March 10, 1931. H. A. DAVIS 1,795,841

FILLING FORK AND GRID MECHANISM FOR LOOMS

Filed July 10, 1929 2 Sheets-Sheet 1

Fig. 1.

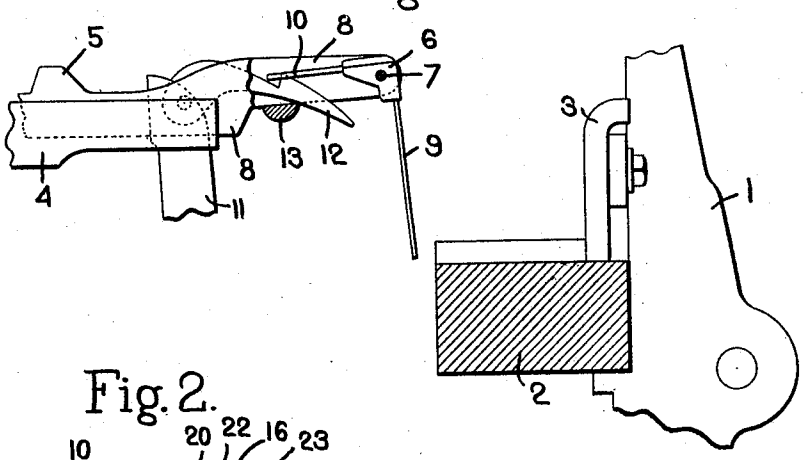


Fig. 2.

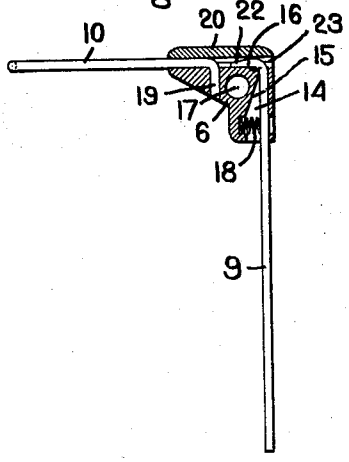


Fig. 3.

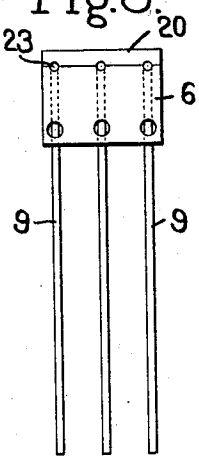


Fig. 4.

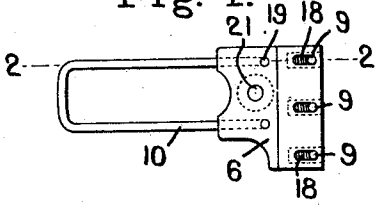


Fig. 5.

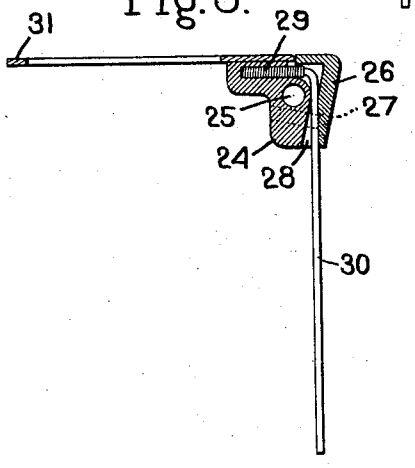
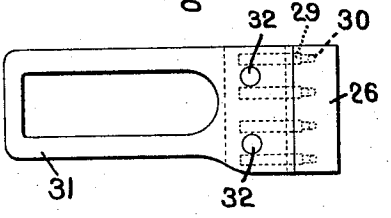


Fig. 6.



Inventor.
Harry A. Davis
by Heard Smith & Tennant.
Attys.

March 10, 1931. H. A. DAVIS 1,795,841

FILLING FORK AND GRID MECHANISM FOR LOOMS

Filed July 10, 1929 2 Sheets-Sheet 2

Fig. 7.

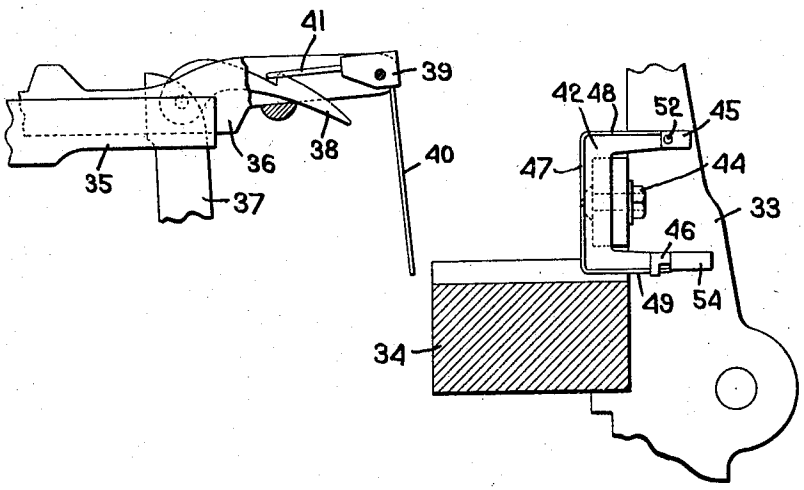


Fig. 8.

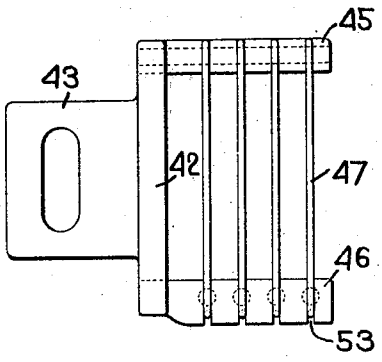


Fig. 9.

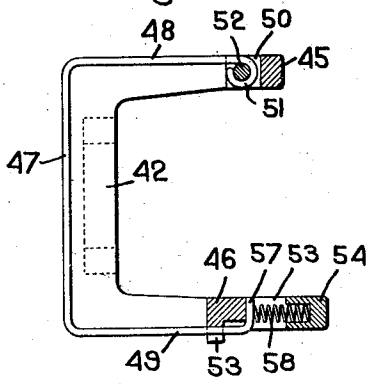
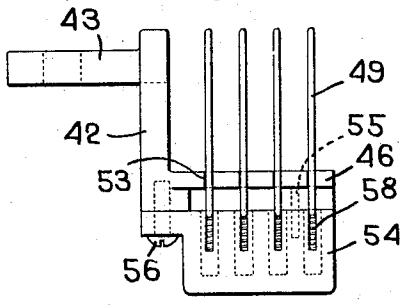


Fig. 10.



Inventor.
Harry A. Davis
by Heard Smith & Tennant.
Attys.

Patented Mar. 10, 1931 1,795,841

UNITED STATES PATENT OFFICE

HARRY A. DAVIS, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER CORPORATION, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE

FILLING FORK AND GRID MECHANISM FOR LOOMS

Application filed July 10, 1929. Serial No. 377,115.

It is common practice to provide a loom with a so-called filling fork and grid mechanism which acts to detect the absence of the filling due to exhaustion or breakage and thereupon effect the stopping of the loom or a change in its operation. A grid having a plurality of generally vertical parallel spaced bars is usually secured to the lay and a fork also having a plurality of generally vertical parallel spaced bars in the form of tines is usually mounted upon the breast beam and these elements cooperate when the lay beats up in such a manner that if the filling is present in front of the grid, the normal operation of the loom will continue, but if the filling is absent due to exhaustion, breakage, or any other reason, the cooperative action of the fork and grid, detecting this absence of the filling, will effect the stopping of the loom or the desired change in the operation of the loom.

It has been found that when cloth is being woven with a light filling, with rayon, or with brittle and easily breakable filling, the impact of the fork and grid elements against the filling damages and even breaks the filling, thus either injuring the quality of the cloth or effecting an undesired stopping or change in the operation of the loom with consequent loss in efficiency. Repeated tests have shown that a very large percentage of filling breakage which occurs under these conditions in the loom operation is due to this action of the fork and grid on the filling. Various factors enter into this undesirable result, among which the following have been observed, (1) the filling does not always lie in the same vertical position with respect to the fork and grid with the result that there is a variation in the force of the impact, (2) the tension on the filling varies due the position of the shuttle, the conditions in the shuttle, the size of the filling mass on the bobbin, the action of the feeler on the filling when a filling replenishing mechanism is employed, (3) the bars of the elements, that is, the tines of the fork and the ribs of the grid, are frequently not in parallelism or in parallel planes with a resulting uneven action of the several bars when these elements cooperate in engagement with the filling, (4) frequently there is a variation in the setting or adjustment of the fork and the grid, (5) the bars of either one or both elements, that is, the tines of the fork and the ribs of the grid, may be bent or uneven. Furthermore, even when the conditions under which the fork and grid cooperate are at the best, there is a very substantial impact on the filling during the detecting operation because the elements must be fairly rugged in order to perform their function of effecting the stopping or change of operation of the loom. The fork is usually mounted to move on a pivotal axis each time the lay beats up with the filling present and it must be steady in its movement and must not flutter, or it would rebound and function improperly.

The present invention consists in constructing one or the other of the fork and grid elements so that the bars thereof are severally and independently yieldable away from the other element in the direction of their cooperative movement so that upon impact a slight independent yield of these bars may take place, thus automatically securing just sufficient force of impact on the filling to insure the proper functioning of the mechanism without deleterious results to the filling.

These and other objects and features of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

As the general construction and operation of a loom and of filling fork and grid mechanism is well known and familiar to those skilled in the art, it will only be necessary here to illustrate and describe those elements directly concerned with preferred embodiments of the present invention.

The drawings show several forms which the invention may take as applied both to the fork element and the grid element.

In the drawings:

Fig. 1 is a side elevation partially in vertical cross section of an ordinary type of filling fork and grid mechanism with portions of a loom immediately associated there-

with and with one form of the invention embodied in the fork element.

Fig. 2 is a detail in vertical cross section taken on the line 2—2 of Fig. 4 of the fork element shown in Fig. 1.

Fig. 3 is an elevation looking toward the rear of the fork element shown in Fig. 1.

Fig. 4 is a bottom plan view of the fork element shown in Fig. 1.

Fig. 5 is a view similar to Fig. 2 showing another form of the invention embodied in the fork element.

Fig. 6 is a top plan view of the construction shown in Fig. 5.

Fig. 7 is a view similar to Fig. 1 with another form of the invention embodied in the grid element.

Fig. 8 is a front elevation of the grid element shown in Fig. 7.

Fig. 9 is a view in vertical cross section of the grid element shown in Fig. 7.

Fig. 10 is a bottom plan view of the grid element shown in Fig. 7.

In the construction shown in Figs. 1 to 4, inclusive, the usual oscillating lay structure of the loom comprising the swords 1 and lay 2 is shown as provided with a grid element 3 of the usual type. Such a grid is rigidly supported with its parallel spaced bars or ribs standing parallel with and at the rear of the path of the shuttle. The stand or support 4 is secured to and projects rearward from the breast beam and carries the usual filling fork slide 5 mounted to slide forward and rearward therein. The filling fork element comprises a body 6 pivotally journalled on a bearing 7 between the bifurcated arms 8 of the fork slide 5. From the body depend in spaced relation the bars or tines 9 and from the body in a direction generally at right angles to the tines extends the looped tail 10. The usual vibrating weft hammer 11 carries pivoted thereto the hook 12 between the arms 8 and resting upon the cross bar 13 of the fork slide. The operation of these elements is a familiar one. Each time the lay beats up, if the filling is properly laid in front of the grid, it is carried by the grid against the tines of the fork, raising the tail 10 out of the path of the hook 12. But if the filling is absent, no movement of the fork takes place and as the weft hammer 11 swings forwardly, the hook 12 engaging the tail 10 gives a forward movement to the fork slide which through suitable mechanism acts to effect the stopping of the loom or a change in its operation.

In the construction shown in Figs. 1 to 4, the present invention is shown embodied in one form in the fork element of the combination wherein the filling engaging bars or tines 9 are shown as made of wire, three in number, and arranged in parallelism. The main portion of the body 6 is formed parallel with the side surface with a plurality of recesses 14, one for each tine. These recesses present a rear wall constituting a stop to hold the tines in parallelism and a front wall 15 inclined forward and downward so that the recess is of considerable width at the bottom. At the upper front portion of each recess the body presents a shoulder 16 and these shoulders are parallel with the journal axis 17 of the body and constitutes a pivotal axis for the tines. The tines are bent into hook shape at their upper ends so that they may swing forward and rearward on the shoulders 16. Forward of each tine an individual spring 18 is mounted in each recess 14 between its tine and the front wall of the recess which is bored out to receive the spring. Thus each filling engaging bar or tine is normally held against the stop or rear wall of its recess with all the tines in parallelism and thus each bar or tine yields severally and independently forward against the action of its spring 18. The tail 10 is in the form of a wire loop having depending legs 19 fitted into apertures in the body. The top plate 20 of the body is separate from the main portion of the body so that both the tines and the tail may be inserted in the body through the top and then held in position by the top plate secured in place by a suitable screw or securing device 21. The forwardly projecting ends 22 of the bars or tines are bevelled off as shown to permit the swinging or pivotal movement of the tines in a horizontal recess 23 shown as formed partly in the main body 6 and partly in the cover plate 20.

In Figs. 5 and 6 is shown a slightly different form of filling fork element from that already described but for use in a similar combination. In this construction the body 24 has a similar journal bearing 25 to that already described. The cover portion 26 in this case is located at the rear of the body and secured thereto by screws 27 with the recesses 28 for the fork bars or tines formed partially in the body and partially in the cover, the tines being limited in their rearward swing by the inner stop surface of the cover and in their forward swing by the body. In this case individual contractile springs 29 are secured to the upper forwardly bent ends of the tines 30, herein shown as four in number, and to the body and act normally to hold the tines in parallelism against the stop surface of the cover and permit the tines to yield separately and independently in a forward direction. The looped tail 31 of the fork element is in the form of a flat recessed plate secured to the top of the body by suitable rivets or screws 32.

In the construction shown in Figs. 7 to 10, inclusive, the general arrangement and operation of the fork and grid elements is the same as already described, but in this case the grid element is the one in which the parallel bars are separately and independently

yieldable while the filling fork element is shown as of the usual construction. The lay swords 33, the lay 34, the filling fork stand 35, the filling fork slide 36, the weft hammer 37 and the hook 38, are all shown as of the same construction as in Fig. 1. The filling fork is of the usual type comprising the body 39, the depending bars or tines 40 mounted therein to cooperate with the grid and the tail 41 mounted therein to cooperate with the hook 38.

The grid element in which one form of the main feature of the invention is here embodied is shown in detail in Figs. 8, 9 and 10. As shown, the body of this element comprises a U-shaped frame 42 having a lug 43 extending laterally therefrom by means of which the frame is secured to the lay sword, as by a suitable bolt 44, and wherein arms 45 and 46 extend laterally from its rear ends in the direction opposite to the lug 43. The several filling engaging bars or ribs 47 normally stand in parallelism in a substantially vertical plane extending parallel to and at the rear of the lay. These bars at their upper and lower ends are bent rearwardly at 48 and 49. These bars or ribs are mounted in the body or frame of the grid element to swing severally and independently thereon in a direction normal to the plane of the bars. This is secured by mounting the rear end of each portion 48 in a separate slot 50 in the arm 45 and by bending the rear ends of the portions 48 to form bearing portions 51 mounted upon a common bearing stud 52 extending through the arm 45. The rear ends of the lower portions 49 are guided in individual slots 53 formed in the lower arm 46 and a block 54 removably secured to the rear thereof, as by a positioning pin 55 and a screw 56, so as to form a part of the arm 46. These rear ends of the lower portions 49 of the grid bars are upturned as at 57 and individual springs 58 are seated between these upturned ends and bores in the block 54. The rear surface of the arm 46 engaged by the upturned ends 57 forms a stop surface positioning the bars 47 of the grid element in parallelism when at the limit of movement in the filling engaging direction and the individual springs 58 mounted between each of these grid bars or ribs and the body or frame of the grid element act yieldably to hold the bars in this position and also to permit independent yielding of the bars away from this position.

In the various forms thus described as illustrative embodiments of the invention, it will be seen that the fork and grid elements have relative bodily movement toward and away from each other, and that each has a plurality of filling engaging bars such as the tines of the fork and the ribs of the grid which are sufficiently stiff to be normally inflexible, being preferably made of metal, and that the filling engaging bars of one of these elements are severally and independently yieldable away from the other element in the direction of the relative bodily movement which takes place between the two elements. Furthermore and more specifically, in whichever element the invention may be embodied, there are a plurality of parallel filling engaging bars mounted on the body of the element and severally and independently yieldable thereon in a direction normal or in general at right angles to the plane of the bars. Again in either specific construction shown, the body of the element provides means for positioning all of the filling engaging bars in parallelism when at the limit of their movement in a filling engaging direction and individual springs are mounted between each bar and the body of the element which act yieldably to hold the bars in this position and also to permit the independent yield of the bars away from said position.

The invention thus presents a construction in which, in a filling detecting mechanism of this general type, the desired detecting action may be secured with a minimum danger of injury to or breakage of the yarn.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. A filling detecting mechanism for a loom comprising cooperating fork and grid elements having relative bodily movement toward and away from each other and each having a plurality of filling engaging stiff bars in which the bars of one element are mounted to yield severally and independently away from the other element in the direction of said movement.

2. A filling detecting mechanism for a loom comprising cooperating fork and grid elements having relative bodily movement toward and away from each other and each having a plurality of filling engaging stiff bars in which the bars of one element are mounted therein for several and independent movement in the direction toward and away from the other element and are spring-actuated toward the other element.

3. A filling engaging element for a fork and grid filling detecting mechanism comprising a body and a plurality of parallel filling engaging stiff bars mounted on the body to yield severally and independently thereon in a direction normal to the plane of the bars.

4. A filling engaging element for a fork and grid filling detecting mechanism comprising a body, a plurality of parallel filling engaging stiff bars mounted on the body and severally and independently movable thereon in a direction normal to the plane of the bars, and individual springs mounted between each bar and the body permitting the bars to yield independently out of parallelism and acting normally to retain the bars in parallelism.

5. A filling engaging element for a fork and grid filling detecting mechanism comprising a body, a plurality of normally parallel filling engaging stiff bars pivotally mounted on the body to swing severally and independently thereon in a direction normal to the plane of the bars, means for positioning the bars in parallelism when at the limit of movement in the filling engaging direction and individual springs mounted between each bar and the body acting yieldably to hold the bars in the said position and to permit independent yield of the bars away from said position.

6. A filling fork for a filling detecting mechanism for a loom comprising a body having a journal bearing, a tail rigid with the body and extending generally radially from said body, a plurality of filling engaging tines pivotally mounted on the body on an axis parallel with the journal bearing and extending in a direction substantially at right angles to the tail, a stop on the body positioning the tines in parallelism, and individual springs between the body and the tines acting to hold the tines against the stop and to permit the tines to swing independently on their pivotal axis away from the stop.

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

HARRY A. DAVIS.