

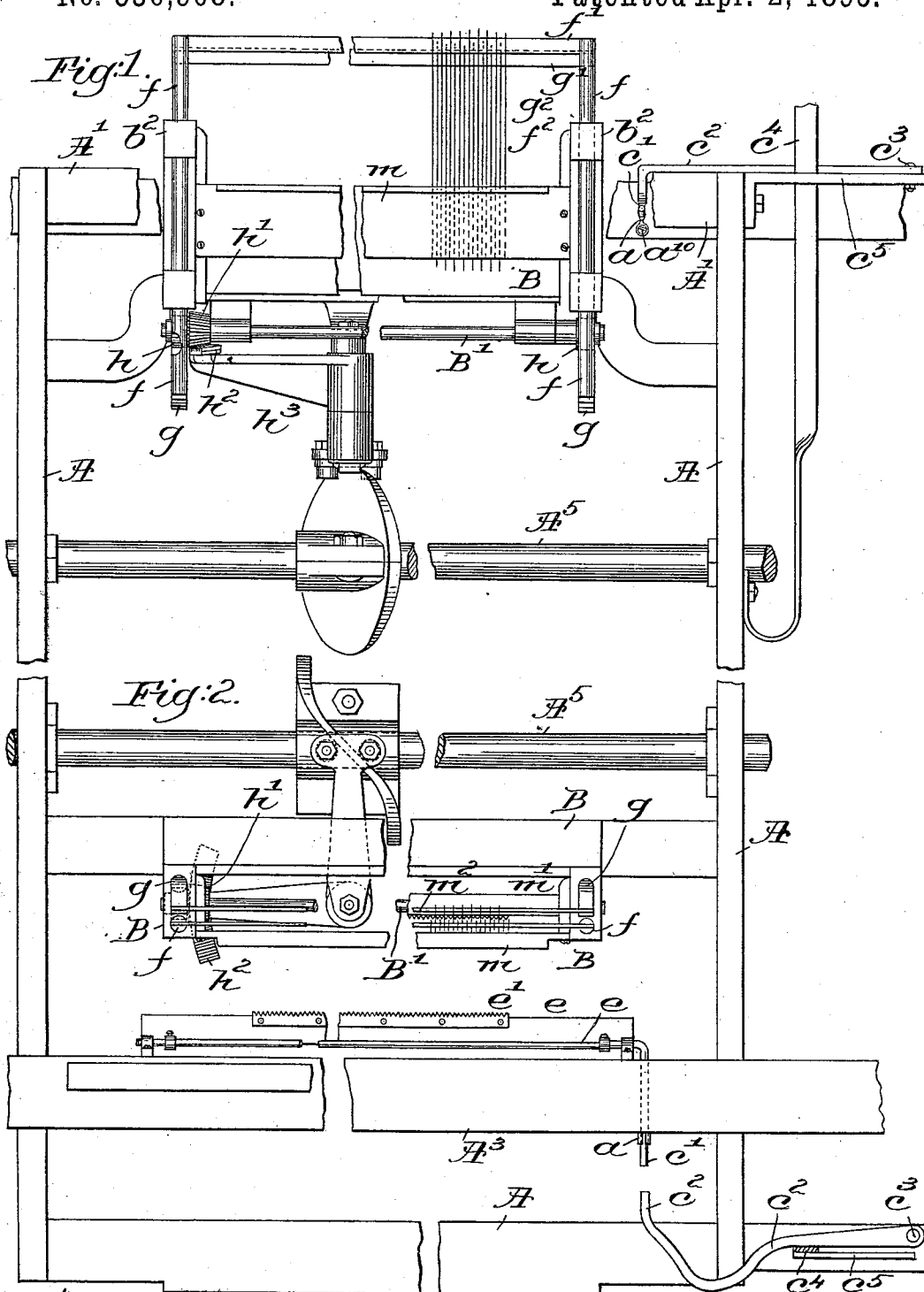
(No Model.)

2 Sheets—Sheet 1.

C. F. ROPER.
WARP STOP MOTION FOR LOOMS.

No. 536,968.

Patented Apr. 2, 1895.



Witnesses.

Louis N. Gould.

Thomas J. Drummond.

Inventor:

Charles F. Roper.
by Crosby & Rogers

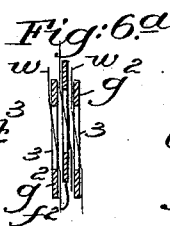
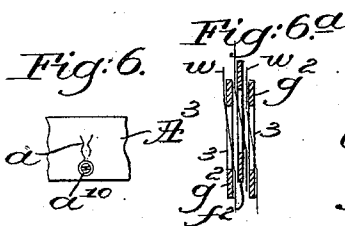
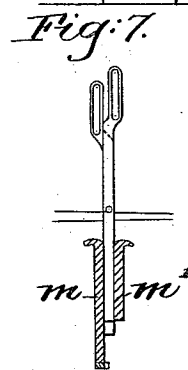
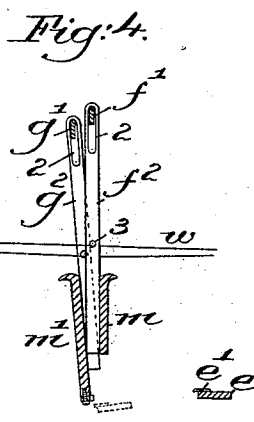
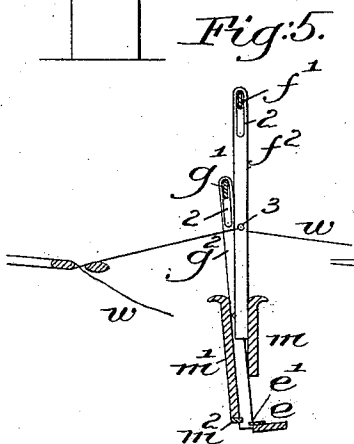
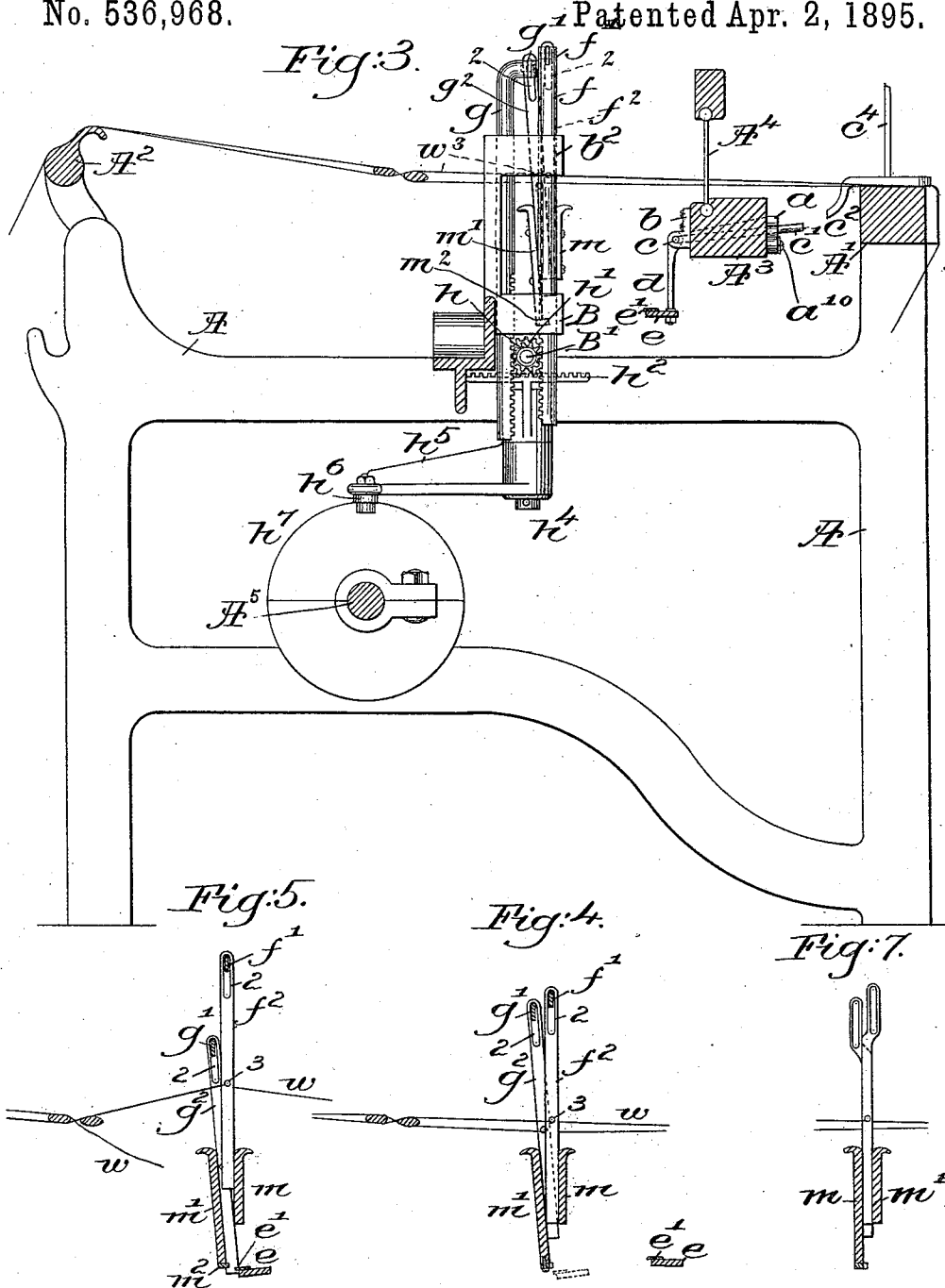
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Louis V. Gowell.

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Inventor:
Charles F. Roper.
by Crosby & Feggen
attys.

UNITED STATES PATENT OFFICE.

CHARLES F. ROPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE
NORTHROP LOOM COMPANY, OF SAME PLACE AND SACO, MAINE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 536,968, dated April 2, 1895.

Application filed December 7, 1893. Serial No. 492,967. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. ROPER, of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Warp Stop-Motions for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve and simplify the harness or warp controlling mechanism of looms.

In accordance with my invention I provide a series of thin metallic heddles, and string them at one end on actuating bars so that the said heddles may be raised and lowered in opposition, to open or form a shed, the ends of said heddles which are not strung on the actuating bars lying preferably side by side and being controlled as to their position by a guide, with relation to which they slide up and down, said guide having, as shown, an open-bottom. The actuating bars,—they constituting what may be called a harness frame—are, in this instance of my invention, shown as attached to slide rods provided with racks or teeth engaged by pinions on a rock-shaft, so that said bars, as the rock-shaft is moved, are made to move the heddles and form in the warp threads carried by them a suitable shed for the reception of the weft, but this invention is not limited in all instances, to the means shown for moving the actuating bars. The upper edge of the guide in which the heddles rise and fall are, in this instance of my invention, made also to constitute a support for the under sides of the warp threads carried into the lower plane or half of the shed, but the parts which support the said threads might be independent of the guide and yet not depart from my invention. The slots in the heddles where they surround the actuating bars are longer than said bars are wide, thus enabling whichever bar is descending to act upon the heddles at the lower ends of the slots when pushing said heddles down to put the warps carried by them into the lower plane of the shed, the descent of the actuating bar being only far enough to let the warp threads in the lower plane of the shed meet certain warp rests or supports to be

described, and should a warp in the lower plane of the shed break, so that it did not support the heddle used to put it into that position, said heddle by reason of the slot in its end can drop relatively to its actuating bar, thereby putting the end of the dropped heddle into proper position to cooperate with a stop motion mechanism to be described. The warp threads lying on the warp supports and in position in the lower plane or half of the shed support the weight of the heddles used to put the warps in that position.

In another application, Serial No. 484,723, filed September 4, 1893, I have shown thin metallic heddles slotted both at their upper and at their lower ends, said heddles being each strung on two bars forming part of a harness frame, two such frames being shown, each adapted to be reciprocated by cams and levers.

In this present invention the lower ends of the heddles are controlled by guides entirely independent of the actuating bars, and, as shown, both sets of heddles are controlled by the same guide.

As my invention is herein embodied, the stop motion mechanism has one bar which co-operates with any dropped heddle, said bar when it strikes a heddle serving to turn a rock-shaft mounted, as herein represented, on the lay, so that said rock-shaft places a dagger connected to it and extended from the front of the lay, in position to engage a suitable knock-off lever and thus release the shipper handle.

Figure 1 shows in front elevation, but partially broken out, a sufficient portion of a loom with my improvements added to enable my invention to be understood. Fig. 2 is a top or plan view of the parts shown in Fig. 1. Fig. 3 is a partial side elevation and section of the loom represented in Fig. 1. Fig. 4 is a sectional detail showing the heddles, the guide for their lower ends, and actuator bars. Fig. 5 shows the parts represented in Fig. 4, but in a different position, a thread being broken. Fig. 6 is a detail of the friction device co-operating with the dagger; Fig. 6^a, an enlarged detail of three heddles and their warp threads as the eyes 3 come in line; and Fig. 7 shows a modification.

The loom frame A, the breast beam A', the whip roll A², the lay A³, the reed A⁴, and the cam or cross shaft A⁵ are and may be all as common, and the lay may have movement 5 imparted to it in any usual manner.

At the front of the lay I have attached a friction device or detent *a*, see Figs. 3 and 6, represented as a two-armed spring held in place by a screw *a*¹⁰. The lay has suitable 10 bearings *b* for the reception of a rock shaft *c* having a dagger *c*', which, when its point is elevated from the position shown in Fig. 3 strikes the knock-off bar *c*² pivoted at *c*³ on the breast beam, see Figs. 1 and 2, said 15 knock-off bar resting against the belt shipper handle *c*⁴ held in a notch in the usual slot in the plate *c*⁵ and pushes said shipper handle out of said notch thus effecting the stopping of the loom through suitable devices, 20 not shown but which in practice may be all as in looms now commonly in use.

The rock shaft *c* has depending arms *d* which support a bar *e*, along one edge of which will preferably be secured a notched 25 plate *e*'.

The loom frame has a suitable cross stand or support B which contains suitable bearings for a rock shaft B', and suitable guides or boxes *b*² for two sets of slide rods *f*, *g*, the 30 slide rods being shown as toothed for part of their length, see Fig. 3, the teeth of said slide rods being engaged by pinions *h* fast on shaft B', said shaft as herein shown having also attached to it a gear *h*' engaged by a rack *h*², 35 which, as shown, is carried by an arm *h*³, the hub of which is mounted on a stud *h*⁴ connected with frame B, said arm *h*³ having connected to or forming part of it an arm *h*⁵ provided with, as shown, two roller studs *h*⁶ 40 which are acted upon by a spiral cam *h*⁷ fast on shaft A⁵. The pair of rods *f* are connected at their upper ends by an actuating rod *f*', while the rods *g* are connected by an actuating rod *g*'. These rods have strung on them 45 the thin metallic heddles *f*², *g*², the lower ends of which enter a guide shown as composed of two plates or bars *m*, *m*', the rear-most bar *m*' having below it and below the lower edge of the bar *m*, a bar *m*² notched, as 50 shown in Fig. 2, said bar being a substantial counterpart of the bar *e*'. The upper ends of the bars *m*, *m*' are preferably rounded to support the lower sides of the warp threads which are depressed into the lower half of the 55 shed.

The thin metallic heddles have at their upper ends slots 2 through which pass the actuating bars *f*', *g*', referred to, the slots being longer than the bars are wide. Each heddle 60 has preferably a substantially round eye 3, said eyes being substantially equidistant from the slot 2 therein, and the warp threads *w* are threaded through the eyes 3 of the heddles *f*², *g*², as shown, the threads being passed 65 through said eyes from one to the other side of the heddles, see Fig. 6², the lower ends of said heddles being shown as put into said

guide side by side so that they may touch each other. As the shaft B' is rocked by the mechanism described or by any well known 70 device or equivalent mechanism, the slide rods are reciprocated, one rising as the other falls.

Figs. 1, 3 and 4 show the heddles in a position to nearly even the warp threads in the shed. Now let it be assumed that the rock 75 shaft B' is moved in a direction to lift the slide rods *f* and heddles *f*² to put part of the warp threads into the upper plane of the shed. During this movement of bar *f*' it will engage the upper ends of slots 2 in heddles *f*² and 80 lift them positively. As the bar *f*' rises, the bar *g*' descends, and the lower edge of said bar *g*' acting on the heddles *g*² at the lower ends of the slots 2 therein will cause said heddles to act on the warp threads controlled 85 by them and put them into the lower plane or half of the shed, the descent of the bar *g*' being, however, arrested about as the said warp threads which are being depressed meet the warp supports *m*, *m*'. If, however, a warp 90 thread put into the lower plane or half of the shed should break so as not to hold up the heddle used to put it into the lower plane or half of the shed, said heddle,—it not being 95 supported vertically by either the warp thread or by the actuating bar—, will drop, as indicated at the left in Fig. 5, until the upper end of the slot 2 of the heddle eye meets the top of the actuating bar on which it is strung, such descent of the heddle due to the break- 100 ing of the warp thread, causing the lower end of the dropped heddle as shown in said figure, to enter one of the notches of the guide bar *m*², the dropping of the heddle putting its lower end in the path of movement of the bar 105 *e*, so that as the lay retires from the breast beam, said bar or its notched edge *e*' will strike said dropped heddle, and immediately thereafter the rock-shaft *c* will be turned to put the dagger *c*' in line with the knock-off 110 lever *c*² to act as before described to stop the loom at the next movement of the lay toward the fell of the cloth, the dagger being kept in the position in which it is put by the rock-shaft by or through the detent *a*, before de- 115 scribed.

The only function of the notches in the plates *e*', *m*² is to prevent twisting the thin flexible heddles.

In Fig. 7 I have shown a modification in 120 which the heddles are offset at their upper ends instead of being made straight, such construction enabling a greater portion of the heddle to be brought into the same line.

This invention is not limited to making the 125 guide for the lower ends of the heddles exactly as shown, but one and the same guide device will preferably serve for both sets of heddles.

By using the toothed bars I am enabled to 130 do away with the shaft and pulleys above the heddles, as shown in my said application, but my invention would not be departed from by moving the actuating bars up and down by

any devices commonly used to raise and lower harness or heddle frames in looms.

My apparatus so far described and shown is very simple and durable, and may be run efficiently at high speed with but very little noise or wear.

The bar *e* constitutes a feeler and the actuating bars may be considered as heddle frames.

I have herein shown the heddle bars *f'*, *g'* as deriving their vertical motions to open the shed by or through slide rods, but this invention is not limited to the employment of such slide rods, as instead I may employ any other usual or suitable mechanism for imparting vertical motion to said bars; and while excellent results are attained in imparting motion to the heddles by letting one overlap the other, yet this invention is not in all instances limited to such particular location of the heddles one with relation to the other.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a loom, a heddle frame having a rod or bar, and a series of metallic heddles adapted to slide vertically thereon independently of the vertical movement of the latter, combined with a guide for the lower ends of said heddles, said guide being independent of said bar, a feeler to meet the edge of a dropped heddle and devices to move the feeler—substantially as described.

2. In a loom, a heddle frame having a rod or bar, a series of sheet metal heddles adapted to slide vertically thereon independently of the vertical movement of the latter, and a guide for the lower ends of said heddles, said guide being independent of said bar and having co-operating with it a notched bar to receive the ends of the dropped heddles, combined with a feeler movable in the direction of the length of the warp, said feeler also having its acting edge notched to embrace the edge of the heddle, substantially as described.

3. In a loom, a heddle frame, and a rod or bar, a series of metallic heddles attached to said bar, said heddles being unconnected with said frame at their lower ends, combined with a stationary guide for the lower ends of said heddles, a feeler to engage a dropped heddle held by said guide, and devices to move said feeler to and fro in the direction of the length of the warp, to operate, substantially as described.

4. In a loom, two heddle frames having each a heddle bar, two series of metallic heddles having holes for the warp threads and hung on said bars, and a guide independent of the heddle frames and surrounding and guiding said heddles at or near their lower ends, said guide being extended upwardly to serve as a rest for the warp threads brought into the

lower plane of the shed, substantially as described.

5. In a loom, a heddle, a bar on which it is free to slide vertically to a limited extent, a lay, a feeler carried thereby and adapted to engage a dropped heddle, and devices actuated by said feeler to effect the stopping of the loom when a heddle drops due to a broken warp, substantially as described.

6. In a loom, a pair of reciprocating heddle frames, and a series of heddles on each frame, combined with a stationary guide into which are entered the lower ends of said heddles, the lower ends of the heddles of one series being separated by the lower ends of the heddles of the other series, substantially as described.

7. In a loom, a plurality of pairs of reciprocating slide rods, each pair being connected by actuating bars, means to reciprocate said rods, a set of metallic heddles having warp thread receiving eyes, and slotted at their upper ends and strung on each of said bars, combined with a stationary guide independent of the said actuating bars to receive and guide the lower ends of the heddles of the different sets, and a feeler to co-operate with the dropped heddles to effect the stopping of the loom, to operate, substantially as described.

8. In a loom, a plurality of pairs of reciprocating slide rods, each pair being connected by actuating bars, means to reciprocate said rods, a set of metallic heddles for each of said bars, said heddles having warp thread receiving eyes and slotted at their upper ends and strung on said bars, and a guide independent of said actuating bars to receive and guide the lower ends of the heddles of the different sets, combined with a feeler to co-operate with any heddle of either of said sets of heddles which may drop by reason of the breaking of the warp threads, substantially as described.

9. In a loom, a plurality of pairs of reciprocating slide rods, each pair being connected by actuating bars, means to reciprocate said rods, a plurality of sets of metallic heddles, each heddle having warp thread receiving eyes and slotted at their upper ends and strung on said bars, combined with a stationary guide to receive and guide the lower ends of both said sets of heddles, and with a feeler bar, a lay, a rock-shaft carried by the lay, a dagger on said rock-shaft, and a knock-off lever and shipper handle, substantially as described.

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

CHARLES F. ROPER.

Witnesses:

GEO. OTIS DRAPER,
R. A. COOKE.