

G. Copeland.
Bag Loom.

Sheet 12 Sheets.

No. 12,293.

Patented Jan. 23, 1855.

Fig. 1.

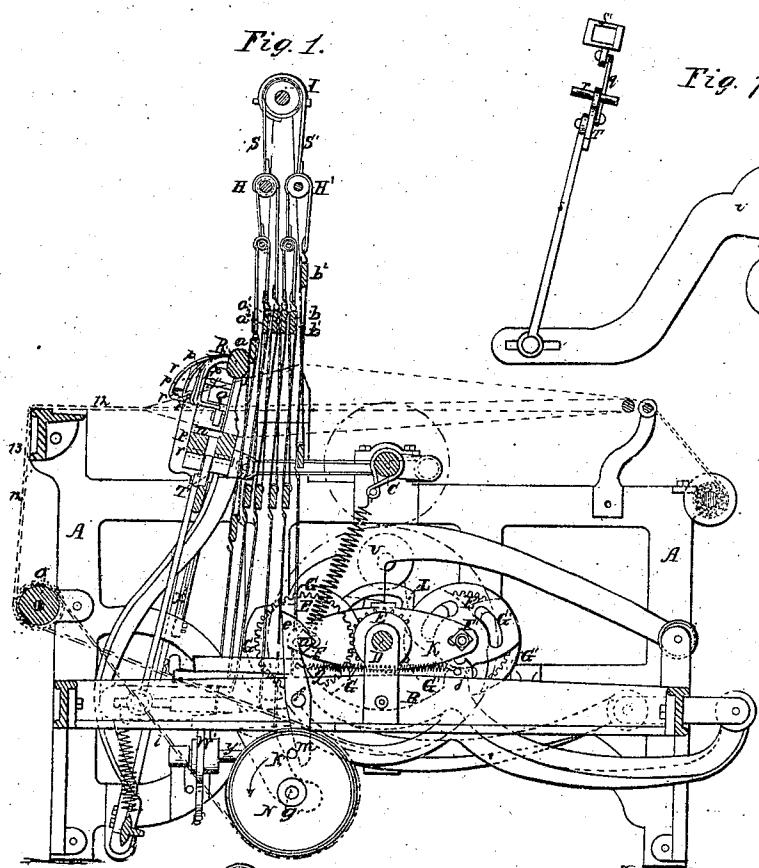


Fig. 7.

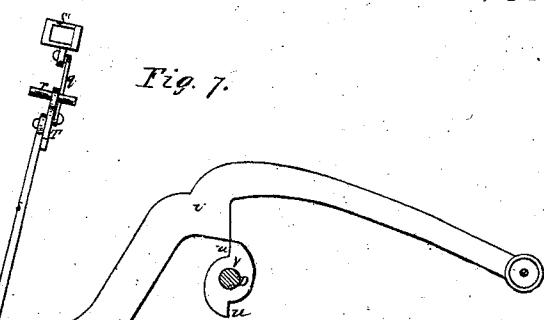


Fig. 4.

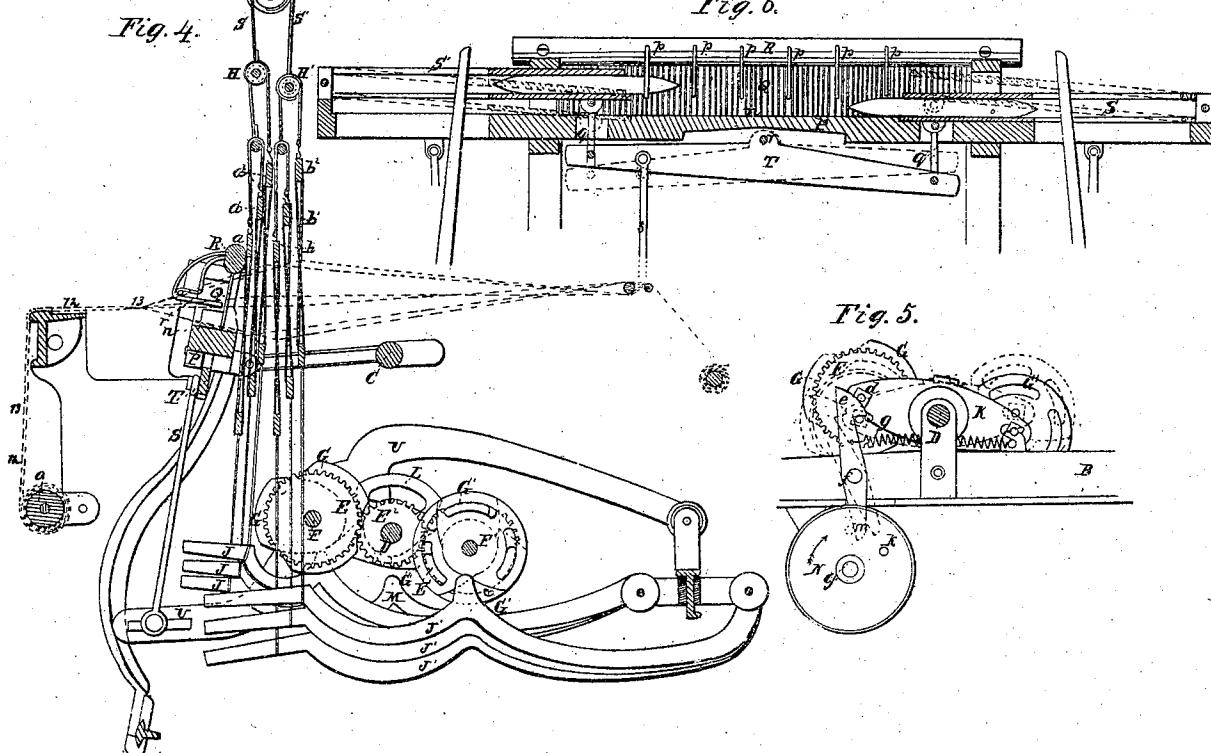


Fig. 6.

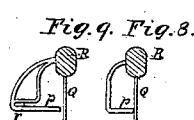
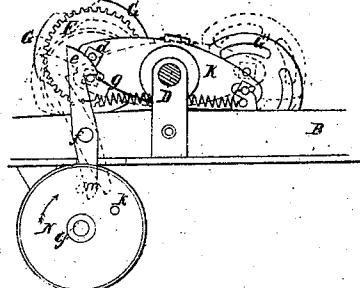


Fig. 5.



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Fig. 2.

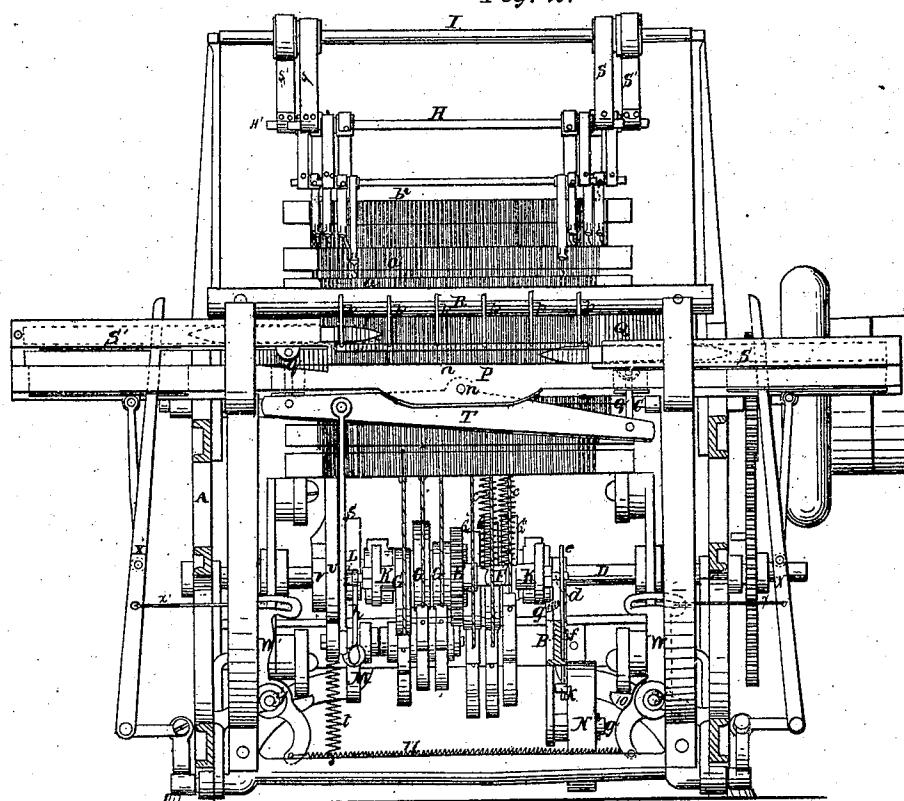
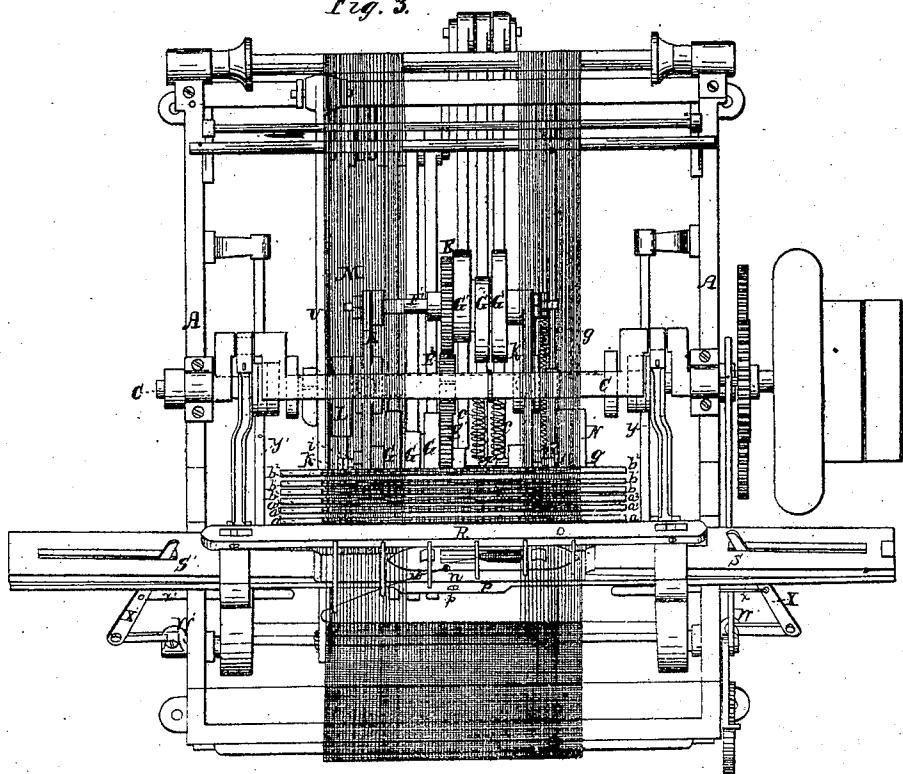


Fig. 3.



UNITED STATES PATENT OFFICE.

GEORGE COPELAND, OF LEWISTON, MAINE.

LOOM.

Specification of Letters Patent No. 12,293, dated January 23, 1855.

To all whom it may concern:

Be it known that I, GEORGE COPELAND, of Lewiston, in the county of Androscoggin and State of Maine, have invented certain 5 new and useful Improvements in Looms for Weaving Seamless Bags and other Open Double Fabrics of a Similar Character; and I do hereby declare that the following is a full, clear, and exact description of the 10 same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1, is a vertical section parallel with the warp of a loom for weaving twilled 15 bags, constructed according to my invention. Fig. 2, is a front elevation of the same with the breast beam and cloth roll removed, and front of the framing broken away to show the parts behind more distinctly. Fig. 3, is a top view of the same 20 with the harness removed. Fig. 4, is a vertical section of the principal working parts, showing them in different positions to Fig. 1. Fig. 5, is a side view, intended to illustrate the manner of effecting the changes of 25 position of the harness cam shafts. Fig. 6, is a longitudinal section of the lay, reed and shuttle boxes, and front view of reed. Fig. 7, is a side view of the cam and treadle 30 which give motion to the shuttle boxes. Figs. 8 and 9 are two of the light metal guides forming the upper shuttle race.

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

35 This invention does not change the general character of the loom from that of the power looms now commonly employed for weaving plain or twilled fabrics, but consists chiefly, in certain modes of constructing, arranging, and operating some of the 40 parts which require to be duplicated.

A loom constructed according to this invention contains two complete sets of harness, either for plain or twilled weaving, 45 according as a plain or twilled bag is required, and all the mechanism necessary to operate the two sets of harness independently of each other. It also contains two shuttle races placed one above the other in 50 front of the same reed, and employs two shuttles which are both, at all times, in operation. In weaving the bag, though only one warp is used, two independent sheds are opened continually, one above the 55 other, and the two shuttles follow each other through the upper and lower sheds,

and thus produce a fabric composed of two parts united at the edges, one half the warp, from which the upper sheds are formed, composing one half or side of the bag, and the other half from which the lower sheds are formed, composing the other half or side of the bag; the two parts of the said fabric only requiring to be united at certain intervals corresponding with the required depth of the bags, to form a continuous piece which, when finished, only requires to be cut across at proper intervals, to separate the bags. The union of the two parts of the fabric is produced by a change 60 in the arrangement of the harness, which is effected without any stoppage of the weaving, to cause the upper and lower parts so to blend that they will be woven together, and when this has continued long enough, 65 the harness resumes its original position in which it continues till a proper length is woven for another bag. The changes of the harness are effected by mechanism which operates with the loom, so that the whole is 70 self acting.

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

A, is the frame of the loom, which only 85 differs from the framing of a common loom, in having an additional rail B, which serves to attach some of the additional working parts.

C, is the crank shaft occupying the usual 90 position and gearing in the usual manner with a shaft D, which corresponds with the cam shaft of the most common form of power loom, and only differs therefrom in not carrying the cams which operate the 95 harness treadles, but in giving motion by gearing E, E', E'', to two sets of harness cams G, G, G, and G', G', G', upon two other shafts arranged parallel with it.

The harness in the loom represented, is 100 composed of six leaves arranged in two sets a, a', a'', and b, b', b'', of three leaves arranged one before the other, each set being like that commonly employed for weaving three leaf twill, the front set a, a', a'' which 105 is to open the lower sheds and weave the lower half of the bag, being arranged to bring the twill on the upper surface, but the back set b, b', b'', which opens the upper sheds and weaves the upper half of the cloth, 110 being arranged to bring the twill on the under surface. Each set of the two sets of

harness is suspended from one of two rolls or rock shafts H , H' , in the usual manner, and the two rolls or rockshafts H , H' , being suspended by straps, S , S' , from a third roll or rockshaft I , which occupies the position occupied by the single harness roll in the common loom. The leaves a , a' , a^2 , of the front harness are connected with treadles J , J , J , and the three leaves b , b' , b^2 , of the back harness, with treadles J' , J' , J' , all arranged side by side, but the latter being some distance in rear of the others, owing to the position of the harness and of the cams which operate upon them. The cam shafts F , F' , are secured at opposite ends of two lever beams K , K , which are hung loosely at their centers on the shaft D , the shaft F , carrying the cams G , G , G , for operating the front harness being at the front end, and the shaft F' , carrying the cams G' , G' , G' , for operating the back harness, at the back end of the beams. The shafts are firmly secured in the beams and their respective cams and wheels E , E' , by which the said cams are driven, are all secured together to rotate freely upon them. In order to weave the open part of the bag, the lever beams K , K , and shafts F , F' , are held stationary in the position shown in Fig. 1, by the action of springs c , c , which connect the shaft F , to the crank shaft, and draw a stud d , which is formed by the protrusion of its right hand end d , through the beam, against a hook e , which is pivoted by a pivot f , to the rail B , of the framing, as shown in Fig. 1, and is held secure by a spring g , connecting it with the said rail above the pivot. While the beams and cam shafts are in the above position, the two sets a , a' , a^2 , and b , b' , b^2 , of harness operate independently of each other, the front set a , a' , a^2 , opening a shed below, and the back set b , b' , b^2 , opening another shed above the line of the warp, and continuing this operation without the two sheds interfering with each other in any way whatever, the two shafts or rolls H , H' , occupying in the meantime, fixed positions relatively to the shaft I .

In order to weave the bottom of the bag, the hook e , requires to be set free of the stud d , when a rocking motion of the lever beams takes place, and they are alternately drawn to the positions shown in Fig. 4, by the action of the springs c , c , and back again to the position shown in Fig. 1, by a cam L , on the shaft D , acting upon a treadle M , which is arranged by the side of the harness treadles and connects by a rod h , with the left hand end i , of the shaft F . The movement which is given by the springs c , c , is limited by a stop piece j , which is attached to the rail B , (see Fig. 1) to receive the end of the shaft F' . The rocking operation of the lever beams and cam shafts is

further illustrated in Fig. 5, where the position corresponding with Fig. 4, is shown in black, and that corresponding with Fig. 1, in red outline. The lever beams are thrown regularly to the former position at the time of one flight of the shuttle, and to the latter position, at the time of the next flight. This alternate elevation and depression of the shafts F , and F' , acts upon the whole of the treadles at once, in such way as to change the position of the whole harness, as will be seen by comparing Figs. 1 and 4, causing the shafts or rolls H , and H' , to change their positions relatively to the shaft or roll I . When the harness treadles and cams are in the position shown in Fig. 4, the two separate sheds are no longer maintained, but by the depression of the whole of the back harness b , b' , b^2 , and elevation of the front harness a , a' , a^2 , they are woven into each other as shown by the crossing of the warp threads, in that figure. The reason why the rocking of the lever beams is kept up in weaving the bottom and the harness is not allowed to remain in the position shown in Fig. 4, is that when enough of the fabric has been woven together, the hook e , may catch the stud d , which it could not do when the lever beams were in the position of Fig. 4. The throwing the hook e , on and off, is effected by a stud k , on one side of a disk N , which is fitted to rotate on an axle g' , attached to the rail B , of the frame. This pulley is driven by a band l , from the cloth beam or bag roll O , and its diameter bears such a relation to that of the beam or roll O , as is necessary to make it perform one revolution, while one bag of the desired length is woven. The length of the bag is therefore regulated by the size of this disk N , which requires to be changed for one of different diameter for bags of different length. The stud k acts upon the front side of a tail m , which is extended from the hook below the pivot f , and thus forces back the hook and holds it clear of the stud d , until it passes to the tail, when the hook is thrown into action by the spring g . The time the hook remains thrown off, and the length of the fabric which is woven to close the bag bottom depends upon the length of the tail m , or the distance of the stud k , from the axle of the disk.

P , is the lay supported and driven in the usual way from the crank shaft.

Q , is the reed which is of the usual construction, but must be of twice the depth that is necessary for a common loom, in order that it may receive the two open sheds of warp and allow the two shuttles to pass one above another, when one travels upon the raceway n , which corresponds with the raceway of the common loom, and the other upon a raceway made of a number of light metal guides p , p , which are attached to the

lay cap R, and which form a sort of cage through which the upper shuttle may pass, and by reason of their thinness, do not interfere with the warp whose threads pass them without difficulty. The guides p, p, are of such form that they constitute a flat track for the sole of the shuttle, and a guard to prevent its flying off, and their distance apart may be about a third of the length of 5 the shuttle. S, S', are the shuttle boxes which are connected at their outer ends with the ends of the lay in such a manner as to leave their inner ends free to move up and down opposite either of the two raceways, 10 15 20 25 30 35 40 45 50 55 60 65

the box S, being connected in such manner that it will stand horizontally opposite the lower raceway n, and form a continuation thereof, and the box S', in such manner as to stand horizontally opposite the raceway p, p, and form a continuation thereof, and either shuttle being in an inclined position when opposite the other raceway. The object of thus attaching the shuttle boxes to the lay is, that the two shuttles may be made to follow one another in the direction of the arrows shown in Fig. 6, both leaving the boxes together, and one moving to the left along the lower raceway, while the other moves to the right along the upper one, passing one another in the center of the two sheds, and each entering the opposite box which, during its flight, will have had its position changed to receive it. In order to effect this, the boxes must stand in line with the raceways, as shown in black in Fig. 6, at the time the sheds are open and the action of the pickers takes place to throw the shuttles, and immediately after the shuttles have left them, their positions must be changed with sufficient rapidity to bring each opposite the other raceway, as represented in red outline in the same figure, to be in readiness to receive the shuttle thrown from the other; after which, and before the completion of the next opening of the shed, and before the next operation of the pickers to throw the shuttles, they must resume the position shown in black. The movements of the shuttle boxes are given by connecting them to rods q, q, at equal distances from the center of a lever T, which hangs on a pivot r, under the center of the lay, and is connected at one end by a rod s, with a treadle U, which is operated upon by a double cam V, on the shaft D, and a spring t, which attaches it to the lower part of the framing. The change of position from that shown in red, to that shown in black outline in Fig. 6, is effected by the cam raising the treadle, but the sudden and instantaneous change from the black to the red position is effected by one of the steps u, u, of the cam passing the treadle at the right time, and the treadle being suddenly pulled down by the spring t.

In employing an upper raceway composed of a number of guides p, p, as described, it is necessary to make some provision for the thread which is leaving the shuttle while the latter is in the upper raceway, to draw directly, or nearly so, from the filling point at the edge of the warp, which would be prevented if the fronts of the guides were without opening, as shown in Fig. 8, which represents the form employed for the greater 70 75 80 85 90 95 100 105 110 115 120 125 130

number. The provision which I make for this purpose, consists merely in forming a few of those guides which are nearest to the side of the loom from which the shuttle enters the upper shed, with a slot r, as shown in Fig. 9, to admit the thread, so that it may draw in the direction shown by the blue line w, representing it in the plan Fig. 3. It will be evident that, if all the guides were constructed without these slots, as shown in Fig. 8, a portion of the weft thread leading from the filling point to the first guide, would be left slack at every filling. In order not to make the guides stand out farther than is necessary, the length of the slots may be progressive, commencing near the center of the loom, very short, and increasing to the outermost guide which will require to have the longest one. This will be understood by referring to Figs. 1 and 3, particularly the latter figure.

The shuttle motion in this loom may be the same as that employed in common looms, the main point of difference being the operation of both pickers at once as above described instead of one at a time alternately. The picker staves X, X', are represented as being operated to throw the shuttles, by means of rods x, x', connected with the upper arms of levers W, W', which are secured to rock shafts y, y', arranged parallel with the sides of, and near the bottom of the loom. The said shafts y, y', having the necessary motion given to them at the proper time, by means of arms Y, Y', on the shaft D, carrying rollers Z, Z', which are brought by the revolution of the shaft into contact with toes 10, 10, on the rockshafts, and made to depress the said toes suddenly, and thus to give the picker staves the necessary motion. The picker staves are returned after having thrown the shuttle, by a spring 11, connecting the lower arms of the two levers W, W'. This way of driving the shuttles is well known.

The operation of weaving the bags in this loom is commenced and proceeds in the following manner. The warp, composed of a proper number of threads, is inserted in the loom in the common way, and the harness being properly adjusted, the loom may be started in the usual manner. The disk N, may be adjusted for its stud k, to throw off the hook e, immediately from the stud d, and cause the operation of weaving the up-

per and lower sheds together to be commenced as shown in Fig. 4, where, as well as in Fig. 1, the warp threads are shown in blue outlines, to weave the bottom of a bag; 5 but as soon as the stud *k*, passes the tail of the hook and the hook catches the stud *d*, and brings the lever beams *K*, *K*, and cam shafts *F*, *F'*, to the position shown in Fig. 1, the warp is continually opened in two 10 entirely independent sheds, one above the other (as shown in blue outline in Fig. 1), and the two shuttles in following each other through the upper and lower sheds in regular succession, weave a double open fabric. 15 This operation continues until the proper length for one bag has been woven, by which time the stud *k*, will have arrived in contact with the tail of the hook *e*, and set free the lever beams *K*, *K*, which will then 20 commence their rocking, and at every second opening of the sheds, will bring some of the threads which form portions of the lower sheds in Fig. 1, into the upper shed, and some of the threads which form the 25 lower sheds in Fig. 1, into the upper shed. The shuttles still following one another as before through an upper and lower shed put in the filling in such a way as to make a closed fabric. This latter operation only 30 requires to be continued for a short time, say till a length of from half an inch to an inch has been woven, when the stud *k*, will pass the hook *e*, and set it free to catch the stud *d*, and the open weaving will be again 35 proceeded with. When the whole piece is woven, it is composed of a number of long open parts 12, 12, and a number of short closed parts 13, 13, as shown by the blue outlines in Fig. 4, where the fabric is represented 40 from the filling point to the cloth beam or bag roll *O*, and when the piece is removed from the loom it is cut at one end of every closed part 13, to form the bags. When the bags are cut off, each is turned 45 inside out to bring the closed piece forming the bottom, inside, and give it a neat appearance. The turning of the bag inside out brings the face of the tweel outside on both sides of the bag; it having been with 50 a view to this turning inside out that the tweel was brought on the upper face of the lower part and the under face of the upper part.

In order to weave plain bags, the reduction of the number of leaves of the harness and of the cams and treadles for operating them, will be necessary, four leaves only being required to operate in two pairs, each pair being hung on one of the shafts or 60 rolls *H*, *H'*, which would still be suspended from the top shaft or roll *I*, in the manner represented. The gearing of the cam shaft will also require to be changed, those represented making only half the revolutions of 65 the shaft *D*, while the cam shafts of the

plain harness would require to make as many revolutions as the shaft *D*, or half as many as the crank shaft. In weaving the open part of the plain bag, each pair of harness will operate like the harness of a 70 loom for plain fabrics, but in weaving the end or bottom, the sheds will be blended, substantially as in weaving the twilled bag.

The loom represented may be used for weaving wind-sails for ships, or any other 75 tubular fabric, by simply throwing off the band *l*, and stopping the action of the pulley *N*, and its stud *k*, and thereby leaving the lever beams *K*, *K*, and the cam shafts *F*, *F'*, in the position shown in Fig. 1, when the 80 open weaving will continue throughout the whole piece. A loom constructed specially for the above-named purpose might have the shafts *F*, *F'*, secured in or working in bearings in the position represented in Fig. 85 1, and the lever beams *K*, *K*, the cam *L*, treadle *M*, rod *h*, springs *c*, *c*, hook *e*, and disk *N*, may all be dispensed with, thus making it more simple than the loom represented.

The manner herein shown, of arranging 90 the shutter boxes, is that which I consider to be the best, though my invention is by no means limited to that arrangement, as they may rise and fall parallel with the raceways instead of vibrating from the end as shown, 95 and probably may be arranged to work in other ways.

Having thus fully described my invention, I will proceed to point out what I claim as new, and desire to secure by Letters Patent. 100

1. I claim, placing the cams *G*, *G*, *G*, and *G'*, *G'*, *G'*, which operate the two sets of harness upon two shafts *F*, and *F'*, carried by opposite arms of lever beams *K*, *K*, which are capable of rocking upon a fixed shaft *D*, 105 with which the cam shafts *F*, *F'*, are geared, and from which they receive the motion, substantially as herein described, relatively to each other, to change the operation of the harness. 110

2. I claim, the method herein described, of securing the lever beams *K*, *K*, to maintain the proper position of the cam shafts for one mode of operating the harnesses, and changing their position for the other mode of operating, by means of a spring or springs *c*, *c*, or equivalents, or hook *e*, and a disk *N*, or equivalent, carrying a stud *k*, all operating and acted upon substantially as herein set forth. 115

3. In weaving the closed part of the fabric or bottom of the bag, I claim giving the lever beams a continual rocking movement on the shaft *D*, for the purpose of enabling them to be caught by the hook *e*, and secured 120 in position for weaving the open part of the fabric, as soon as a sufficient length of closed part or bottom has been woven and the hook escapes from the stud *k*, which holds it during the latter weaving operation. 125

4. Though I do not claim the employment of two raceways in the same loom with two shuttles which move simultaneously, one leaving its thread in the upper and the other 5 in the lower of two sheds opened one above the other, I claim for the purpose of throwing and catching the two shuttles simultaneously pivoting the shuttle boxes to the ends of the lay substantially as described so that 10 they may by a vibrating or swinging motion move opposite to the upper or lower raceway as required.

5. I claim the manner herein described, of operating the two shuttle boxes, so that both 15 may move simultaneously to and from the

positions for throwing and catching the shuttles, by connecting both with a lever T, which is arranged to work under the lay and receives the required motion from a treadle and cam, or other analogous means. 20

6. I claim the slots in the bars p, p, which form the upper raceway, for the purpose of enabling the weft thread which is being carried through the warp, to draw directly or nearly so from the filling point of the cloth 25 or fabric.

GEORGE COPELAND.

Witnesses:

AARON YOUNG, Jr.,
JOSEPH S. ANDERSON.