No. 740,276. PATENTED SEPT. 29, 1903

A. C. HOUGH.

WEFT HANDLING MECHANISM FOR LOOMS.

APPLICATION FILED SEPT. 12, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

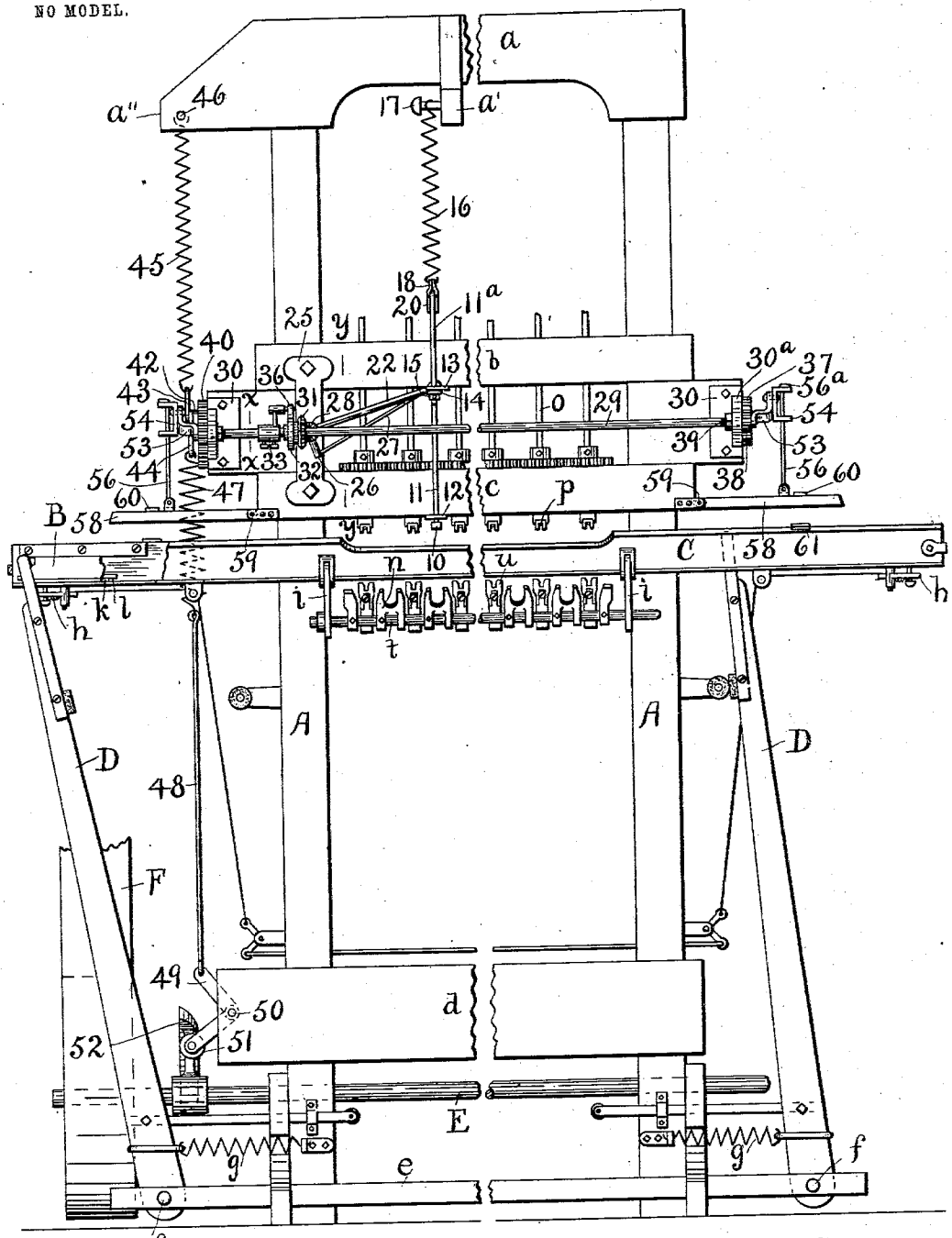


FIG. 1.

Witnesses

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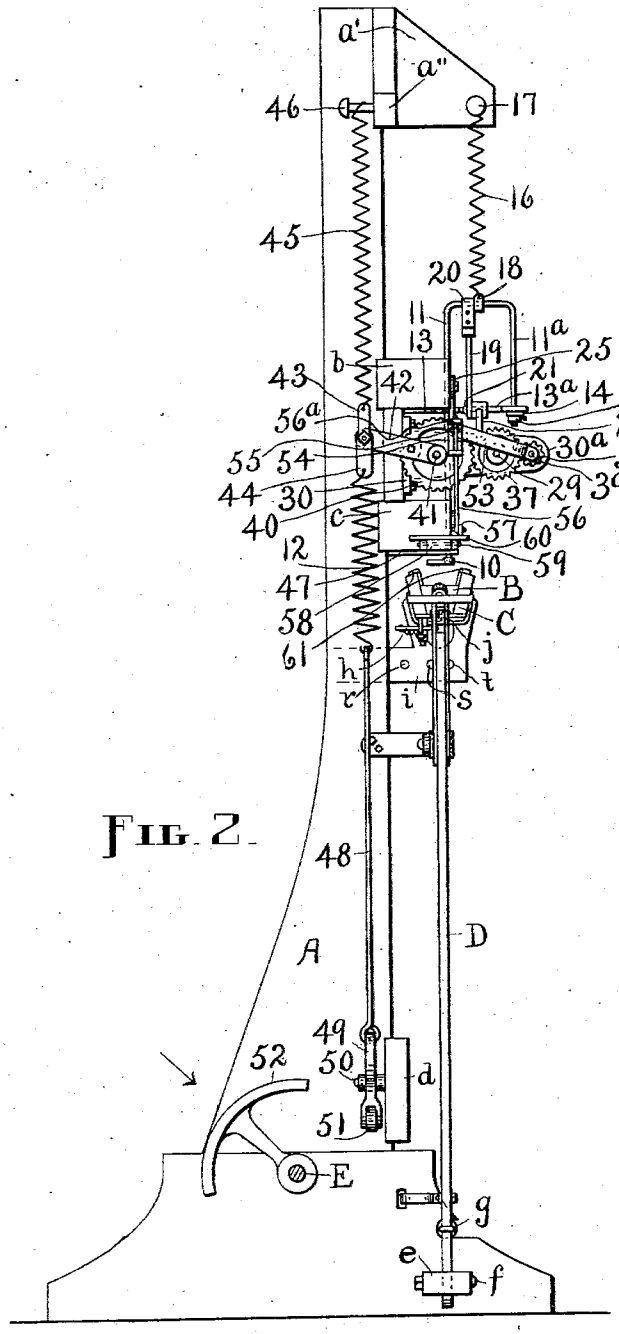


FIG. 2.

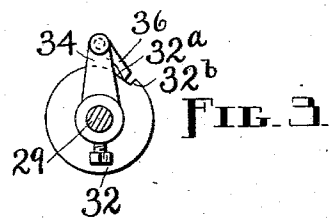


FIG. 3.

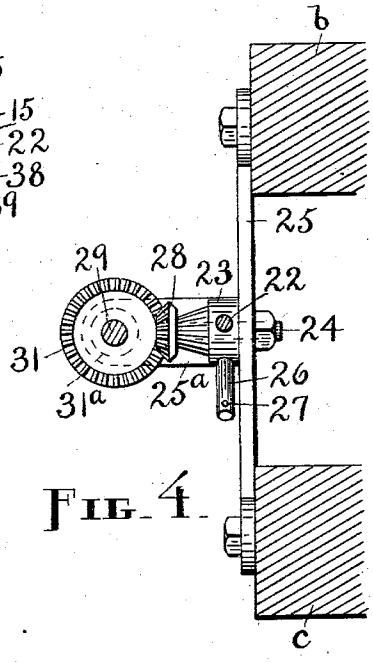


FIG. 4.

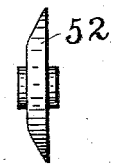


FIG. 5.

Witnesses

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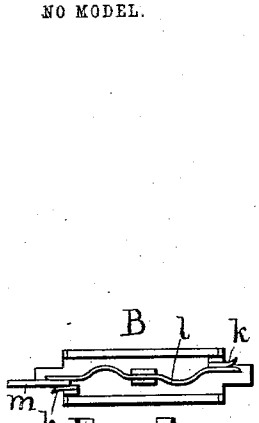


FIG. 7.

FIG. 6.

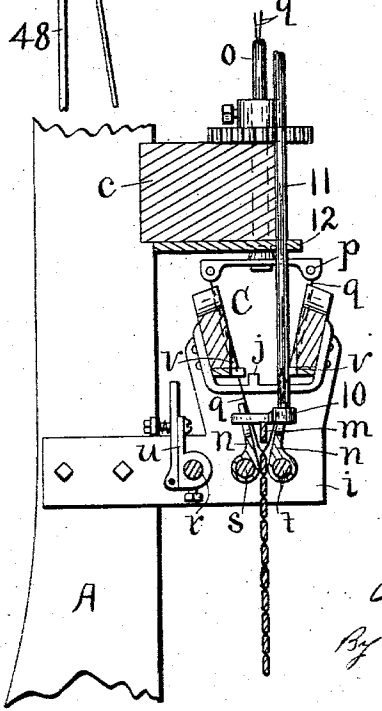


FIG. 8.

Witnesses

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No. 740,276. Patented September 29, 1903.

UNITED STATES PATENT OFFICE.

AZEL C. HOUGH, OF WORCESTER, MASSACHUSETTS.

WEFT-HANDLING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 740,276, dated September 29, 1903.

Application filed September 12, 1902. Serial No. 123,061. (No model.)

To all whom it may concern:

Be it known that I, AZEL C. HOUGH, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented new and useful Weft-Handling Mechanism for Looms, of which the following is a specification.

My invention relates to improvements in the shed and shuttle mechanism or what may be termed the "weft-handling" mechanism for looms for producing woven fabric for curtains, shades, screens, and the like, which is formed of splints or slats of wood or other analogous material, held together by warp threads or strands interwoven therewith.

The object of my improvement is to provide efficient and practical mechanism which is adapted to press the weft material into the shed; also to protect the member which acts upon the weft material from the shuttle during the time said member is in its low position, the mechanism being operated automatically; and to this end my invention consists in the various features of construction, combinations of elements, and arrangement of parts, as will be clearly understood from the description hereinafter, taken in connection with the accompanying drawings, and the novel features of which will be pointed out in the claims at the end of this description. I accomplish this object by the means illustrated in the accompanying drawings, in which—

Figure 1 is a front view of so much of a loom as is necessary in order to show the arrangement and operation of my invention in connection therewith; Fig. 2, an end elevation; Fig. 3, an enlarged detail on lines x x, Fig. 1, looking to the right; Fig. 4, an enlarged detail on lines y y, Fig. 1, looking to the left; Fig. 5, a view of the operating-cam looking in the direction of the arrow, Fig. 2; Fig. 6, an enlarged front view of a portion of the loom, showing my mechanism in its operative position; Fig. 7, an enlarged bottom view of the shuttle; and Fig. 8, an enlarged sectional view through the shed mechanism, showing the relative positions of the parts when the depressor-foot is down.

Similar letters and figures refer to similar parts throughout the several views.

My invention is useful in weaving any fabric the filling or weft of which is composed of substantially stiff material, as slats, cane, or straw, in contradistinction from fabric the filling of which is of textile material proper.

My invention comprises generally means for acting upon the weft material after it has left the shuttle and forcing it down into the shed and certain peculiar means for protecting the depressor member from the shuttle by introducing into the path of travel of the latter a stop member which bars the way of the shuttle during this pressing-down operation. I prefer to introduce the aforesaid stop into the shuttle-raceway; but it will be readily seen that it might be interposed in the path of a projection carried by the shuttle, naturally above the raceway in such case. The weft material is liable to become twisted, warped, or otherwise misshapen, so that it does not readily fall to the bottom of the shed or within reach of the guide and presser fingers which may enter into the construction of the shed mechanism. Then, again, if this material is quite light it is apt to float upon the air, and thus be prevented from properly passing into the shed. These and other difficulties are obviated by the mechanism about to be described.

That part of the improved mechanism which comes into contact with the splint or other weft unit necessarily enters the path of travel of the shuttle, which, if accidentally released, would bend or break off such part and do more or less damage, to prevent which stops are provided, as before stated, and which will presently be described in detail.

In order to render the application and operation of my invention fully intelligible, I have illustrated and will describe parts of a shed mechanism and of warp devices, as well as a shuttle and its operation, by means of which the weaving is carried on; but it will be understood that other means for beating up and weaving the fabric may be employed; also that any other suitable shuttle and means for operating the same may be used.

I will first describe those parts of the loom which are not claimed in this application, but in connection with which my invention may be used, and then the invention itself will be fully set forth.

The framework of the loom is composed of standards A A, cross-pieces *a*, *b*, *c*, *d*, and *e*, and various other supporting and stay pieces, as shown. The long pliable splints or strips which form the filling or weft of the fabric are supplied by a shuttle B, which is thrown alternately from one end to the other of a raceway C by levers or picker-fingers D D, pivoted at *f f* to the ends of the cross-piece *e*. The picker-fingers D are actuated toward the center of the loom by means of springs *g g*, and suitable mechanism is employed to actuate first one of said picker-fingers and then the other outwardly against the resiliency of its spring. A fresh splint is supplied to the shuttle at each end of the loom before it begins its movement along the raceway. The mechanism which actuates the picker-fingers D against their springs and which operates other parts of the loom may be connected with the main driving-shaft E, journaled in the framework and driven by a pulley and belt F or in any other desired way. A suitable latch *h*, attached to the under side of the raceway C, one at each end, holds the picker-finger D when thrust outwardly until actuated out of engagement therewith by some suitable means.

The raceway C is supported by brackets *i i*, fastened to the uprights A, and a lug *j* extends upward from each of said brackets into the open space between the bottom plates of the raceway, as best shown in Fig. 8. On the bottom of the shuttle B, at opposite sides of the longitudinal center thereof, are fixed abutments *k k* and a flat spring *l*. The spring *l* is secured in its center to the shuttle and its free ends normally bear against the abutments *k*. When a splint *m* is thrust by hand between one of the abutments and the adjacent end of the spring, it is held by the latter until released by contact with one of the lugs *j*. The lugs *j* are out of alinement with each other, so that each splint held by the shuttle will clear the lug which it first reaches, but will contact with the one beyond and be discharged into guide-fingers *n* below.

Twister-heads *o*, having at their lower ends cross-heads *p*, are journaled in the cross-pieces *b* and *c* and suitably operated. The threads or strands *q*, which form the warp of the fabric, pass through these twister-heads and cross-heads down to the point where in the rotation of the twister-heads they are woven around the splints *m*.

The members which act upon the splint after it has passed into the shed and which may be termed the "old shed" mechanism comprise shafts *r*, *s*, and *t*, journaled in the brackets *i*, the presser-fingers *u* on said shaft *r*, and the guide-fingers *n*, arranged in pairs on said shafts *s* and *t*. Suitable means are employed to cause the guide-fingers *n* on the shafts *s* and *t* to approach each other after the splints have been deposited between them and then to cause the presser-fingers *u* to turn down over said splint and beat it up; but before these operations take place it is necessary that the splint shall be fairly brought into the field of operation of the guide and presser fingers; and to this end my invention has been produced. Suitable mechanism for operating the twister-heads *o*, guide-fingers *n*, and presser-fingers *u* is shown and described in an application for Letters Patent of the United States filed by me October 16, 1901, Serial No. 78,791.

My auxiliary weft-handling mechanism is described as follows: A depressor-foot 10 is fixed to the base of a rod 11, which passes upward through guide-plates 12 and 13 on the bottom of the cross-pieces *c* and *b*, respectively, and said rod is bent forward at the top and then downward to again pass through said guide-plate 13. On the bottom of this short vertical part 11ª of the rod 11 is a washer 14, preferably of rubber or other yielding material, resting upon a collar 15, fast on said part. A spring 16, having one end attached to a pin 17, projecting from an extension *a'* from the cross-piece *a* and the other end to a clip 18 on the horizontal part of the rod 11, normally draws said rod upward until the washer 14 abuts against the under side of the plate 13, said washer serving as a buffer to lessen the shock when the rod after being depressed is released to the action of said spring. The depressor-foot is located above one pair of the guide-fingers *n*, which guide-fingers are preferably forked, as shown, and when said depressor-foot is depressed it enters between the prongs of the registering pair of guide-fingers. An oscillating arm 19 is connected with the horizontal part of the rod 11 by means of a strap 20 and has its base pivoted at 21 to the adjacent end of a rocker-arm 22. Rocker-arm 22 is rigidly attached to a collar 23, carried by a stud 24. Stud 24 projects from the face of a bracket 25, bolted to the cross-pieces *b* and *c*. An arm 26 extends from the collar 23 below the arm 22, and a stringer or brace 27 connects said arms in order to strengthen the construction. On the front end of the stud 24 and rigid with the collar 23 is a small bevel-gear 28. A rock-shaft 29 is journaled in forwardly-extending projections 30ª 30ª from brackets 30 30, suitably supported at opposite ends of the framework. A large bevel-gear 31, meshing with the gear 28, is loose on the rock-shaft 29 at one side of a projection 25ª of the bracket 25 and has a collar 31ª extending through said projection. A mutilated disk 32 is fast on the collar 31ª at the opposite side of the projection 25ª, the periphery of the disk 32 being notched at 32ª. Fast on the rock-shaft 29 to the left of the sleeve 31ª is a sleeve 33, provided with a crank-arm 34, to which is pivoted at 35 a dog 36. The free terminal of the dog 36 rests upon the mutilated or depressed surface of the disk 32, with its beak normally a little remote from the shoulder 32ᵇ, as best shown in Fig. 3, thus introducing a lost-motion device into the mechanism,

for the purposes hereinafter described. Two gears 37 are fast on opposite ends of the rock-shaft 29 and mesh with small gears 38 38 on studs 39, projecting from the bracket projections 30^a. At the left-hand end of the loom a large gear 40 on a stud 41, projecting from the adjacent bracket projection 30^a, meshes with the adjacent gear 37. An arm 42 is rigidly connected with the gear 40, extends to the rear, and has clips 43 and 44 pivoted to its free end. A spring 45 extends upward from the clip 43 to a pin 46, driven into an extension a'' from the cross-piece a. A spring 47 depends from the clip 44 and has an operating-rod 48 attached to its lower end. The springs 16 and 45 are comparatively light, while the spring 47 is heavy. The lower end of the operating-rod 48 is pivotally connected to the upper end of a bell-crank lever 49, pivoted at 50 to the end of the cross-piece d. The lower end of the bell-crank lever 49 is provided with a roller 51. A cam 52, of substantially the form shown in Figs. 1, 2, and 5 in the drawings, is fast on the main driving-shaft E, and the roller 51 lies in the path of said cam. As the cam revolves its right-hand edge strikes the roller 51 and actuates the bell-crank lever 49, which in turn operates the mechanism. Arms 53 53 are rigidly attached at their front ends to the small gears 38 and have lifters 54 54, pivoted at 55 55 to their rear ends. Each lifter 54 comprises a vertical side and horizontal pieces at the top and bottom, perforated to receive loosely a lifter-rod 56.

The parts described below are used at both ends of the loom and a description of those at one end is deemed sufficient for those at the other end.

The lifter-rod 56 is bent over at the top at 56^a, so that it cannot be detached from the lifter 54, and is pivotally connected at the bottom to an ear 57, rising from a shuttle safety-stop 58. The stop 58 is pivoted at 59 to suitable projections from the cross-piece c and has a cross-piece 60, forming lugs projecting on both sides, which are adapted to rest upon the top of the raceway C when said stop is lowered. The free end of the stop is sufficiently narrow to permit of its entrance between the sides of the raceway.

Assuming that the shuttle h has been provided with a splint m and driven from the right-hand end of the raceway C by means of the right-hand picker-finger D toward the left-hand end of said raceway and the splint has encountered the left-hand lug j and been detached from said shuttle, the operation of my invention, the parts of which stand as shown in Figs. 1 and 2, is as follows: The revolution of the shaft E is so timed that it now brings one of the pointed ends of the cam 52 into contact with the roller 51, rocks the bell-crank lever 49, and draws down the rod 48. The spring 47 takes up the shock that would otherwise occur to the parts now being brought into action and draws down the lever 42 against the resiliency of the lighter springs 45, thus causing the gears 40, 37, and 38 to make partial revolutions. The gears 38 being so much smaller than the other two carry the arms 53, with the lifters 54, downward and permit the stops 58 to drop by gravity into the path of the shuttle B before the dog 36 contacts with the disk-shoulder 32^b, said stops turning upon their pivots 59. The shuttle B having reached the left-hand end of the raceway, it is only the adjacent stop 58 which is required, as shown in Fig. 6; but when said shuttle is at the opposite end of the raceway the other stop comes into requisition. For the sake of simplicity in construction, however, the two stops are arranged to operate simultaneously. The stops 58 now rest with their cross-pieces 60 bearing on the upper edges of the raceway, rubber or other yielding buffers 61 61 being provided on said raceway beneath said cross-pieces, if desired, to lessen the shock of contact when the stops are dropped or lowered. The lifters 54 slide down the rods 56 some distance below the overturned ends 56^a. Hence considerable motion is permitted to the parts without affecting the stops 58. The continued downward movement of the lever 42 as it is actuated by the cam 52 and the intervening members causes the dog 36, through the medium of the gear 40 and meshing gear 37, rock-shaft 29, collar 33, and crank-arm 34, after it contacts with the shoulder 32^b to rotate the disk 32 and gear 31, which in turn imparts rapid motion to the small gear 28. The partial rotation of the gear 28 and the connected collar 23 causes the arm 22 to sweep downward and carry with it the rod 11 against the resiliency of the spring 16, since said arm is operatively connected with said rod in the manner hereinbefore described. The depressor-foot 10 is thus carried down and into the position shown in Figs. 6 and 8 and forces the splint m just deposited in the shed downward into the field of action of the guide and presser-fingers, since said foot is above said splint. The guide-plate 13 is cut out at 13^a to leave room for the oscillating rod 19 and the connected end of the rocker-arm 22 to operate freely. As soon as the cam 52 passes away from the bell-crank lever 49 the springs 16 and 45 act to restore the several members of the mechanism now under consideration to their respective positions; but the stops 58 are not removed from the path of the shuttle until after the depressor-foot 10 has been carried up out of said path, so that at no time is it possible for the shuttle if accidentally released to escape from the adjacent stop, and thus damage the depressor-foot and its connections. The reason that the stops 58 are not elevated until after the depressor-foot rises is because the lost motion between the dog 36 and the disk 32 is so timed as to permit the arms 53 with the lifters 54 to elevate the rods 56 only after the spring 16 has raised the rod 11. Then and

not until then the quick action of the small gears 38 causes said stops to be elevated, for, be it remembered, the dog 36 remains in contact with the disk-shoulder 32^b until the rod-stop represented by the washer 14 and collar 15 on the part 11^a strikes the under side of the plate 13. The spring 45 assists indirectly in raising the depressor-rod 11, and after the latter has been checked in its upward travel by the plate 13, as explained above, said spring completes the work of actuating the parts to raise the stops 58, the dog 36 drawing away from the disk-shoulder 32^b at this time. The amount of play permitted the lifters 54 on the rods 56 is sufficient to allow for the elevation of the rod 11 before said lifters engage the ends 56^a of said rods. The splint or other weft unit is now within the grasp of the guide-fingers *n*, and the presser-fingers *u* immediately act to beat up said splint, after which the twister-heads *o* operate to wrap the warp threads or strands *c* about the splint. Then these parts return to their former positions, and the shuttle takes another flight through the raceway with a fresh splint for a repetition of the cycle of the loom. The operation of the auxiliary mechanism is the same regardless of the direction taken by the shuttle. The cam 52 is of such length and so timed as to cause the new mechanism to do its work while other parts of the old weft-handling mechanism are at rest or at least not in active operation, wherefore conflict with such parts is avoided. By constructing the cam 52 alike at both ends provision is made for operating the dependent mechanism whichever way the shaft E is revolved, and the arrangement of said mechanism is such that the direction of said cam does not change or vary the mode of operation of the mechanism. This feature is valuable in case it is desired to back up the loom for any purpose.

More than one depressor-foot and coacting mechanism may be employed in the same loom, if desired; but under ordinary circumstances one is sufficient, because the weaver who tends the loom is able to take care of the end of the splint at his end of the loom—generally the right-hand end.

The sides of the raceway C and the bottom plates thereof may be cut away, as shown at *v v*, Fig. 8, if necessary, to permit of the passage of the depressor-foot 10.

Mechanism constructed as herein shown and described has been found by actual experience to be practical and successful to a marked degree; but I am aware that various changes and modifications in the number, construction, arrangement, and combination of the component parts may be made, and I desire to include within the scope of my claims all such changes and modifications which do not violate the spirit of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a loom, an open-bottom raceway for a shuttle, and a depressor member adapted to intersect the path of travel of the shuttle.

2. In a loom, an open-bottom raceway for a shuttle, and a depressor member adapted to intersect the path of travel of the shuttle and be projected into the field of the shed.

3. In a loom, a raceway open at the bottom, and a depressor member arranged above the same and adapted to force the weft material as soon as it leaves the shuttle, farther into the field of the shed.

4. In a loom, a raceway open at the bottom, and a reciprocating depressor member arranged above said raceway and adapted to pass through the same and force the weft material toward the closed part of the shed.

5. In a loom, a stationary raceway, a shuttle adapted to run therein, a depressor member, and means operated by the main shaft of the loom to reciprocate said member across the path of travel of the shuttle and through the raceway.

6. The combination, with the guide-fingers of a loom, of a depressor member adapted to intersect the path of travel of the shuttle and force the weft material into the field of action of said guide-fingers after said material leaves the shuttle.

7. The combination, in a loom, with weft-depressor members spring-actuated in one direction and parts comprising a rock-shaft and fast and loose members thereon adapted to actuate said members in the other direction, of means operated by the main shaft of the loom for operating said rock-shaft.

8. The combination, in a loom, with a depressor rod and foot suitably guided from the framework, of a stop on said rod and a spring to normally retain the rod in its elevated position, pivotally-connected parts arranged to depress the depressor-rod against the spring, a rock-shaft, gearing between one of said parts and said rock-shaft, and suitable means for operating the latter.

9. The combination, in a loom, with a suitably-guided depressor rod and foot, of a rock-shaft, gearing operated by the latter, a lost-motion device between said gearing and rock-shaft, pivotal connections between said rod and gearing, and means for rotating said rock-shaft.

10. The combination, in a loom, with a suitably-guided depressor-rod spring-pressed in one direction, of a rock-shaft and fast and loose members thereon, and means to rotate said shaft and members and depress said rod against the resiliency of its spring to carry its foot into the field of the shed and to release the rod to the action of its spring.

11. The combination, in a loom, with a suitably-guided depressor rod and foot spring-pressed in one direction, of a rock-shaft and fast and loose members thereon, means to rotate said rock-shaft and members and depress said rod to carry its foot into the field of action, and means to release the rod to the action of its spring.

12. The combination, in a loom, of a depressor-rod 11 provided with a part 11^a and a foot, guides for said rod attached to the framework, a spring to elevate the rod, a stop on said part 11^a to limit the upward travel of the rod, an oscillating rod 19 connected with the rod 11, a collar 23 having an arm 22 pivotally connected to said rod 19, and means for rotating said collar, substantially as described.

13. In a loom, a safety-stop adapted to be lowered into the path of travel of the shuttle, and means operated by the main shaft, and arranged for a limited amount of vertical movement independent of said stop to operate the same.

14. The combination, in a loom, with a shuttle safety-stop, of means operated by the main driving-shaft for permitting said stop to be thrust into the path of travel of the shuttle, and resilient means for removing it from said path.

15. The combination, in a loom, of a depressor member for the weft material, a safety-stop for the shuttle, and means operated by the main driving-shaft for thrusting said member into the field of the shed and said stop into the path of travel of the shuttle.

16. The combination, in a loom, of a depressor member adapted to be thrust into the field of the shed, a safety-stop for the shuttle, and means for operating said stop before and after said member is operated.

17. The combination, in a loom, of a depressor member adapted to be thrust into the field of the shed, a safety-stop for the shuttle, and means operated by the main driving-shaft for operating said member and stop, such means adapted to cause the member and stop to act independently of each other.

18. The combination, in a loom, of a depressor member adapted to be thrust into the field of the shed, a safety-stop for the shuttle, and means for actuating said member and stop so that one operates within the limit of time fixed for the operation of the other.

19. The combination, in a loom, with a safety-stop arranged to be thrust into the path of travel of the shuttle, of a lifter-rod for said stop, a lifter for said rod, an arm pivoted to said lifter, and means for oscillating said arm.

20. The combination, in a loom, with a safety-stop arranged to be thrust into the path of travel of the shuttle, of a lifter-rod for said stop, a lifter playing freely on said rod except at the upper end of its travel when the rod and stop are lifted thereby, an arm pivoted to said lifter, and means for oscillating said arm.

21. The combination, in a loom, with a shuttle safety-stop 58 pivoted to the framework and having lugs adapted to rest upon the raceway when said stop is lowered, an operating-arm 53, a lifter 54 pivotally connected to said arm, a lifter-rod 56 attached to the stop and passing freely through said lifter, said rod being turned over the top of the lifter and adapted to be raised thereby, and means to oscillate said arm, substantially as described.

22. In weft-handling mechanism for looms, the combination with a depressor-rod and a shuttle safety-stop, of means for operating these members, and a lost-motion device introduced into the mechanism to enable said stop to act before and after the action of said rod takes place.

23. The combination, in weft-handling mechanism for looms, of a rock-shaft, means for operating the same, a depressor-rod spring-pressed in one direction, intermediate means between said rock-shaft and rod to actuate the latter against its spring, a shuttle safety-stop, intermediate means between the rock-shaft and said stop to actuate the latter, and a lost-motion device in the mechanism for the purpose of allowing the stop to act before and after the action of the depressor-rod takes place.

24. In weft-handling mechanism for looms, the combination of a rock-shaft, means for operating the same, a mutilated disk loosely mounted on said rock-shaft, a crank-sleeve tight on the shaft and provided with a dog arranged to engage the mutilated part of said disk, a shuttle safety-stop operated by said shaft, and a depressor-rod for the weft material operated or permitted to be operated when said dog operatively engages the disk.

25. The combination, in weft-handling mechanism for looms, of a rock-shaft, a gear fast thereon, a larger and a smaller gear suitably mounted and meshing with the rock-shaft gear, a spring-pressed arm rigid with the largest gear, means for actuating said arm against its spring, an arm rigid with the smallest gear and provided with a lifter, a lifter-rod on which said lifter runs freely except when at the upper end of its travel, a shuttle safety-stop pivotally connected with said lifter-rod, a crank-provided sleeve fast on said rock-shaft carrying a dog, a mutilated disk loose on the rock-shaft and adapted to be engaged by said dog, a gear rigid with the disk, a second gear rigid with a collar provided with an arm, said second gear meshing with the disk-gear, and a depressor-rod spring-pressed in one direction and operatively connected with said collar-arm, substantially as set forth.

26. The combination, in weft-handling mechanism for looms, of a rock-shaft, a gear fast thereon, a larger and a smaller gear suitably mounted and meshing with the first, a spring-pressed arm rigid with the largest gear, a cam on the main driving-shaft and intermediate members for actuating said arm against its spring, an arm rigid with the smallest gear and provided with a lifter, a lifter-rod on which said lifter runs freely except when at the upper end of its travel, a shuttle safety-stop pivotally connected with said lifter-rod, a crank-provided sleeve fast on said rock-shaft carrying a dog, a mutilated

disk loose on the rock-shaft and adapted to be engaged by said dog, a gear rigid with the disk, a second gear rigid with a collar provided with an arm, said second gear meshing with the disk-gear, and a depressor-rod spring-pressed in one direction and operatively connected with said collar-arm, substantially as set forth.

27. The combination, in weft-handling mechanism for looms, of a rock-shaft, a gear fast thereon, a larger and a smaller gear suitably mounted and meshing with the first, a spring-pressed arm rigid with the largest gear, a bell-crank lever and a cam for actuating said arm against its spring, a spring introduced between this arm and the bell-crank lever, an arm rigid with the smallest gear and provided with a lifter, a lifter-rod on which said lifter runs freely except when at the upper end of its travel, a shuttle safety-stop pivotally connected with said lifter-rod, a crank-provided sleeve fast on said rock-shaft carrying a dog, a mutilated disk loose on the rock-shaft and adapted to be engaged by said dog, a gear rigid with the disk, a second gear rigid with a collar provided with an arm, said second gear meshing with the disk-gear, and a depressor-rod spring-pressed in one direction and operatively connected with said collar-arm, substantially as set forth.

28. The combination, in a loom, with shuttle safety-stops, of a rock-shaft, gears thereon, other gears suitably mounted and meshing with the rock-shaft gears, arms rigid with the second gears, lifters pivoted to said arms, and lifter-rods operatively connected with said lifters and pivotally attached to said stops, for the purpose set forth.

29. The combination, in a loom, with a weft-depressor member adapted to be introduced into the shed, of a rock-shaft, gears thereon, other gears suitably mounted and meshing with the rock-shaft gears, arms rigid with the second gears, lifters pivoted to said arms, lifter-rods operatively connected with said lifters, and shuttle safety-stops pivotally attached to said lifter-rods, for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AZEL C. HOUGH.

Witnesses:
FRED A. WALKER,
PAUL C. CHAMBERLAIN.