freed and enters the tube 3 (Fig. 3), and on the rise said arm in elevating the plunger elevates the carrier, compressing the spring, and the carrier becomes caught and held by the pawl. It is old (see, for example, my Patent No. 1,564,386) to provide spring means to throw a shuttle or carrier and releasable means to hold the spring means tensioned or cocked. But in such cases the spring means is re-cocked by one instrumentality and the shuttle returned by another, as a replica of the said two means. One important distinction between such a mechanism and the present is that the releasable means (pawl 11) acts on the carrier to hold the same against the urge of the spring means or other force, and only a single instrumentality (as 13—14—15) is needed for both the re-cocking and return of the carrier. Another is that, given any means to shoot the shuttle or carrier from a given position (as, here, spring 9 and the pawl for holding it in the condition in which power is stored therein), there is means, movable approximately to said position, to return the carrier each time it is shot (as plunger 15 and arm 13).

The shuttle, and also the plunger, it will be noted, fits the tube 3 quite snugly so that air entrapped in the space of said tube by the incoming shuttle has but limited opportunity to escape, and it therefore serves as a cushion to slow up the shuttle in the final part of its movement and it comes to rest against the cushion 3<sup>b</sup> substantially without noise or jar.

When the yarn is exhausted the carrier or shuttle may be removed and the yarn-package renewed upon removing cap 2<sup>a</sup>.

The shuttle driving force may be changed as requirements demand by substituting one spring 9 for another of different power. Or an extension sleeve 2<sup>a</sup> may be screwed on sleeve 2 and adjusted up or down, in which case corresponding adjustment of keeper 8 may be effected by screwing it up or down in part 5.

The shuttle or carrier A (Figs. 5, 6 and 7) comprises a cylindrical case 18 closed at one end and open at the other; an axial spindle 19 in the case secured to its closed end; a brake-member 20 in the form of a barrel journaled on the spindle and having frictional contact with said end wall of the case—specifically, in the present instance, with a friction disk of leather or equivalent 21; a spring 22 coiled about the spindle and, backed by an adjusting nut 23 thereon, abutting a loose collar 24 on the spindle and thereby holding brake-member 20 pressed toward said closed end of the case; a bobbin 25 or core for the wound yarn-

package F journaled on said collar and nut; a spiral spring 26 connecting studs 20<sup>a</sup> and 25<sup>a</sup> on the brake-member and bobbin, respectively; and a cap 27 closing the other end of the case and screwed on the spindle, 29 being the yarn outlet of the case and 28 its mentioned lug for engagement by pawl 11. The underlying object is not only to provide in a compact mechanism for imposing an equable tension on the yarn but for the let-off thereof and the take-up of any slack therein. By providing a brake-member with which the package is connected by an elastic rotation-imparting means both these results follow, it being apparent that spring 26 always keeps the yarn taut and when it is tensioned sufficiently to overcome the friction resisting the rotation of the brake-member the latter rotates, with consequent let-off of the yarn.

The guide 1 may be slotted at 30 to permit the trailing yarn to traverse with the carrier.

Having thus fully described my invention, what I claim is:

1. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, the combination of a yarn-package carrier movable back and forth in a given path and normally urged in one direction, means to guide the carrier in said path, releasable means to restrain the carrier against movement in said direction while so urged, and means to return the carrier to the latter means after each such movement.

2. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, the combination of a yarn-package carrier movable back and forth in a given path and normally urged in one direction, means to guide the carrier in said path, releasable means to restrain the carrier against movement in said direction while so urged, and means to return the carrier to the latter means after each such movement and thereafter cause said latter means to release the carrier.

3. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, the combination of a yarn-package carrier movable back and forth in a given path and normally urged in one direction, means to guide the carrier in said path, means to restrain the carrier against movement in said direction while so urged, and reciprocating means to return the carrier to the latter means after each such movement and thereafter cause said latter means to release the carrier.

4. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, the combination of a yarn-package carrier movable back and forth in a given path and normally urged in one direction, means to guide the carrier in said path, a detent normally restraining the carrier against movement in said direction while so

urged but movable to release the same, and means to return the carrier to the detent after each such movement and thereafter move the detent to release the carrier.

5 5. In a mechanism for passing a yarn package with the yarn trailing therefrom, the combination of a yarn-package carrier movable in a given direction, a spring to impel the carrier in said direction, a guide for the carrier, and a releasable detent coactive with  
10 a part of said guide and active on the carrier to maintain the spring tensioned.

15 6. In a mechanism for passing a yarn package with the yarn trailing therefrom, the combination of a yarn-package carrier movable in a given path and normally urged in one direction, and means to check the movement of the carrier in said direction including a cylinder forming an air-space open toward and formed to receive, and to afford  
20 limited release of the air entrapped in said space by, the carrier.

25 7. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, the combination of a yarn-package carrier movable back and forth in a given path and normally urged in one direction, releasable means to restrain the carrier against movement in said direction, means  
30 to check the movement of the carrier in said direction including a cylinder forming an air-space open toward and formed to receive, and to afford limited release of the air entrapped in said space by, the carrier, and means, including a plunger reciprocating in  
35 said cylinder, to return the carrier to the first-named means and thereafter cause the latter to release the carrier.

40 8. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, a substantially tubular guide having its end portions separated to admit between them yarn to be crossed by the yarn of said package, the combination of a yarn-package carrier movable lengthwise of and  
45 in the guide and normally urged toward one end portion thereof, releasable means to restrain the carrier against such movement, and means, including a plunger reciprocating in said end portion, to return the carrier to the first-named means and thereafter cause the latter to release the carrier.

50 9. In a mechanism for passing a yarn package back and forth with the yarn trailing therefrom, the combination of a yarn-package carrier movable back and forth in a given path, means to guide the carrier in said path, means to shoot the carrier in one direction of its path from a given position, and  
60 means, movable approximately to said position in the opposite direction, to return the carrier each time it is so shot.

10. In a mechanism for passing a yarn package back and forth with the yarn-trailing therefrom, the combination of a yarn-

package-carrier movable back and forth in a given path, means to guide the carrier in said path, means, including a carrier-propelling spring, to shoot the carrier in one direction of its path from a given position, and means, movable approximately to said position in the opposite direction, to return the carrier each time it is so shot. 70

11. A yarn-package-carrier propelling mechanism including, in combination, a substantially tubular guide and a propelling spring for the carrier contained in the guide and supported thereby against bodily displacement toward one end thereof and removable therefrom. 75

12. A yarn-package-carrier propelling mechanism including, in combination, a substantially tubular guide, a propelling spring for the carrier contained in the guide, and an abutment member for the spring opposing movement thereof bodily toward one end of the guide and connected with the guide for adjustment lengthwise thereof. 80

13. A yarn-package carrier including a case having an internal spindle forming an axis of rotation for a revoluble yarn-package to be contained in the case, a revoluble brake-member journaled on the spindle within the case, means on the spindle urging the brake-member axially in friction contact with the case, and spring-including means to connect the brake-member with the package. 85

14. A yarn-package carrier including a case having an internal spindle forming an axis of rotation for a revoluble yarn-package to be contained in the case, a revoluble brake-member journaled on the spindle within the case, adjustable means on the spindle urging the brake-member axially in friction contact with the case, and spring-including means to connect the brake-member with the package. 100

15. A yarn-package carrier including a case adapted to contain a revoluble yarn package, a revoluble brake-member, spring-including coupling means to connect the brake-member with the package, and adjustable means holding the brake-member in friction contact with the case. 110

16. In combination, a carrying structure including a case, a bobbin structure revoluble in the case, a revoluble brake member in the case, spring-including means connecting the brake-member with one of said structures, and means urging the brake-member axially in friction contact with the other structure. 120

In testimony whereof I affix my signature.

WILLIAM S. WELLS.

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