

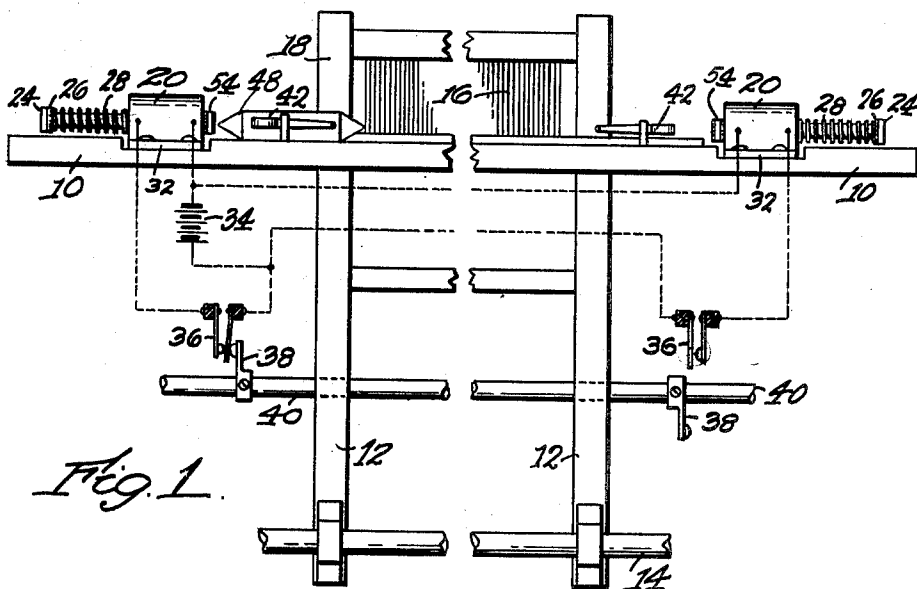
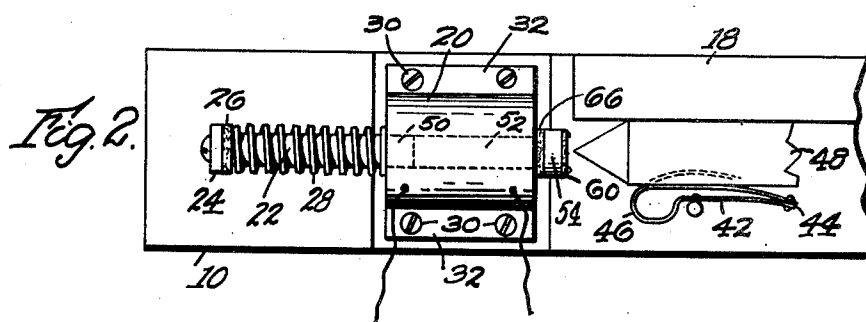
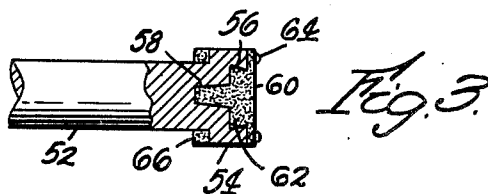
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SHUTTLE DRIVE

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SHUTTLE DRIVE

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5 Claims. (Cl. 139—134)

This invention relates to certain new and useful improvements in drive mechanisms for shuttles, it being the main object of my invention to provide an inexpensive, trouble free, and comparatively noiseless driving means for loom shuttles.

Other objects of the invention reside in the provision of electromagnetic driving means for a shuttle wherein the shuttle is moved directly under impact of the cores of solenoids which are mounted on the lay and which are alternately energized for driving the shuttle from side to side of the lay. Other objects of the invention reside in the provision of an electric solenoid shuttle drive wherein the solenoids are provided with central steel cores which are spring pressed in a direction opposite from the center of the loom so that upon energization of the solenoids the shuttle will be driven directly across the lay, and upon de-energization the core will be returned to its spring-pressed position; the provision of a solenoid shuttle drive comprising a core having two axially aligned and fixed parts, one part being made of steel and the other of non-magnetic material, the core being normally resiliently held in such a position that the steel part of the core is largely exterior of the solenoid, and the non-magnetic part is located within the solenoid for the purpose of obtaining a longer throw and consequently a more definite impact on the shuttle to insure driving the same across the lay; the provision of a driving head for the core of a shuttle-driving solenoid comprising a two-part counterbore in the head, and a rubber plug fitting the counterbore in such a position as to contact the shuttle as it is driven, there being washers provided behind the head of the core to reduce the noise occasioned by the reciprocation thereof.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing in which

Fig. 1 is a front view in elevation of a loom embodying my invention;

Fig. 2 is an enlarged partial plan view of one end of the lay of the loom with reed omitted; and

Fig. 3 is a view in section through the head of the non-magnetic core part.

In the drawing reference numeral 10 indicates the lay of a loom, the lay being mounted on the rocking frame 12 journaled on a shaft 14, as is conventional in looms. The lay is provided with the usual reed 16 mounted in a frame 18 fixed to the lay so as to be rockable therewith.

At each end of the lay there is mounted a stationary, solenoid 20, each solenoid having a core

22. Each core 22 is considerably longer than its solenoid as is clearly shown in the drawing, and each core is provided with a lug 24 at one end and a rubber, or the like, washer 26 against which a coil spring 28 is arranged to normally maintain the core in inoperative position. The solenoids are arranged to move the cores inwardly of the lay when energized, and this action takes place against the action of springs 28. If desired a further washer may be interposed between the solenoid housing and the springs to reduce any possible noise arising from the action of the springs against the housing.

Each solenoid is arranged to be fastened to the lay by bolts or other fasteners 30 which extend through flange 32 on each solenoid housing. The solenoids are adapted to be energized by an electric source of power 34 which is here shown as a battery, but in most cases the power would be derived from a conventional electric power circuit through a transformer. Each circuit to the solenoids is provided with a spring finger contact switch 36 which is normally maintained open but is adapted to be closed by cams or other similar means 38 fixed to a shaft 40 which is driven by the power energizing the loom itself. Cams 38 are arranged 180° apart on the shaft 40 so that switches 36 are alternately closed and opened when shaft 40 is rotated. It will be clear that a rheostat may be applied to the prime mover for the loom to vary its speed of operation, but in any case shaft 40 will be rotated in timed relation to the speed of operation of the loom.

A spring gate 42 is arranged adjacent each solenoid, and each gate comprises a spring loop which is formed with a narrow end 44 extending toward the center of the loom and away from the reed frame 18 to form a shuttle guide. The spring loop also includes an enlarged end 46 adjacent each solenoid, this enlarged end having a greater rigidity than the narrow end 44 for the purpose of closely engaging the shuttle 48 to stop the same after rebounding from the solenoid core and hold it in position to be struck by the solenoid core for the return travel.

Each solenoid core comprises a steel section 50 and a non-magnetic section 52, the latter being made of some non-magnetic material such as brass. Section 52 is provided with an enlarged head 54 which is counterbored at 56 and undercut as shown in Fig. 3. A second counterbore 58 is provided centrally of the undercut area 56, and the counterbore 58 is formed so as to taper in a direction opposite to the taper of counterbore 56. A rubber plug 60 is formed to fit in the double

counterbore in head 54 and it will be seen that it is necessary merely to jam the rubber plug into the counterbores to a position wherein the flaring skirts 62 of the plug will snap into and be held by the tapered wall of counterbore 56. This construction obviates the necessity of providing any further fasteners for the rubber plug, but screw fasteners 64 may be used in addition if desired. A washer 66 is applied to the shoulder of head 54 so as to cushion the impact of the latter as it impinges the solenoid housing on the return stroke occasioned by spring 28.

As the shuttle is driven back and forth across the lay it may be guided in part by the reed frame 18, and the threads extending through the reed will operate to hold the shuttle down onto the lay in the usual manner. By reason of the construction of the two-part core a long throw of the latter is provided, and it will be seen that this throw will be uniform from the start of its travel wherein the steel section 50 is mainly exterior of the solenoid, up to the end of its stroke where the brass section 52 will be located exterior of the solenoid housing on the other side. Hence at each energization of a solenoid a long powerful blow will strike the shuttle and send it across the lay to a position wherein it is guided into the gate 42 by the offset pointed end 44 of the gate; and the enlarged loop 46 will be sprung outwardly by the shuttle and hold it ready to be struck by the other solenoid core. It is to be noted that the main holding power of the gates is located adjacent the solenoids, and that, therefore, the initial travel of each core will be sufficient to release the shuttle from the gate prior to the main power action of the solenoid, so that the shuttle is free of its gate before the effect of the driving blow ceases. The action of the spring gate is shown by the solid and dotted lines in Fig. 2, it being noted that the point at 44 does not deviate to any great extent.

The rubber plug 60 is so designed as to have the tapered portion 58 thereof at the center, so that this portion of the plug receives the main impact of the shuttle relative to the core. This action will result in a pounding of the center of the plug into the tapered hole, and there will be no tendency for the plug to become separated from the head 54. Washers 26 and 66 will greatly re-

duce the noise occasioned by the reciprocation of the core, but in any case the noise of the picker sticks is eliminated by the present invention and a much quieter loom action results. In cases where the rheostat referred to above is used, the operator can determine by test the highest speed the loom may assume without breaking the yarn, and therefore for each kind of thread the most efficient driving speed may be utilized.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. In a loom, the combination of a lay and a shuttle adapted to be driven thereon; with a solenoid for driving said shuttle, a core in said solenoid, a striking head on said core, a relatively large diameter undercut counterbore in said head, a relatively small tapering recess at the bottom of said counterbore, and a rubber plug located in and conforming to said counterbore and recess.

2. A loom according to claim 1 wherein said head is non-magnetic.

3. In a loom, the combination of a lay, a shuttle race thereon, and a shuttle; with a solenoid at each end of the lay, an elongated core having a non-magnetic section extending from its solenoid when the latter is energized to strike the shuttle, a striking head on each non-magnetic core section, resilient means to cushion the head on its retractive stroke, and a gate disposed inwardly of each solenoid for braking the shuttle at the end of its stroke, each gate comprising a spring loop mounted on the lay, said loop having a narrow end and an enlarged end, the enlarged end being located adjacent the nearer solenoid, and the narrow end pointing toward the far solenoid, said narrow end of the loop being resilient per se, said core being of a length to position the striking head in the region of the enlarged end of the loop when the nearer solenoid is energized.

4. A loom according to claim 1 wherein the striking head is enlarged relative to the solenoid so that the head strikes the solenoid on the return stroke, and means cushioning the head.

5. A loom according to claim 1 wherein the striking head is enlarged relative to the core, forming a shoulder, and a washer on the shoulder.

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