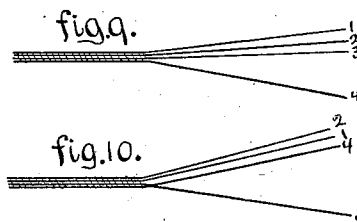
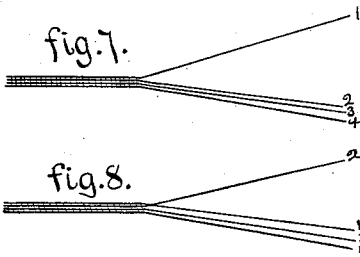
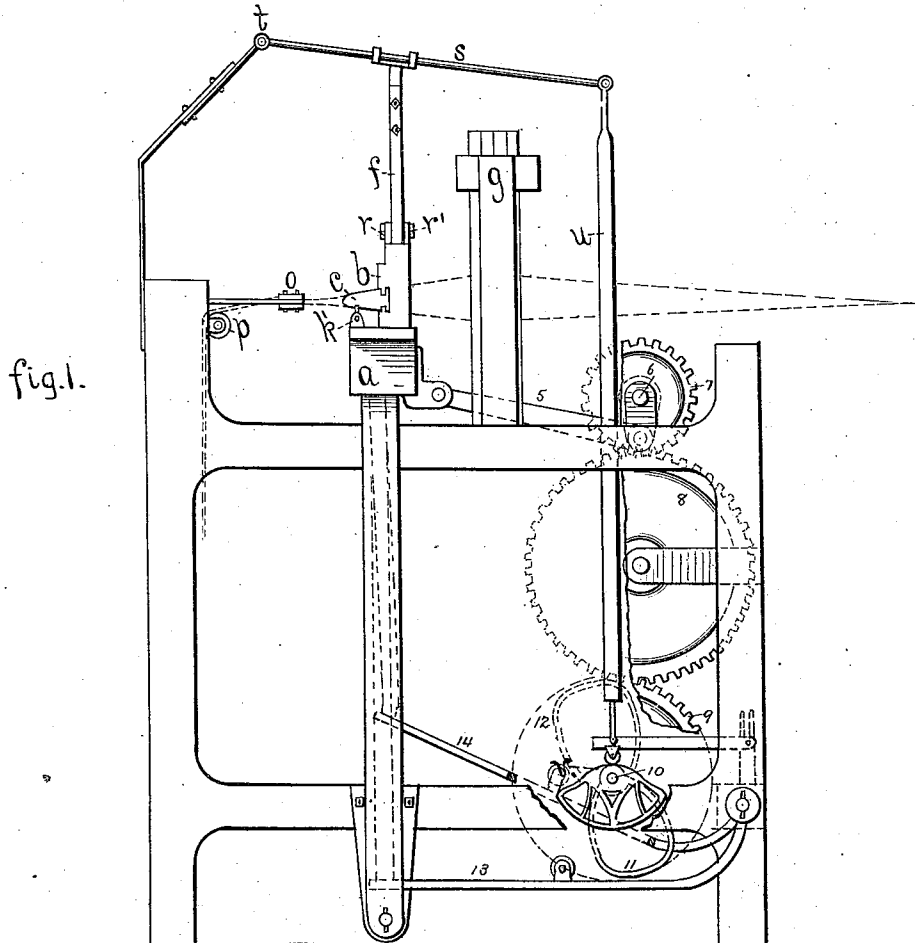


H. W. CADY.

2 Sheets—Sheet 1.

Loom for Weaving Tubular Fabrics.
No. 226,594. Patented April 20, 1880.



Witnesses:
R. D. Gayland
E. Stelle

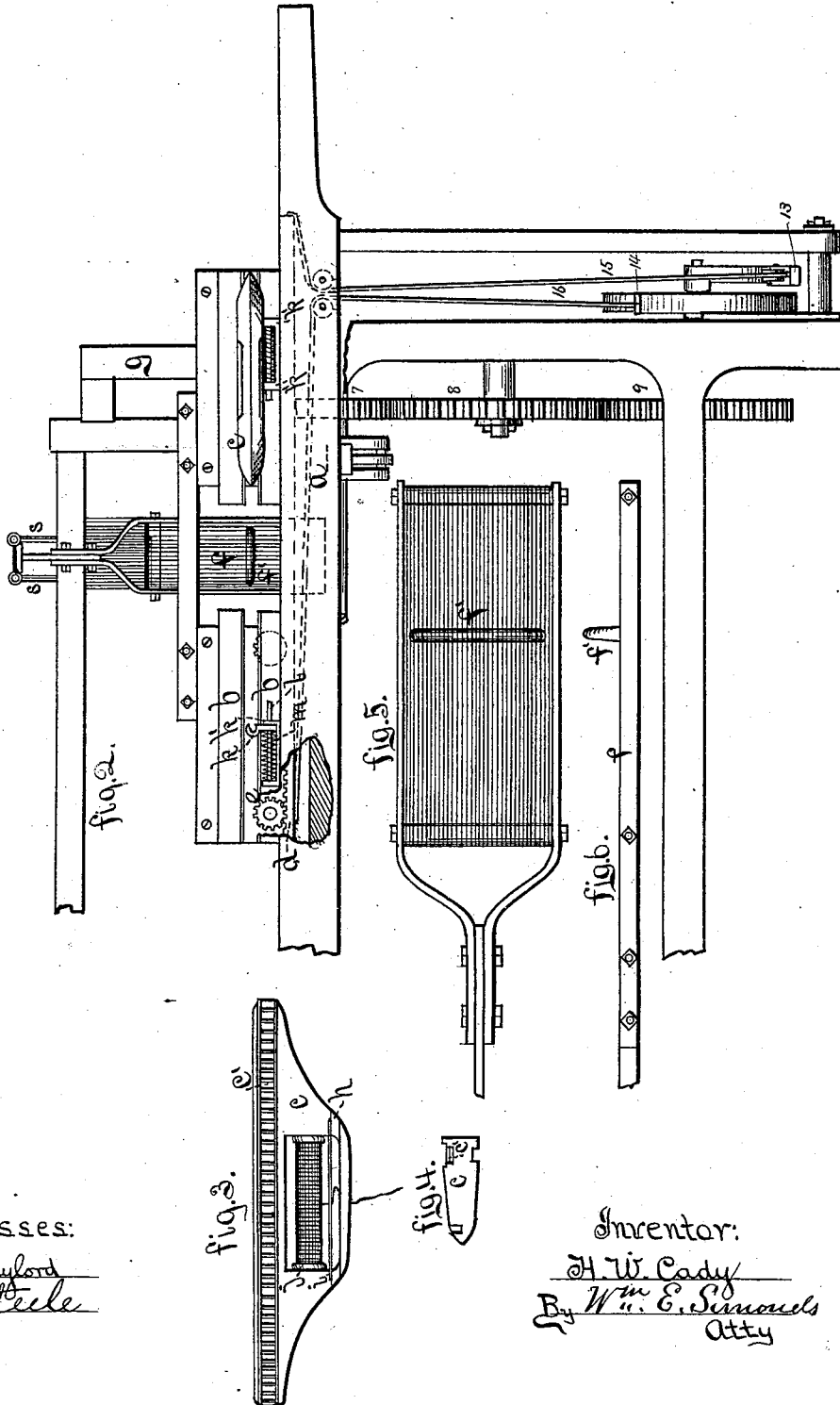
Inventor:
H. W. Cady,
By Wm. E. Simonds
Atty.

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Loom for Weaving Tubular Fabrics.

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Witnesses:

R. F. Gaylord
T. E. Steele

Inventor:

H. W. Cady
By Wm. E. Simonds
Atty

UNITED STATES PATENT OFFICE.

HENRY W. CADY, OF PAWTUCKET, R. I., ASSIGNOR TO THE RUSSELL
MANUFACTURING COMPANY, OF MIDDLETOWN, CONN.

LOOM FOR WEAVING TUBULAR FABRICS.

SPECIFICATION forming part of Letters Patent No. 226,594, dated April 20, 1880.

Application filed March 24, 1879.

To all whom it may concern:

Be it known that I, HENRY W. CADY, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements pertaining to Looms, of which the following is a specification, reference being had to the accompanying drawings, where—

Figure 1 is an end view of a loom embodying my improvements. Fig. 2 is a front view of the lathe, the breast of the loom being broken away. Only one end of the lathe is shown, there being two or more duplicate sets of weaving apparatus on the same lathe. Figs. 3 and 4 represent enlarged side and end views of the shuttle. Figs. 5 and 6 are enlarged top and side views of the reed. Figs. 7, 8, 9, and 10 show side views of the warp, with different sections in their successively relative positions.

My invention consists in adding improvements, hereinafter to be described, to the common form of tape or belt loom, whereby I am enabled to weave, by machinery, in one piece and without a seam or selvage, the fabric of ordinary tubular fire-hose of one or more ply.

Referring now to the drawings, and particularly to Figs. 1 and 2, the letter *a* represents the lathe of my loom, vibrating in the usual manner, and bearing on its face the ways *b b*, in which the shuttle *c* travels, being actuated through the medium of the rack *d*, which drives the pinions *e*, and they, in turn, mesh in the rack *c'* of the shuttle.

Between the two sets of ways *b b* is located the reed *f*, back of which is the harness, composed of four or more parts, moving up and down in the frame *g*.

Supposing, now, the four sections of warp—two for the upper and two for the lower half of the fabric—to be properly arranged and a piece of the fabric commenced, the action is as follows: The first part of the harness rises, carrying with it the first section of warp, Fig. 7, the shuttle passes to the opposite side through the shed formed by the first section of warp being above and the second below, and leaves a thread of the filling. Now the lathe moves forward, causing the reed to beat up against the filling-thread just laid. Now

the third and second parts of the harness rise, carrying with them the second and third sections of warp, Fig. 9, and the flight of the shuttle is through the shed formed by section 3 of the warp being above and section 4 below, after which the reed beats up again against the filling-thread. At this point these sections of warp cross each other over the filling just laid, the first and second parts of the harness fall back, carrying warp-sections 1 and 3, and the shuttle passes above section 1 and below section 2. After the beating up of the reed the first and fourth parts of the harness rise and the shuttle flies above section 3 and below section 4 of the warp.

It will be seen by this description that the shuttle passes around the edge of the whole fabric, weaving all parts alike; but a fabric woven in this way would come from the loom in very irregular shape, and would not answer the purpose for which it is intended.

To avoid this irregularity of shape, and to produce a fabric which will open into a perfect cylindrical form, I build up on my reed the former *f'*, which practically, though not necessarily, separates the warp-sections of the upper half of the fabric from those of the lower. This former does not extend quite to either side of the reed, enough of the flat strips that compose the reed being left uncovered to allow the warp-threads to be woven around the edges of the former, and it is of the right size to completely fill out the fabric every time the reed beats up against the filling-thread, thus keeping it very firm, regular in thickness, tightly woven, and perfectly uniform in size. This uniformity of the fabric produced is also brought about, in conjunction with the means just described, by regulating the tension of the warp-filling, making it to draw tightly when the shuttle comes to rest, and allowing it to play out easily when the shuttle is in its flight.

Thus it will be seen that the reed beats up only when the filling-thread is tightly drawn between the sections of warp, and for this reason the liability of loops or knots occurring is avoided. This regulation of the tension of the filling-thread I accomplish by making in my shuttle a slot, *h*—in this particular case formed by the plate *i* and the side of the shut-

tle—cutting across the hole through which the filling passes out from the bobbin *j*.

The letter *k* represents a spring-catch borne on shaft *l* and actuated by spring *m*. This spring-catch is so located on the lathe that as the shuttle passes over it, and just before it reaches the limit of its flight, it shall catch that part of the filling-thread then passing across the slot *h* and cause it to form a loop, as seen in Fig. 3. This loop and the contact of the filling-thread with the edges of the catch and slot effectually prevent the filling-thread from unwinding from the bobbin until the spring-catch is drawn back, and during the remainder of the shuttle's flight the filling just laid between the sections of warp is drawn tight, its elasticity preventing its breaking, and is held so until the reed has beaten up and the shuttle started on its return. The spring-catch, moving as it does a short distance with the bobbin, is held to engagement with the loop in the filling-thread by the spring *m*.

The spring-catch being limited in its movement by the two supports, *k' k'*, it will be readily seen that as the shuttle retreats the catch loosens its hold on the filling-thread, which is again free to run out.

A spring-catch of the same construction and for the same purpose is located on the opposite side of the warp.

As the fabric is woven it passes forward through guide *o* and over roller *p*, where it may be weighted, or in any of the many other ways kept taut.

As the weaving goes on there is a slight up-and-down movement of the fabric, owing to the constantly-varying positions of the warp-sections. This and the circular movement of the reed, riding on the vibrating lathe, would, were the reed fixed, cause the warp to come in frictional contact with the former, and the warp being drawn very tight would soon wear it in shreds did I not obviate the difficulty by a device which I will now describe.

The reed is loose to move up and down in the lathe, being held between the plates *r r'*. At its upper end it has a cross-head attachment to the reed-guides *s s*, which have a stationary bearing at *t*, and which are jointed at their other ends to a vertical link, *u*, the lower end of which is arranged to travel on the periphery of cam *v*. This arrangement of the reed-guides with the link *u* and the size, speed, and shape of the cam are such that as the reed

beats up against the filling-thread it has the right movement up and down to avoid the frictional contact of the former with the warp. I have described these reed-guides as located above the lathe. It will be plainly seen that to place them below the lathe would not alter the principle of their action.

To operate the lay I may employ a rod, 5, connected to a crank-shaft, 6, which may receive motion through a pinion, 7, meshing with a spur-wheel, 8, that is revolved by a pinion, 9, on the cam-shaft 10, and this latter shaft may be the driving-shaft. The shuttle-driving rack *d* may be reciprocated by means of cams 11 and 12 on the shaft 10, said cams operating pedal-like levers 13 14, that have straps 15 16 leading from their front or free ends up over pulleys in the beam *a*, and attached at opposite ends to the rack *d*.

It will be noticed as a feature of the operation of this loom that the reed bearing the former or plug reciprocates vertically—*i. e.*, substantially vertically—with each flight of the shuttle. I have pointed out hereinbefore how this movement of the reed and former is made to avoid undue and hurtful friction of the former upon the warp in its varying positions; but I now advert to this feature to show that it also permits the shuttle to move transversely back and forth in straight lines on the same plane, avoiding the necessity for having the shuttle pass around the former, so to speak.

I claim as my invention—

1. The lathe provided with a reed having a former, as described, and mechanism to reciprocate the reed vertically at each vibration of the lathe, in combination with a shuttle adapted to move in straight lines across the face of the reed, and mechanism to actuate the same, substantially as and for the purposes set forth.

2. In combination, the reed *f*, bearing the former *f'*, the reed-guides *s s*, the link *u*, and the cam *v*, all combined substantially as described, and for the purpose set forth.

3. The combination of the shuttle *c*, having the slot *h* across the passage of the filling-thread, with the spring-catches *k k*, constructed and arranged substantially as described, and for the purpose set forth.

HENRY W. CADY.

Witnesses:

E. H. BURR,
E. DEMING.