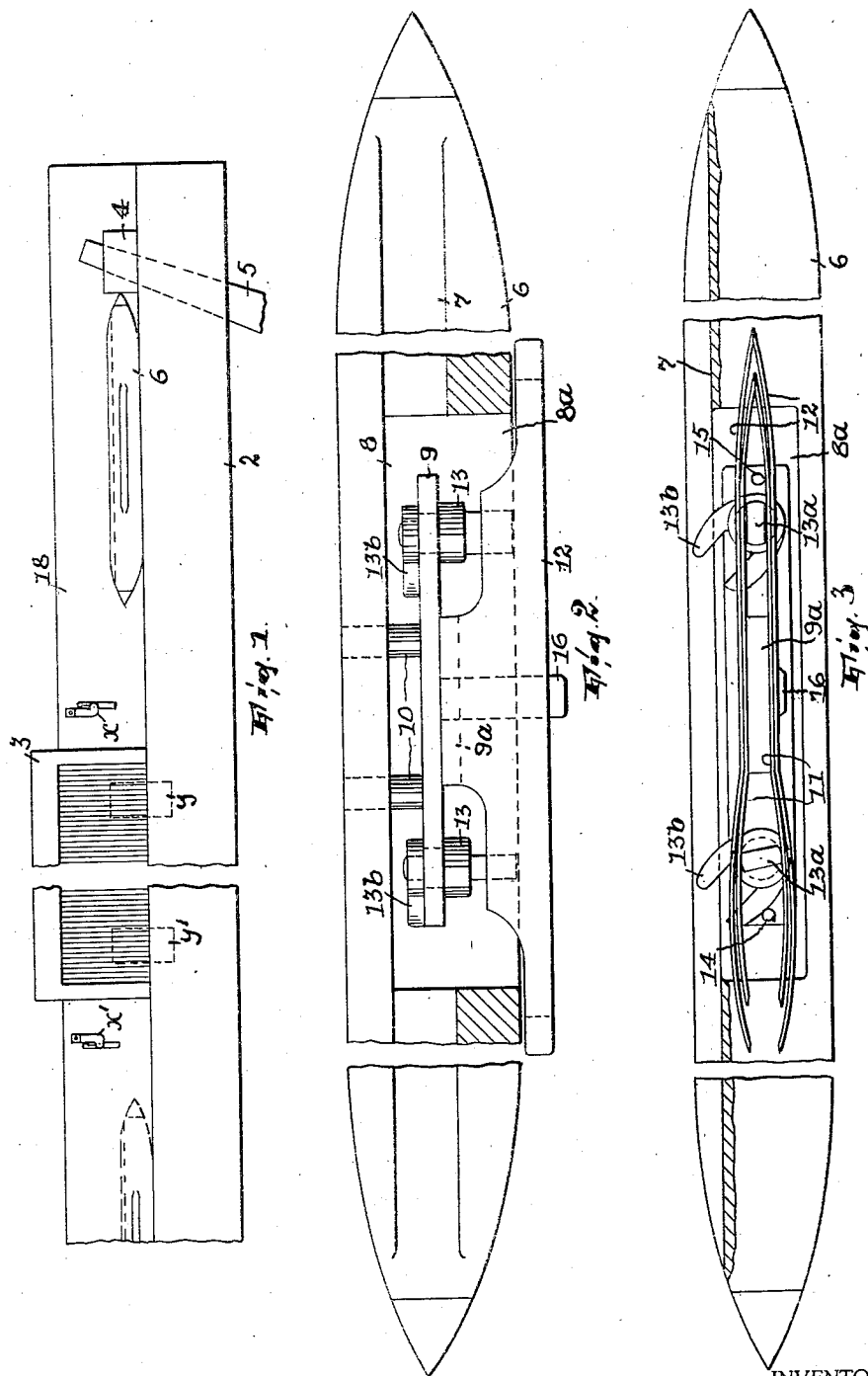


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ATTORNEY.

Dec. 24, 1946.

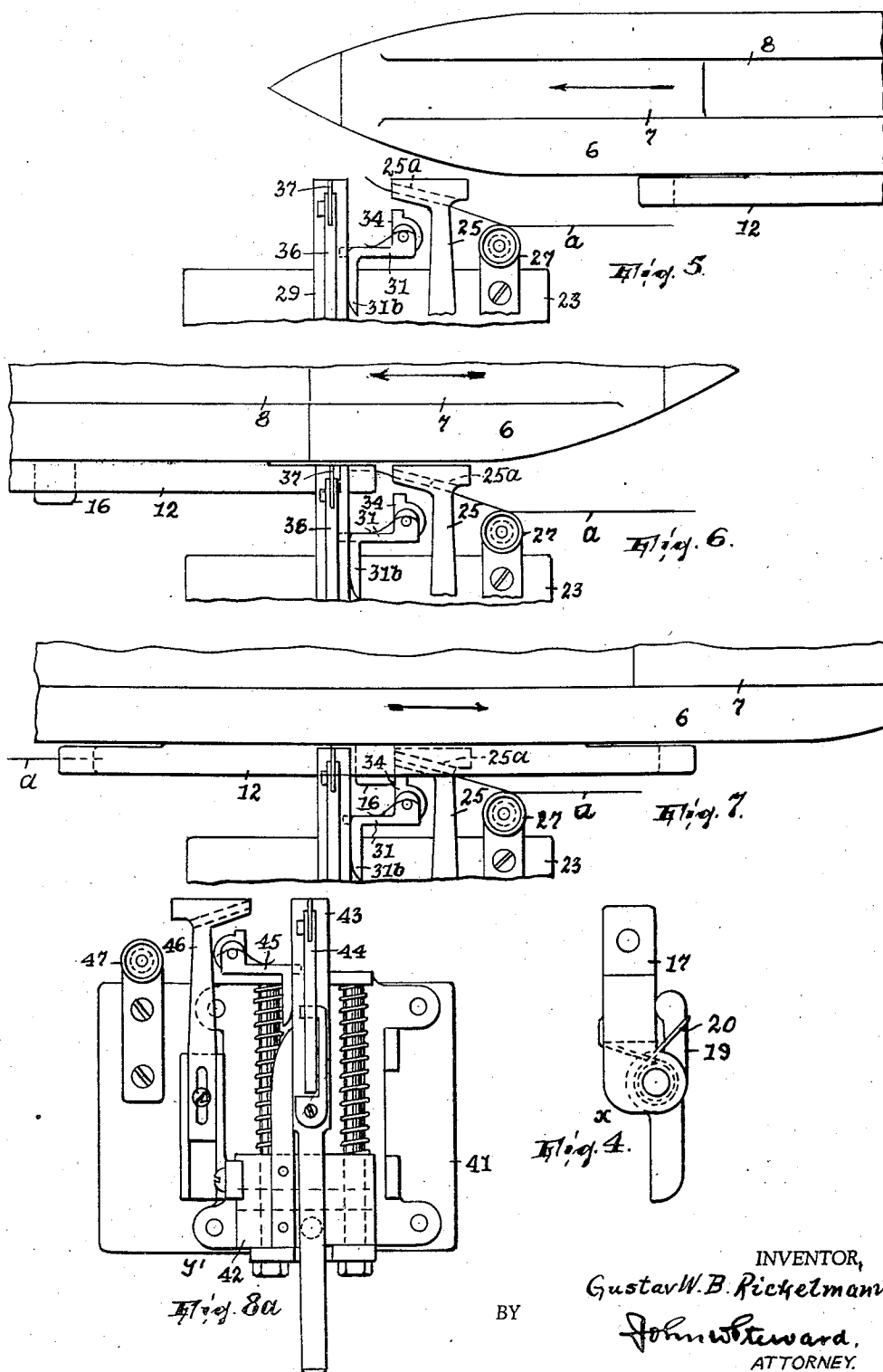
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LOOM

Filed Oct. 18, 1944

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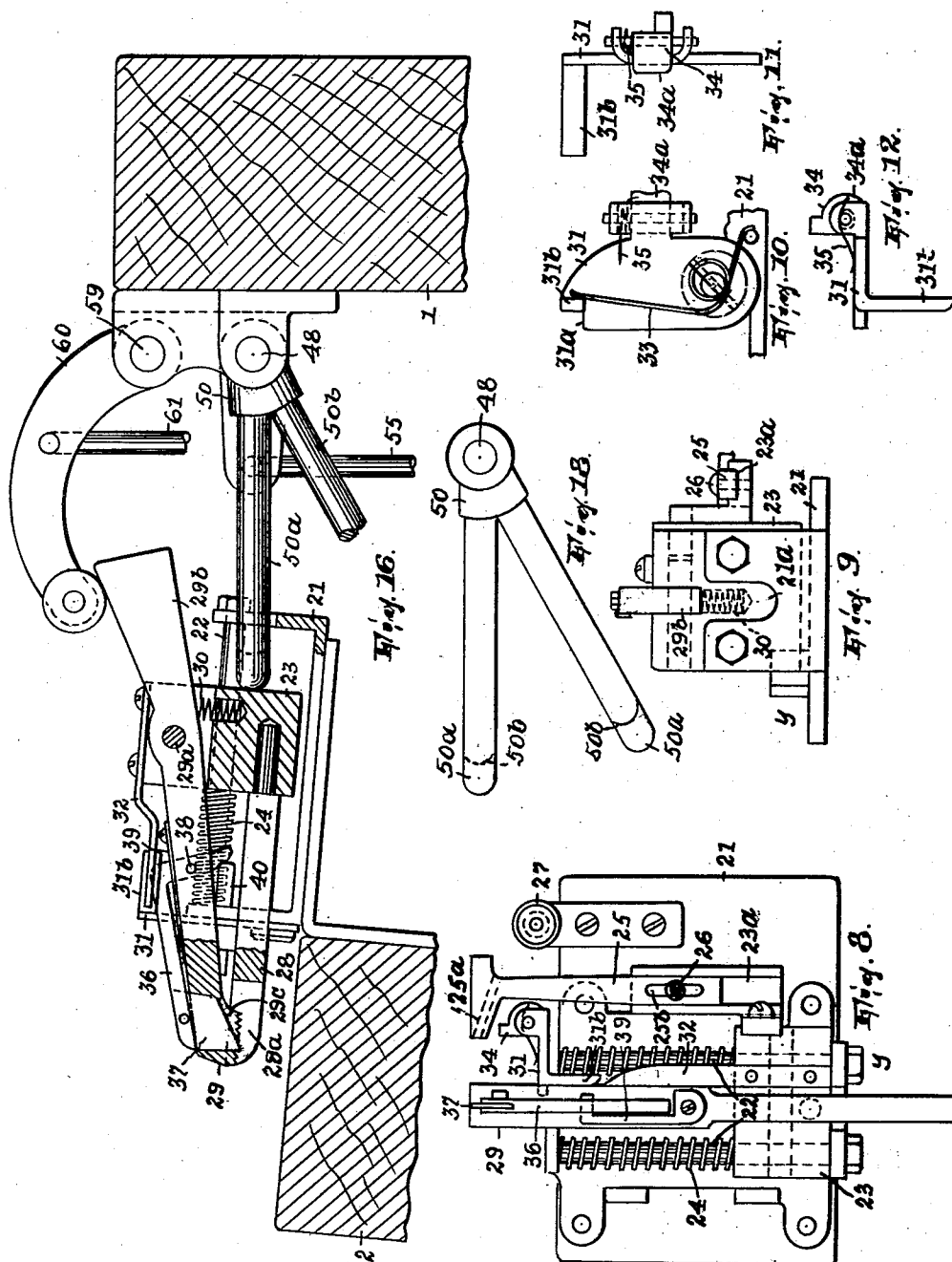
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LOOM

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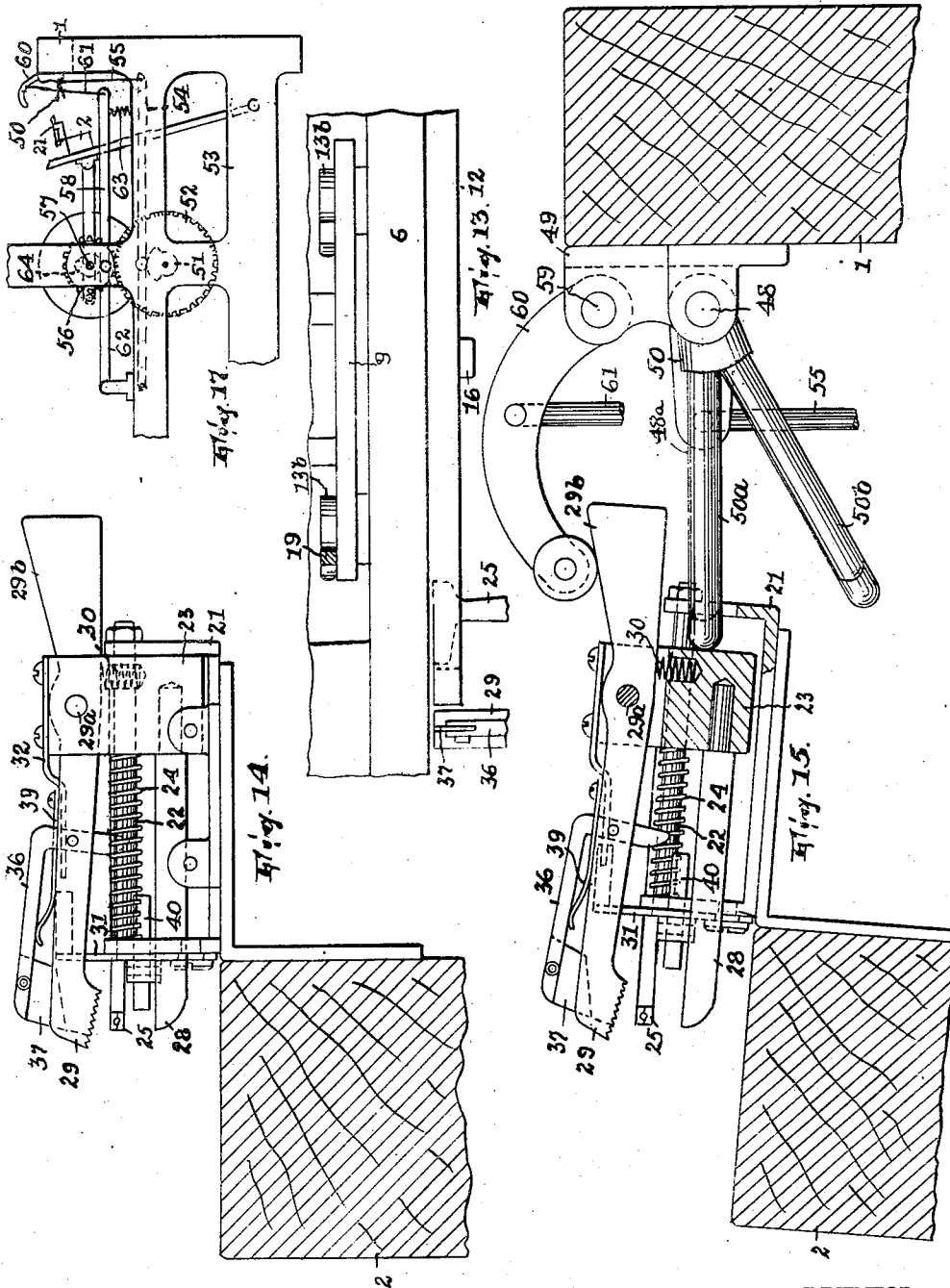
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LOOM

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2,413,155

LOOM

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Application October 18, 1944, Serial No. 559,140

16 Claims. (Cl. 139—126)

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This invention relates to looms and is particularly concerned with manipulation of the filling or weft. According to the invention a shuttle is used but, there being separate filling supplies, whereby two fillings are entered to the warp shed from its respective sides, the shuttle on its flight in either direction, as by clamping the filling, draws it through the shed, whereupon the filling is severed at the side of the shed at which it entered, whereby each shot of filling exists in the fabric with ends at both sides thereof. The clamping means of the shuttle may be provided by at least one pair of blades generally spaced from each other but which, during the shuttle's flight in either direction, are made to have their leading ends open and their trailing ends closed or in clamping relation to the filling. For guiding the filling and holding it is in position to be clamped by the blades; for clamping it at both sides of and after it has been drawn through the shed and during beating up thereof by the reed; and for severing the filling at the entering side, thus to leave it with ends at both sides of the fabric, there are two units that are reverse counterparts of each other.

In the drawings,

Fig. 1 is a general fragmentary front elevation of the batten, reed, shuttle, picking means, devices x and x' , and units y and y' ;

Figs 2 and 3 are respectively a plan and front elevation, partly in section, of the shuttle;

Fig. 4 is a front elevation of the detent device x ;

Fig. 5 is a fragmentary plan of the shuttle, unit y and the adjoining thread or filling, the shuttle travelling to the left;

Fig. 6 is a similar view showing the shuttle travelling also to the left;

Fig. 7 is a view like Fig. 6, with the shuttle further advanced to the right;

Figs. 8 and 8a are plan views of the unit y and y' , respectively;

Fig. 9 is a front elevation of the unit y ;

Figs. 10, 11 and 12 are a front elevation and side and plan views, respectively, of the detent 31;

Fig. 13 is a plan view of fragments of the shuttle and unit y , with the shuttle travelling to the right and the pawl 19 of device x , having already shifted to the right-hand shuttle opener, about to shift the left-hand opener to the left;

Fig. 14 shows the unit y in side elevation with its parts in the state they assume when the batten, shown in section, is back;

Fig. 15 shows the batten and breast-beam in section, said unit in side elevation and partly in

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section, and certain means on the batten, shown in side elevation, which controls said unit, the batten being advanced somewhat toward the breast-beam, or forward;

Fig. 16 is a view like Fig. 15, but shows the batten fully forward and the positions of the parts of said unit changed accordingly;

Fig. 17 is a general side elevation of the loom, showing the means for controlling said units;

Fig. 18 is an end elevation of parts 48 and 50.

Let 1 be the breast-beam and 2 the batten of the conventional broad loom, 3 being the reed and 4 and 5 the picker and picker-stick, respectively, at the right side of the reed.

The shuttle 6, appearing only generally in Fig. 1, as shown in Figs. 2 and 3, has a top longitudinal groove 7 and a cavity 8 in the zone of the groove and also open at 8a to what I term the front face of the shuttle, or the side thereof which faces the breast-beam. A plate 9 in the cavity is fixed in the shuttle by studs 10 and has a frontal flange 9a to which are welded a pair of elastic blades 11 which protrude through the opening 8a and have their protruding portions elongated lengthwise of the shuttle, they being generally spaced to provide between them a channel but at their ends normally tending to abut each other so as to clamp the weft thread or filling, the inner surfaces of the end portions converging. Preferably, as shown, similar but somewhat longer blades 12 are welded to the respective upper and lower blades 11 and have their ends, which also act to clamp, extending beyond the ends of the blades 11, thus to assure clamping by the blades 12 if blades 11 fail to clamp. On plate 9 are journaled on horizontal axes transverse of the shuttle two studs 13 having frontal flat heads 13a, one of which is between the ends on the one hand and the other between the ends on the other hand of the blades 11; each stud also includes a fork 13b which is in the cavity 8. I term these devices "openers." When both openers exist tilted to the left (Fig. 3), with the fork of the left-hand opener abutting a stop 14, the flat heads of the left- and right-hand forks respectively hold open and permit the closing of the corresponding ends of the blades, and the left-hand arms of both forks are below, and their right-hand arms project above, the plane of the bottom of groove 7; when both openers exist tilted to the right, with the fork of the right-hand opener abutting stop 15, these conditions will be reversed, or the right-hand ends of the blades held open but the left-hand

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ends closed, and the right-hand arms of the forks will be below, and their left-hand arms above, said plane. Also fixed to the plate 9 is a stud 16 which is under the blades and projects forward beyond them.

When the shuttle as shown in Fig. 1 is being shot to the left, its openers positioned as in Fig. 3, with the left-hand and right-hand ends of the blades respectively open and closed, the positions of the openers are to be reversed, thus to leave the blades with their left-hand and right-hand ends closed and open, respectively, preparatory to the next shot to the right, and when the shuttle is then shot to the right these operations are to be reversed; in each case the openers are shifted as the shuttle approaches the end of its flight. For this purpose there are provided the devices shown at x and x' in Fig. 1 (which are reverse counterparts of each other) and the right-hand one x in detail in Fig. 4, thus: A bracket 17 is affixed to the back wall, as 18, of each shuttle-box (otherwise not shown in detail), and has pivoted thereto a pawl 19 whose depending arm is in the same vertical plane as the groove 9 of the shuttle and reaches into a horizontal path into which the forks 13b project. A spring 20 holds the pawl abutting the bracket so that the pawl is free to be turned in one direction but not in the other. In the case of the right-hand device x its pawl may move clockwise and in the case of the left-hand device x' its pawl may move anticlockwise. Therefore, when the shuttle is shot to the left the right-hand device idles but the pawl of the left-hand device shifts the openers from their Fig. 3 to their reversed positions; and when the shuttle is shot back to the right the left-hand device idles and the right-hand device returns the openers to their Fig. 3 positions. Thus, on each shot of the shuttle, the trailing ends of the blades being initially closed and their leading ends open, this condition is reversed as the shuttle approaches the end of its flight.

At each side of and close to the corresponding margin of the warp (not shown but assumed to be extended as usual through the reed 3) is one of two units generally shown and designated y and y' in Fig. 1 and appearing in detail in other figures, the same being adapted to guide, clamp and sever the filling and incidentally hold it in favorable relation to the fell of the cloth when the reed beats up. These units, as shown in Figs. 8 and 8a, are reverse counterparts of each other so a description of one (here the right-hand one, Fig. 8) will serve for the other. Thus:

A support or frame 21, fixed to the batten at the side thereof adjoining the breast-beam, has a pair of rearwardly projecting guide-rods 22 for a carrier 23 normally urged forwardly by springs as 24. Said batten and frame 21 afford what I term a batten-including structure for supporting the device including the carrier and parts carried thereby.

This carrier supports a fixed thread-guide or T-shaped needle 25 whose head extends lengthwise of the shuttle and is in the path (viewed in plan) of the protruding or active portions of the shuttle blades and is formed with a generally longitudinal thread-guiding hole or eye 25a, the head occupying a horizontal plane between the upper and lower blades so that when the shuttle passes it will be between the blades. (The needle is preferably adjustable toward or from the shuttle path, as by fitting a groove 23a of the carrier and held by a screw 25 penetrating a slot 25b of the needle.) The filling a is to extend (Fig. 5)

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from any suitable supply (not shown), devoted to the instant unit, in engagement with any suitable tension device 27 carried by the support or frame 21 and then through the needle eye, leaving a portion of its free end protruding. When the shuttle travels to the left, with the left-hand ends of its blades open or apart, the needle-head in effect enters between the blades and ultimately cams their right-hand ends apart, which then immediately assume their closed state and thus clamp the free end of filling, whereby to draw the latter through the warp-shed.

For clamping the filling the carrier has a fixed jaw 28 and an upper pivoted jaw 29, both arranged between the thread-guide or needle and the warp and projecting rearwardly, the pivot 29a for jaw 29 being horizontal and between its ends and its forward arm 29b having a function to appear. The upper jaw is normally urged to the position in which its rear end will coact with the rear end of the lower jaw to clamp by a spring 30 (Figs. 15 and 16) but a detent 31, pivoted on the frame 21, is adapted to hold it raised or retracted (Figs. 14 and 15). This detent (Figs. 8, 14 and 15) has a jaw-supporting seat at 31a, and a forwardly projecting cam-arm or cam 31b adapted to be wiped by a fixed cam-arm or cam 32 (Fig. 8), fixed to the carrier, when the latter is moved rearwardly against the tension of the springs 24, thus to free the jaw 29, the detent being normally held against the side of said jaw by a spring 33 (Fig. 10). Pivoted on the detent is a rearwardly projecting pawl 34 which is normally held by a spring 35 with a lug 34a thereof bearing against the detent. This pawl, when subjected to displacing effort to the right in Fig. 8 (as by the stud 16 of the shuttle when the latter moves to the right, as will appear) serves to retract the detent to permit the upper jaw to fall, idling, however, when subjected to displacing effort to the left.

At 36 is the shank and at 37 the knife of a cutter, the shank having its forward end bent down and penetrating and free to oscillate in the pivoted jaw 29 around pivot 38 and the knife penetrating a slit 29c in the free end of said jaw, the lower jaw 28 being coincidentally slitted at 28a to receive the knife when the upper jaw is depressed. The cutter is normally held elevated by a plate-spring 39 on the upper jaw. At 40 on the frame 21 is an abutment which, when the carrier is shifted sufficiently rearwardly, is engaged by the depending end of the cutter, thus depressing the latter to effect cutting of the filling clamped between the jaws.

In Fig. 8a, all the parts, as the frame or support 41, the carrier 42 spring-urged forwardly, the thread-clamping means 43, the thread-severing means 44, the means 45 for releasably locking the upper or pivoted jaw of the thread-clamping means in its raised position, the needle 46, and the tension device 47, are all the same in form and function as the corresponding parts of the unit y of Fig. 8 already described, except that they are devised to make this unit the reverse-counterpart of said unit y , thus to coact, at the left side of the warp, with the shuttle the same in all respects as said unit y .

In order to comprehend the operation of the mechanism as so far described let it be assumed that there is means to be hereinafter described which, on every back-and-forth movement of the batten, displaces rearwardly on the frames 21 of both units their carriers, but so that the carrier at the side of the warp from which the

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shuttle is shot is moved sufficiently rearwardly to bring into action its clamping means and also its severing means but the carrier at the far side of the warp only sufficiently to bring into action its clamping means.

The shuttle is of course shot, as usual, when the batten is back.

From whichever side of the warp the shuttle is shot its blades are initially open at their leading and closed at their trailing ends, and at this time the clamping jaws of both units are open so that the shuttle-blades may pass between them. The blades in the shuttle's flight receive between them the needle head, having the end of the filling *a* protruding therefrom (Fig. 5), and as their trailing closed ends are cammed apart by the needle and then resume their closed state they clamp (Fig. 6) the thread and so draw it through the warp-shed. During the flight of the shuttle the near one of the devices *x-x'*, as explained, idled but the far one reversed the positions of the mentioned openers so that, in preparation for the shuttle's return flight, the shuttle-blades will be open and closed at what were, respectively, their trailing and leading ends.

During the flight of the shuttle (i. e., the batten being back) its stud 16 was inactive as to detent 31 of the unit first passed (Figs. 5 and 6) since pawl 34 of that unit idled, wherefore the clamping jaws of that unit remained open. But the stud caused release through the corresponding pawl of the other unit so that the two jaws thereof clamped the blades of the moving shuttle preparatory to clamping the filling when the blades clear the jaws, thus leaving it extending from the needle first passed to these clamping jaws, which held it so positively that it slipped from between the blades as the shuttle proceeded to complete its flight. (See Fig. 7—which shows the shuttle, however, moving reversely to its direction of Figs. 5 and 6 and hence unit *y* as the one last passed—with stud 16 about to cause release of upper jaw 29 of that unit.)

The filling as thus extending would be too near (i. e., at least the dimension of the width of the shuttle) to the fell of the cloth for beating-up when the batten now moves forward, wherefore the carriers of the two units are to be moved rearwardly, or toward the plane of the reed, by the means above mentioned as hereinafter to be described, and these other operations are to be performed: clamping and severing of the filling at the side at which it entered the warp. Hence:

When the as yet undescribed means represses the carriers of the two units it represses the carrier of the unit last passed (whose jaws already clamp the filling) less than the other carrier, or insufficiently to cause the cutter of the former unit to act. But it represses said other carrier sufficiently for that purpose, i. e., so that its cam, as 32, displaces the corresponding detent 31 to permit the upper jaw to coact with the lower jaw to clamp and so that finally the cutter is engaged by the abutment 40 and the filling is thereby severed.

In short, during the flight of the shuttle in either direction it passes, without releasing, the upper jaw of the first unit but effects release of the upper jaw of the second unit so that the jaws of said second unit, when the blades in their travel pass from between them, are left clamping the filling extending from the needle of the first unit. The batten then moves forward and, by the as yet undescribed means, the

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carriers are repressed to position the filling near the reed. In such repressing the carrier of the second unit is repressed only sufficiently for that purpose (the filling being already clamped by its jaws and severing at that side being unnecessary); but the carrier of the first unit is repressed somewhat further, or so as to actuate its cutter, its movable jaw being released, as by the cam 32, as an incident of the carrier's movement and so as to clamp the filling preparatory to such severing.

On the completion of the batten's forward stroke the filling, with its two ends free, stands beaten up and the clamping thereof being terminated, as will appear, and the shed changing, it remains as the fell of the fabric, having both ends free ends.

The said means for displacing the carriers of the two units is an oscillatory member here consisting of a rock-shaft 48 journaled in bearing 49 on the breast-beam and having two forks or "pushers" such as 50 respectively in the vertical planes of openings 21*a* (Fig. 9) of the frames of said units. Each fork has two arms, one, 50*a*, longer than the other 50*b*, and both long arms and both short arms being of the same length, and one long arm of each being in the same plane as the short arm of the other. Hence when the shaft is rocked to one limit the long arm of one fork and the short arm of the other will enter said openings to displace the carriers, one further than the other, and when the shaft is rocked to the other limit the other two arms will displace the carriers, the latter further than the former. The shaft is rocked to one limit on the alternate forward strokes, and to the other limit on the remaining forward strokes, of the batten, thus, Fig. 17: A cam 51, forming a unit with a gear 52, is journaled in the loom frame 53 and against it bears a lever 54, normally depressed, say by gravity, being connected with the crank 48*a* of shaft 48 by a link 55. On every half-revolution of the cam the lever rises and on the remaining half-revolutions it falls. The gear 52 is in mesh with a gear 56 (one half its diameter) fast to the crank-shaft 57 of the loom whose crank is connected by pitmen, as 58, as usual with the batten. Hence, on the alternate forward strokes of the batten the forks are turned to one limit and on the remaining strokes back to the other limit.

The batten having completed its forward stroke and thus displaced both carriers to their respective rearward limits, with the upper jaws both depressed, said jaws should be released so as to permit the shuttle to pass on its return stroke. Hence, on the bearing 49 is journaled another rock-shaft 59 on which are two arms 60 respectively in the same planes as the two forks. They are to depress the jaws by engaging their rear ends 29*b*, wherefore said shaft 59 is rocked back and forth to effect such depressing and return. For this purpose said shaft has a link 61 connecting one such crank with a lever 62 fulcrumed in the frame and normally held elevated by a spring 63 but adapted to be depressed on each forward stroke of the batten by a pear-shaped cam 64 on the crankshaft.

I define expressions used in the appended claims as follows: The "weaving zone" is the space from one side to the other of the warp. The "back wall" of the batten is afforded by the walls 18 of the shuttle boxes. The "channel" is the space existing between the forwardly projecting portions of the blades 12 as they appear,

for instance, in Fig. 3. The "passage" of the thread-guide 25 is its eye 25a. The shuttle clamping means, formed by a pair of the blades, as 11 or 12, is binary, being as such effective at each end of the pair to clamp.

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

1. In a loom, the combination of the batten, a shuttle movable lengthwise of and on the batten back and forth and having a pair of members elongated, and providing separate filling clamping means offset from each other, lengthwise of the batten and both of which members are normally urged to one of the open and closed states, and coactive mechanism on the batten and in the shuttle for moving, when the shuttle moves in one direction, one of said means from, while permitting the other to assume, the state to which it is normally urged and for moving, when the shuttle moves in the opposite direction, the latter means from, while permitting the former means to assume, the state to which it is normally urged.

2. In a loom, the combination of the batten, a shuttle movable thereon in the direction from one end thereof and having clamping members extending lengthwise of the batten and whose portions relatively adjoining said end of the batten exist elastically held bearing one against the other and provide surfaces facing each other which converge toward said end and said members being spaced apart from their said portions to their opposite ends and forming a channel open from the shuttle, and a unit on the batten arranged to be passed by the shuttle and having a filling guide arranged to project into the channel when the shuttle moves in said direction and having a filling-guiding passage discharging generally toward the latter end of the batten.

3. In a loom, the combination of the batten and means for drawing the filling through the weaving zone including a shuttle movable lengthwise of the batten and having a pair of laterally projecting filling-clamping blades forming between them a channel extending lengthwise of the batten and one such blade being elastic and normally urged against the other.

4. A loom including, in combination with the batten, a shuttle movable thereon lengthwise thereof and having elongated filling-clamping members arranged to form between them a channel extending lengthwise of the batten and one of which members has a portion thereof relatively adjoining one end of the batten normally urged into filling-clamping relation to the other member and one of which members has a portion thereof relatively adjoining the other end of the batten normally urged into filling-clamping relation to the other member, said channel being open from end to end except where only one of said portions or the other is at any time in its said relation.

5. A loom including, in combination with the batten, a shuttle movable thereon lengthwise thereof and having elongated filling-clamping members arranged to form between them a channel extending lengthwise of the batten and one of which members has a portion thereof relatively adjoining one end of the batten normally urged into filling-clamping relation to the other member and one of which members has a portion thereof relatively adjoining the other end of the batten normally urged into filling-clamping relation to the other member, said channel being open from end to end except where only one

of said portions or the other is at any time in its said relation and means in the shuttle to hold retracted from said relation during each flight of the shuttle the then leading one of said portions independently of the other.

6. A loom including, in combination with the batten, a shuttle movable thereon lengthwise thereof and having elongated filling-clamping members arranged to form between them a channel extending lengthwise of the batten and one of which members has a portion thereof relatively adjoining one end of the batten normally urged into filling-clamping relation to the other member and one of which members has a portion thereof relatively adjoining the other end of the batten normally urged into filling-clamping relation to the other member, said channel being open from end to end except where only one of said portions or the other is at any time in its said relation, means in the shuttle to hold retracted from said relation during each flight of the shuttle the then leading one of said portions independently of the other and separate filling guiding means on opposite sides of the weaving zone for respectively holding fillings with their free ends in positions alined with the channel.

7. The loom set forth in claim 4 characterized by said loom also including means movable in the shuttle into position to hold retracted the then leading one of said portions independently of the other, and means on the batten to move the last-named means into and out of said position respectively during the flight of the shuttle in one direction and thereupon reversely.

8. A loom including, in combination with the batten, a shuttle movable thereon lengthwise thereof and having elongated members arranged to form between them a channel extending lengthwise of the batten, said members having inner surfaces thereof relatively adjoining one end of the batten converging toward said end and the portion having one such surface being elastically held in contact with the other and said channel being otherwise open from end to end thereof, and means on the batten for holding a filling with its free end alined with the channel.

9. A loom including, in combination with the batten-including structure, a shuttle movable on the batten from one side to the other of the weaving zone and having filling-clamping means and thereby adapted to trail the filling through said zone, and means, on said structure and at the other side of said zone and past which the shuttle so moves, to exert on the trailing part of the filling clamping pressure exceeding that exerted by the shuttle filling-clamping means.

10. In combination, with the fixed structure of a loom, a batten movable in said structure forward and back, a shuttle movable on the batten from one side to the other of the weaving zone and having filling-clamping means and thereby adapted to trail the filling through said zone, a carrier movable forwardly on the batten, means, on the carrier and at the other side of said zone and past which the shuttle so moves, to exert on the trailing part of the filling clamping pressure exceeding that exerted by the shuttle filling-clamping means, and means on the fixed structure to move the carrier forwardly during the movement of the batten.

11. A loom including, in combination with the batten-including structure, a shuttle movable on the batten in one direction from one side to the

other of the weaving zone and having, projecting laterally from itself, filling-clamping portions which, at opposite sides of their plane of clamping, have their exterior surfaces converging reversely to said direction, and means, at the other side of said zone and arranged to be passed by said clamping portions during said movement of the shuttle, to exert clamping pressure first on said surfaces and then on the filling clamped by and trailing said portions.

12. A loom including fixed structure, a batten movable therein forwardly and rearwardly, a filling guide at one side of the weaving zone, a shuttle movable on the batten from said side to the other of the weaving zone and having means to draw the filling across said zone, separate means movable rearwardly on the batten at the respective sides of said zone and each of which opposes forward displacement of the filling when so drawn and as it extends from the guide to the shuttle and coactive means on said structure and batten to move both of said separate means rearwardly and thereby displace rearwardly the drawn filling.

13. The loom set forth in claim 12 characterized by said coactive means being adapted to move that one of said separate means which is at the first-named side of the weaving zone further rearwardly than the other.

14. The loom set forth in claim 12 characterized by said coactive means being adapted to move that one of said separate means which is at the first-named side of the weaving zone further rearwardly than the other and by the latter separate means having means thereupon to sever the filling.

15. In a loom, the combination of the batten and a device for drawing filling through the weaving zone including a shuttle movable lengthwise of the batten, said device having fast to and lateral of the shuttle an elongated flexible clamping member extending lengthwise of the batten and having a free end portion normally urged into coactive clamping relation to another portion of said device.

16. A loom including a frame, a batten-including structure movable therein, means to move said structure forward and back, means for drawing filling to and through the weaving zone when said structure moves back, a device arranged on said structure at the side of approach of the latter means to said zone and so as to be passed by such latter means and having means to sever the filling and being movable rearwardly on said structure to two limits one of which is further rearward than the other, an oscillatory member journaled in said frame forward of said structure, and means to transmit rotary movement from the first-named means to said member in one direction on the alternate forward strokes of said structure and in the opposite direction on the remaining forward strokes of said structure, said member having means, on rotation of said member in one direction, to move said device to the first-named limit and means, on rotation of said member in the opposite direction, to move said device to the second-named limit, and said structure having means to actuate the severing means on movement of said device past the second-named limit.

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