Sheet 1, 2 Sheets.

W. P. Brown.

Irregular Weaving.

No. 42,986. Patented May 31, 1864.

Fig: 1.

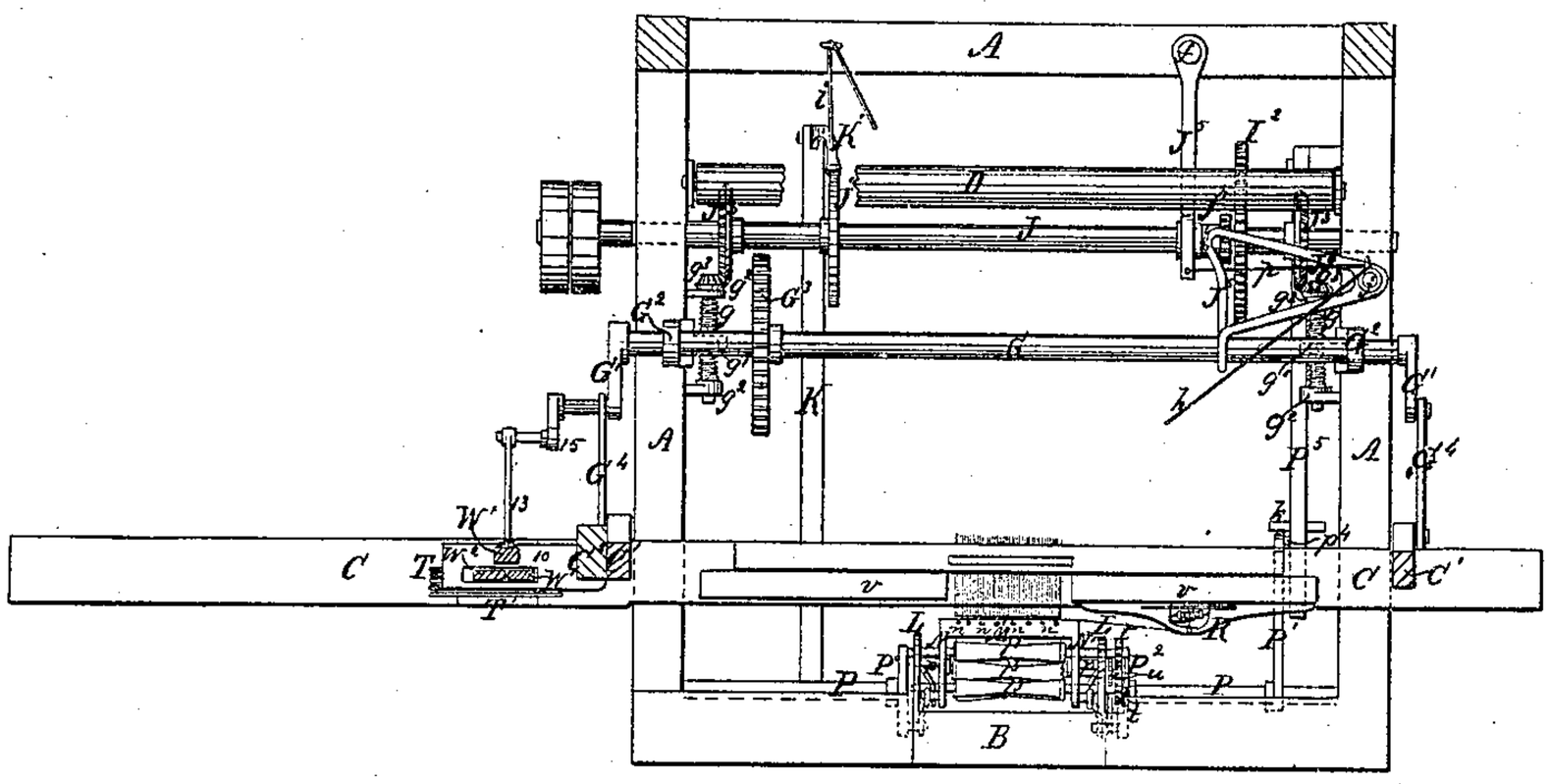
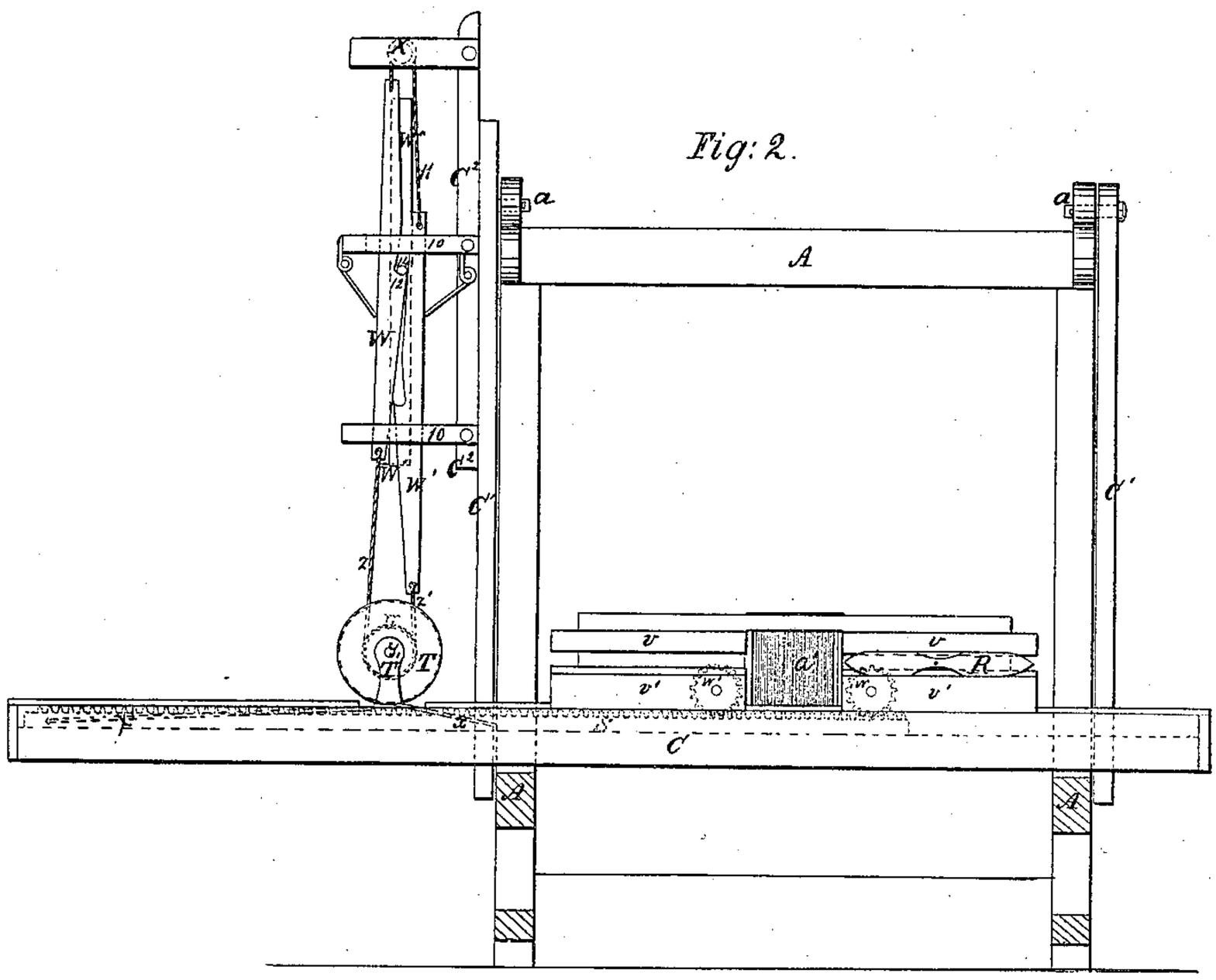


Fig: 2.



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Sheet 2, 2 Sheets

W. P. Brown.

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Fig: 7.

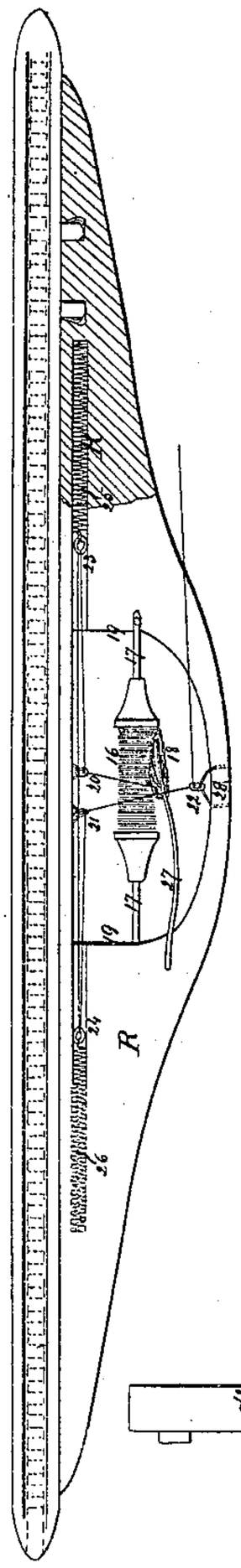

Fig: 6.

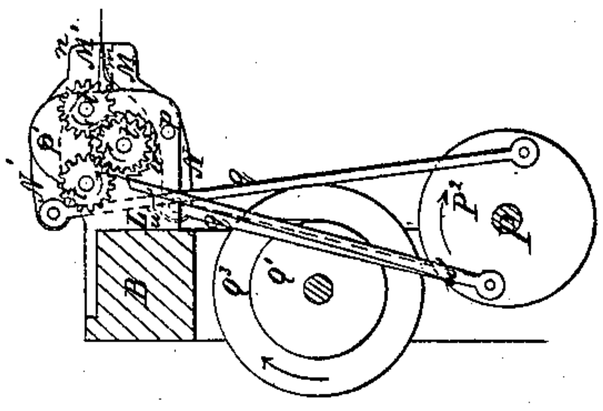

Fig: 5.

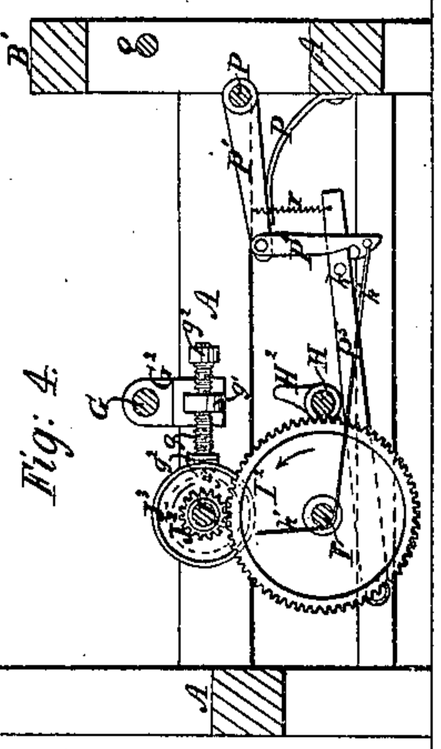

Fig: 4.

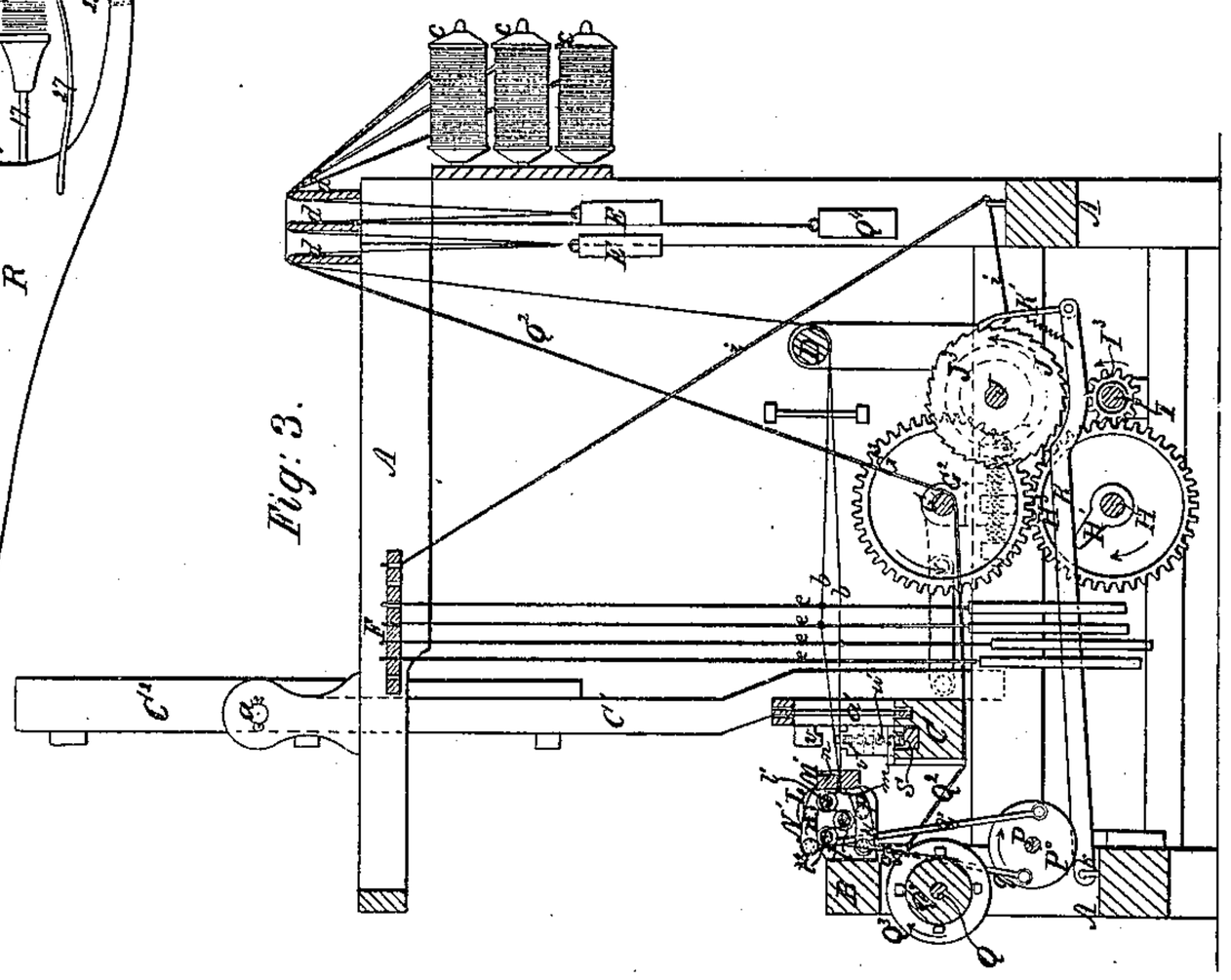

Fig: 3.

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UNITED STATES PATENT OFFICE.

WILLIAM P. BROWN, OF NEW YORK, N. Y.

IMPROVEMENT IN LOOMS FOR WEAVING CORSETS AND ARTICLES OF IRREGULAR FORM.

Specification forming part of Letters Patent No. **42,986**, dated May 31, 1864.

To all whom it may concern:

Be it known that I, WILLIAM P. BROWN, of the city, county, and State of New York, have invented certain new and useful Improvements in Power Looms for Weaving Corsets or other Articles or Goods of Irregular Form; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a horizontal section of a loom with my improvements. Fig. 2 is a vertical section of the same parallel with the front of the loom. Fig. 3 is a central vertical section of the same parallel with the warp. Fig. 4 is a vertical section taken parallel with the warp near the right-hand side of the loom. Fig. 5 is a side view of the "take-up" mechanism on a larger scale than Figs. 1, 2, 3, and 4. Fig. 6 is a plan of the shuttle, partly in section, on a much larger scale than the other figures. Fig. 7 is a transverse section of the shuttle on a scale corresponding with Fig. 6.

Similar letters of reference indicate corresponding parts in the several figures.

The object of this invention is the weaving by power in a continuous or uninterrupted manner, of corsets or other articles or goods having more fullness in some parts than in others. In order to do this the warp is so operated by a Jacquard machine or other suitable means that in places where fullness is required the weft or filling is deposited by the shuttle through but a portion of the warp, which portion is increased or diminished as the successive picks of filling are inserted according to the form of fullness desired, as, owing to the unequal length of the web in different parts of the width of a web so woven, it is very difficult to take it up with perfect regularity. I do not attempt to take it up regularly while the weaving proceeds in but a portion of the warp, but only from time to time, when one or more picks are deposited all across the warp. To permit the weaving to proceed in this manner in a suitable length of warp without taking up, I cause the lay to gradually recede farther and farther back in the loom as the filling is deposited by the shuttle, so that in beating up the reed may always strike with unvarying force, and when the weaving arrives at a convenient stage for taking up I cause the lay to advance at once to its original or most forward position at the same time that the cloth is taken up. This receding and advancing movement of the lay constitute important features of my invention.

Another part of my invention consists in the employment between the reed and the take-up apparatus of a pair of jaws, between which the cloth passes, and which grip it firmly at all times, except when the operation of the take-up apparatus takes place, at which time they are open. The object of these jaws is to hold the cloth in front of the lay more evenly and firmly than, owing to its irregular form, it could be held by the take-up apparatus, and to enable the reed to beat up with equal force against all parts of the width of the web.

Another part of my invention relates to the employment of take-up rolls having a longitudinal profile of an irregular form, which corresponds with the irregularity of form of the corsets or other articles or fabric to be woven, so that all parts of the width of the cloth or web may be taken up smoothly and without leaving any objectionable slackness in any part.

Another part of my invention relates to the shuttle-driving mechanism. The shuttle which I employ is not of the flying kind, such as is commonly used in broad weaving, but is fitted to the lay in a substantially similar manner to the shuttles used in weaving tape and other narrow goods, and operated by means of toothed racks and pinions. The shuttle thus applied having to reach right across the reed from one to another of two driving-pinions, requires to be of great length, and consequently requires to have a great length of movement. This part of my invention consists in a novel mode of giving motion to the driving-rack, whereby I am enabled to get as long a movement as is desirable without making the loom of great height.

Another part of my invention consists in a novel arrangement of springs and yarn-guides within the shuttle for the purpose of drawing back the yarn into the shuttle when the weaving proceeds in but a portion of the whole width of the warp, and so preventing any slack filling being left in the warp.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the framing of the loom. B is the breast-beam. C is the lay, having its swords C′ C′ suspended from fixed centers *a a* at the top of the framing. *a′* is the reed. *b b* is the warp shown in red color. This, instead of being supplied from a beam, is supplied from a number of spools, *c c*, Fig. 3, at the back of the loom, and passes up over rails *d d* or rollers in the form of loops with weights E E suspended from them, as shown in Fig. 3. These weights preserve a uniform tension and allow the warp to be drawn forward in sufficient quantity when the taking up of web, as hereinbefore described, takes place. *e e* indicate the harness, and F the lower knot-board of the Jacquard machine. The remainder of the Jacquard machine is omitted, as its representation is not necessary for the illustration of my invention.

G is the crank-shaft by which the lay is driven. G′ G′ are its cranks, and G^4 G^4 are the connecting-rods connecting the said cranks with the lay. This shaft, instead of working in stationary journal-boxes, as in other looms, has its journal-boxes G^2 G^2 fitted to slide back and forth on suitable ways on the side frames of the loom for the purpose of producing the receding and advancing movements of the lay for the purpose hereinbefore explained. The shaft G is geared by a pair of spur-gears, G^3 H^3, with a shaft, H, arranged below and parallel with G in fixed bearings, and the gear H^3 also gears with a spur-gear, I^3, on the main shaft I of the loom to which the driving-power is applied, the latter shaft being arranged in rear of H in fixed bearings. The crank-shaft receives rotary motion through the gears I^3 H^3 G^3. The movement of the boxes G^2 G^2 back and forth is not sufficient to carry the gear G^3 out of gear with H^3, and therefore does not interfere with the rotary motion of the crank-shaft G.

g g are two screws arranged parallel with the sides of the loom, one near each side for producing the movement of the boxes G^2 G^2 back and forth. These screws are made with journals at their ends, and these journals are so fitted to fixed bearings g^2 g^2, secured to the loom-framing, that though they are free to turn they cannot move longitudinally. Their screw-threads, one being left handed and the other right handed, are received within nuts *g′ g′* attached to their respective boxes G^2 G^2, so that the rotary motion of the screws causes the boxes to move back and forth. The said screws are furnished with bevel-pinions g^3 g^3, gearing with two bevel-gears, J^3 J^3, upon a shaft, J, which is arranged parallel with the main and crank shafts in suitable fixed bearings, the said gears being arranged to turn the two pinions in opposite directions, so that when set in operation the two screws will act to move the boxes G^2 G^2 and crank-shaft G in the same direction, either back or forth. The only reason for making one screw right and the other left handed is that, owing to their arrangement, they could not both be conveniently geared to turn in one direction at the same time. The rotary motion of the shaft J and gears J^3 J^3 to produce the receding movement of the boxes G^2 G^2, shaft, and lay, is obtained from a cam, H′, on the shaft H, the said cam operating upon a lever or treadle, K, which is attached to a fulcrum, *k*, (Fig. 3,) on the front part of the framing, and which carries a pawl, K′, which engages with a ratchet-wheel, J′, on the shaft J. The cam H′, making one revolution during each stroke of the lay, raises the lever K and causes the pawl to turn the ratchet wheel and shaft J a sufficient distance in the direction of the arrow, shown upon it in Fig. 3, to make the screws *g g* draw back the lay a distance equal to the thickness of one pick of weft. The reversed movement of the shaft J, gears J^3 J^3 and g^3 g^3, and screws *g g* to carry forward the boxes G^2 G^2 and crank-shaft G, and so cause the advance of the lay when it is desirable to take up, is produced by means of a large spur-gear, I^2, on the main shaft I gearing with a smaller gear, J^2, on the shaft J. The gear I^2 is fast on the driving-shaft, but the gear J^2 turns loosely on its shaft J until the time for taking up arrives, when it is coupled with the shaft by means of a sliding clutch, J^4, Fig. 1, which is then brought into gear with it by the action of a lever, J^5, which is attached by its fulcrum-pin *f* to the back of the frame, and which is operated by means of a cord, *h*, Fig. 1, connected with and actuated by the Jacquard machine; another cord, *i*, connected with and actuated by the same machine, coming into operation just previously to draw back the pawl K′ out of gear with the ratchet-wheel. The forward movement of the crank-shaft and advance of the lay must be produced in less time than is occupied by one revolution of the said shaft, and therefore it is desirable not to have the lay recede farther than can be avoided. I prefer never to let it recede more than about an inch and a quarter, but in many parts of the work it need not recede nearly so much, and in plain parts, in which the filling is inserted through the whole width of the warp, it may be allowed to recede during four or eight picks of the shuttle and then advance again. Where a long piece of irregular work comes in, the lay may be allowed to advance and the work be taken up at any time by inserting one or two picks of filling through the whole width of the warp, after which the receding movement may commence again. When, however, the weaving proceeds all across the warp for any considerable number of picks, it is not necessary to have the lay recede, as the take-up may operate at every fourth, sixth, or eighth pick. The advancing and receding movements are entirely under

the control of the Jacquard machine. The crank-shaft, when it moves forward, always comes to the same position, where it is stopped by the clutch J^4, being thrown out of gear from the gear J^2 by means of a bell-crank lever, J^6, Fig. 1, which works on a fixed fulcrum, *j*, at the right side of the loom-framing. This lever is hooked to the crank-shaft, and, as the said shaft moves forward, it is made to press the lever away from the gear J^2 and draw away the clutch. When the shaft J is thrown out of gear from, 1 the Jacquard machine allows the cord *i*, which is connected with the pawl K′, to drop and let the said pawl come into operation again to reproduce the gradual receding movement of the crank-shaft and lay. The receding and advancing movements do not interfere with the usual regular vibration of the lay, as the rotary motion of the crank-shaft is uninterrupted.

l' l^2 l^3, Figs. 1 and 3, are take up-rolls, three in number, arranged in fixed bearings in two plates, L L, which are secured to the breast-beam B. These rolls will be hereinafter more fully explained.

M M′ are the jaws by which the cloth is held smooth between the reed and the take-up rolls. The length of these jaws is somewhat greater than the width of the web, so that they extend all across it. The upper jaw, M′, is fitted with a series of sharp pointed pins, *n n*, to penetrate the cloth and keep it from slipping back, and in the upper face of the lower jaw, M, there is a series of holes or a longitudinal groove for the reception and protection of the points of the said pins. The lower jaw has attached to and extending all across it a straight wire, *m*, under which the cloth passes, and which serves to pull the cloth off the pins *n n* of the upper jaw when the jaws open, and so leave it free to be drawn through the jaws by the action of the take-up rolls, aided by the action of the reed. The upper jaw, M′, is attached at its ends to the rear ends of two levers, N′, which work on fixed fulcrum-pins *p′*, secured in the plates L L, and the lower jaw, M, is attached to the front ends of two similar levers, N, working on fulcrum-pins *p*, secured in the said plates. The front ends of the levers N N′ are connected by rods *q q′*, with two disks, P^0 P^2, which are fast on a horizontal rock-shaft, P, which is arranged below the take-up rolls in suitable fixed bearings, the connections of the rods from the two jaws being made on opposite sides of the centers of the disks, as shown in Fig. 3, that by turning the said rock-shaft in the direction of the arrow marked on the disk P^0, which is visible in Fig. 3, the jaws may be opened, and by turning it in the opposite direction they may be closed. The said rock-shaft is furnished with an arm, P′, under which there is applied a spring, P^3, which always presses it upward, and so tends to turn the rock-shaft in the opposite direction to the arrow shown upon the disk P^0 in Fig. 3, and thereby keep the jaws closed. The said arm P′ has suspended from it a hook, P^4, Fig. 4, close to one side of which there is arranged a lever or treadle, P^5, which is depressed by a cam, H^2, on the shaft H, once during every revolution of the said shaft and crank-shaft, and raised again by a spring, *r*. The said lever or treadle is furnished with a projecting pin, *k*, which is capable of engaging with the hook P^4; but the said hook hangs out of the way of the said pin until just before the proper time for the take-up to take place, when the said hook is pulled forward by a cord, *k′*, which connects it with the Jacquard machine, to a position to catch the pin *k* in the next descent of the treadle P^5. The said pin then depresses the hook and pulls down the arm P′, thereby turning the rock-shaft P in the direction of the arrow shown on the disk P^0 in Fig. 3 and opening the jaws. As the first backward movement of the reed takes place the treadle P^5 rises and allows the jaws to be closed again by the spring P^3, and they remain closed until the take-up is about to operate again, when they are opened, as before described.

The take-up rolls l' l^2 l^3 may be each one of piece or divided in transverse planes into several pieces or sections. The irregularity of the form of their longitudinal profile is shown in Fig. 1. This irregularity of form is to be varied according to the irregularity of the form of the article to be woven. The rolls represented are for corsets, which are woven so that the width of cloth or web forms the length of the corset. The fullness for the breast and upper parts of the body, and for the hips and lower parts of the body, is thus brought to the two sides of the web and makes the sides much longer than the central portion, which forms the waist. To accommodate this form of goods, the rolls are made smallest at or near the middle of their length, and gradually increase in diameter toward their ends in proportion as the fullness makes the length of the cloth or web greater toward the selvages. The three rolls are alike, and of a length slightly less than the width of the web, and a loose metal washer, furnished with sharp points at its edges, is applied at each end of the roller to make up a length equal to the full width of the web and keep the web extended laterally and prevent it from drawing down to the smaller portions of the rolls, as it has a natural tendency to do. The three rolls are geared together by spur-gears *t t t* at one end, as shown in Fig. 5, so that all are compelled to rotate together at the same speed, the two upper ones, l' l^3, rotating in the same direction, and the lower one, l^2, in the opposite direction. The power to turn them is applied to a ratchet-wheel, *u*, on the lower roller, l^2, by means of a long pawl, *u′*, which is attached to the disk P^2 of the rock-shaft P. The rollers are not rigidly secured upon their respective shafts, but fitted thereto in such manner as to produce a sufficient amount of friction to make them turn with the shafts and take

up the cloth, but also to permit the shafts to turn without them in case of the movement given to the shafts being greater than is necessary to take up the quantity of cloth woven since the last previous operation of the take-up; and in case the rollers are made of a number of separate sections, each section must be so applied as to be driven separately by the friction of the shaft, and to stop when its respective portion of the web has been taken up. The movement given to the take-up rolls by the pawl *w'* is always the same, whatever be the quantity of cloth to be taken up, and hence the necessity of the rollers being capable of slipping upon the said shaft. The said movement must always be fully sufficient to produce the greatest required amount of operation of the take-up. The cloth passes over the top of the first roller *l'*, under the second l^2, and over the third l^3, and thence to a drum, Q', on which it is rolled up loosely as fast as it is delivered thereto by the take-up rolls by the action of a weight, Q^4, which is suspended from a cord, Q^2, which is attached to a pulley, Q^3, secured to one end of the said drum, and which passes through suitable guides under the lay and shaft G and over the upper rails, *d d*, of the frame, the said weight and cord turning the drum in the direction of the arrow shown on the pulley Q^3, in Fig. 3. As, owing to the take-up rolls being driven by friction, they will not have sufficient power to draw the whole web forward without aid, the jaws M M' do not open, nor do the take-up rolls operate till the lay beats up, when the reed assists the action of the take-up rolls and the jaws close again before the lay swings back.

R is the shuttle, having grooves in its upper and under sides to receive the edges of the boards or blocks *v v'*, which are bolted to the lay. In the under side of this shuttle there is a sunk rack, which gears with the pinions *w w'*, which work in recesses in the lower board, *v'*, and which also gear with the driving-rack S, which is fitted to slide lengthwise within the lay, and which is connected by two cords or straps, *x x'*, with a pulley, T, which is arranged to turn freely on a pin, *y*, which is secured in a fixed standard, T', erected upon the lay, the said cords or straps running round the said pulley in opposite directions and being fastened thereto, so that by turning the said pulley in one direction it will wind up the cord or strap *x'*, thereby moving the driving-rack to the right and causing the pinions *w w'* to drive the shuttle to the left, and by turning the said pulley in the other direction it will wind up the cord or strap *x*, thereby moving the driving-rack to the left and causing the pinions to drive the shuttle to the right. The movement of the pulley T is produced by two cords or straps, *z z'*, which work upon a smaller pulley, U, Fig. 2, fastened to the said pulley T. These cords or straps *z z'* pass round the said pulley T in opposite directions, and each is fastened at one end to the pulley U, and at the other end to the lower end of one of two hooked slides, W W', which are arranged to work up and down in guides 10 10 in a frame, C^2, attached to one of the swords of the lay. The upper ends of the hooked slides W W' are connected with opposite ends of a cord or strap, 11, which passes over a pulley, X, at the top of the frame C^2. Behind the said hooked slides there is arranged in the guides 10 10 a third slide, W*, which is furnished with a pin, 14, and is connected by a rod, 13, with a crank, 15, on the end of the crank-shaft G. The rotary motion of the crank 15 produces a reciprocating rectilinear motion of the slide W*, and in every descent of the said slide its pin 14 catches in the hook 12 of one of the slides W W' and draws it down with it, causing the cord or strap 11 to draw up the other of said slides, and so causing the pulleys U and T to be turned in one direction, and the movement of the shuttle in one direction to be produced. During the ascent of the slide W* the slides W W', and all their connections, remain stationary, and the shuttle is stationary on one side of the reed, and in the next descent of the said slide W* it catches the hook 12 of the other of the two slides W' W and pulls it down, thereby drawing up the slide W or W', previously depressed, turning the pulleys U and T in the opposite direction to that last mentioned, and producing the movement of the shuttle in the other direction. The two pulleys T and U, being attached together, might be considered as portions of the same pulley, and, in fact, will generally be made in one piece.

By the employment for actuating the shuttle-driving rack S of a pulley or pulleys, T U, applied and operating as described, I am enabled to reduce the height of the loom much below what it would require to be with the usual mode of actuating the driving-rack by means of a system of hooked slides and pulleys, as by reducing the size of the pulley or portion of the pulley U below that of T, I do not require to have the movement of the hooked slides so long as the movement of the driving-rack and shuttle. In case of two shuttles being used there will be a substantially similar apparatus at each side of the loom, but the positions of the pulleys and slides will have to be reversed, the pulleys being arranged above the slides.

My improvement in the shuttle is shown in Figs. 6 and 7. In order to apply it the shuttle is made a little wider than usual to obtain a greater width for the opening 19, in which the quill 16 is received. The quill is fitted to turn loosely on its spindle 17 in the usual manner, and a pad, 18, faced with fur or some other soft material, and attached to the shuttle by a spring, 27, is applied to produce upon it a sufficient degree of friction to prevent it from being turned too easily. In the back part of the opening 19 there are attached to the shuttle by loops of soft material two yarn

guides, 20 21, consisting of glass rings, and in the front part of the said opening there is attached, in a similar manner, a similar guide, 22. There are also two other similar guides, 23 and 24, attached to long and light spiral springs 25 26, which are arranged lengthwise of the shuttle in cavities provided for their reception in the body thereof at the ends of the opening 19. The springs 25 26 and the cavities provided for their reception are long enough to allow a great range to the guides 23 24. The yarn passes from the quill through the guide 20, thence to and through the guide 23, thence to and through the guide 24, thence to and through the guide 21, and thence to and through the guide 22, by which it leaves the shuttle. When the spiral springs 25 26 are in their normal or contracted condition, shown in Fig. 6, they should hold the guides 23 24 at a distance apart equal or nearly equal to half the width of the goods to be woven, so that there will be taken up or held back between the said guides and the guides 20 21 a length of yarn nearly equal to the width of the goods. The springs being in the above condition, when the pull comes on the yarn as the shuttle is driven across the warp, the spiral springs extend easily and permit the guides 23 24 to be drawn toward each other. Now, the friction produced upon the quill by the pad 18 is sufficient to prevent any yarn from being given off from it while any remains held back by the springs and until the guide 23 has come in contact with the guide 20 and the guide 24 in contact with the guide 21, and any further movement of the said guides 23 24 is prevented. The yarn will then draw off from the quill. When the shuttle commences to return across the warp, and there is a tendency of the yarn to become slack, the springs 25 26 draw back the guides 23 24, and so take up or draw back through the guide 22 and into the shuttle the yarn which was left between the said guide and the web at the termination of the previous pick. It is by this taking back and letting out the filling into and from the shuttle that the leaving of any slack filling in the web is prevented, as whether the weaving proceeds in the whole width or ever so small a portion of the width of the web, the quantity given off from the quill or bobbin is equal to what is required for such width, and a uniform tension of the filling is preserved. Instead of the ring-guide 22, there may be provided in the shuttle an eye, 28, as shown in dotted outline in Fig. 6, for the passage of the yarn from the shuttle.

The loom may be constructed wide enough for weaving several webs at the same time, as in weaving tape and other narrow goods, the several harnesses being connected with one Jacquard machine; and it is more especially to provide for the weaving of several webs that I use the kind of shuttle and shuttle-motion herein specified, and not a flying-shuttle.

I do not confine myself to the use of the screws *g g*, or any particular means of producing the receding and advancing movements of the lay, as various means of effecting this result might be successfully used; but

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

1. Causing the lay to gradually receed in the loom as the weaving proceeds for a certain distance without any operation of the take-up, and afterward causing it to advance simultaneously, or nearly so, with the operation of the take-up, substantially as and for the purpose herein set forth.

2. The employment between the reed and the take-up apparatus of a pair of jaws, M M′, applied and operating substantially as and for the purpose herein set forth.

3. The employment, in a loom for weaving corsets or other goods of irregular shape, of a series of take-up rolls, l' l^2 l^3, having a longitudinal profile of irregular form corresponding with the irregularity of the form of the goods, and operated substantially as and for the purpose herein specified.

4. Transmitting motion from the hooks W W′ to the driving-rack S of the shuttle operating mechanism by means of a pulley or pulleys, T U, and four connecting cords or straps, *x x′ z z′*, applied and operating substantially as and for the purpose herein specified.

5. The guides 23 and 24, and their connecting-springs 25 and 26, applied within the shuttle, to operate substantially as and for the purpose herein specified.

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