No. 799,594. PATENTED SEPT. 12, 1905.

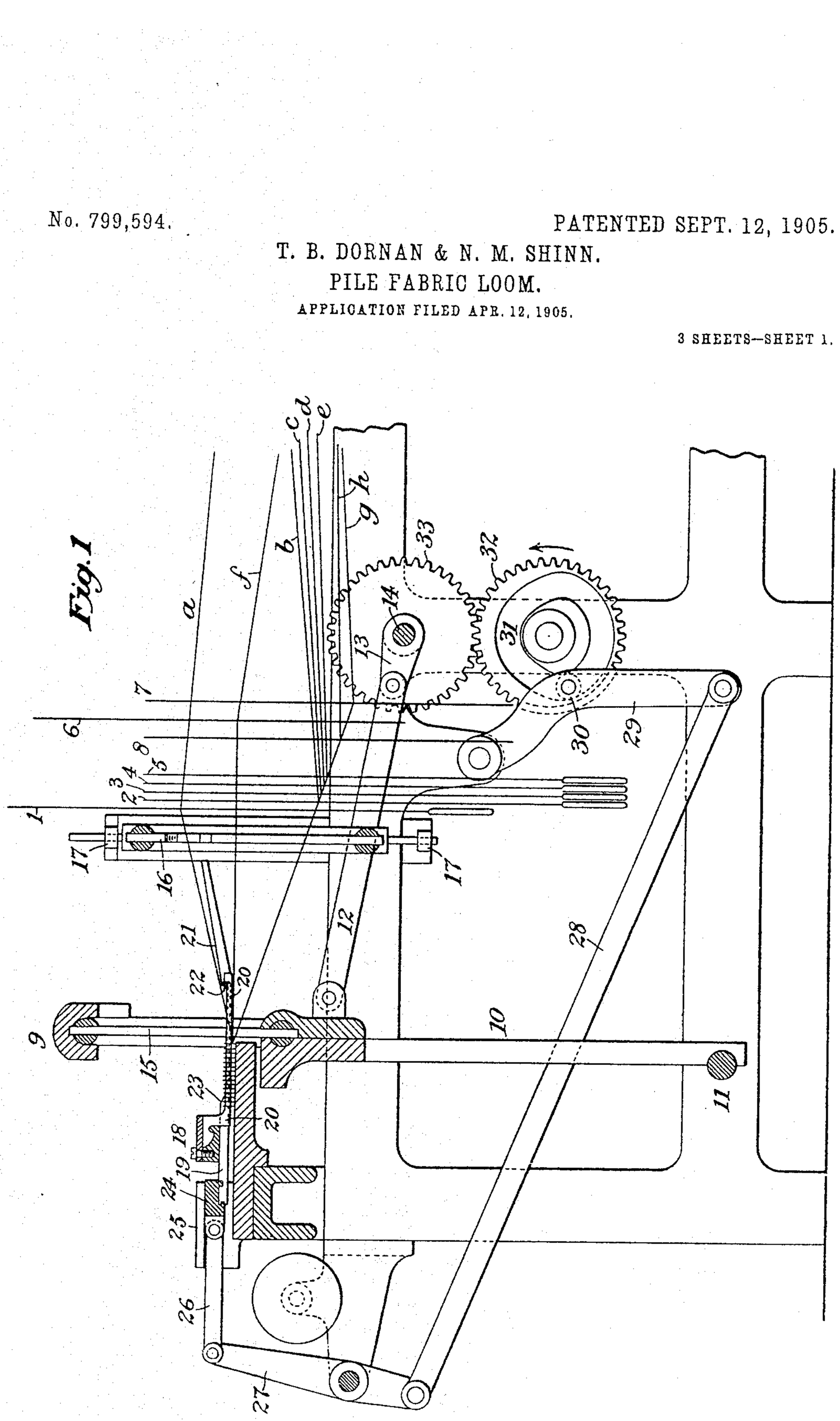
T. B. DORNAN & N. M. SHINN.

PILE FABRIC LOOM.

APPLICATION FILED APR. 12, 1905.

3 SHEETS—SHEET 1.

Fig. 1



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by Henry B. Williams
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3 SHEETS—SHEET 2.

Fig. 2

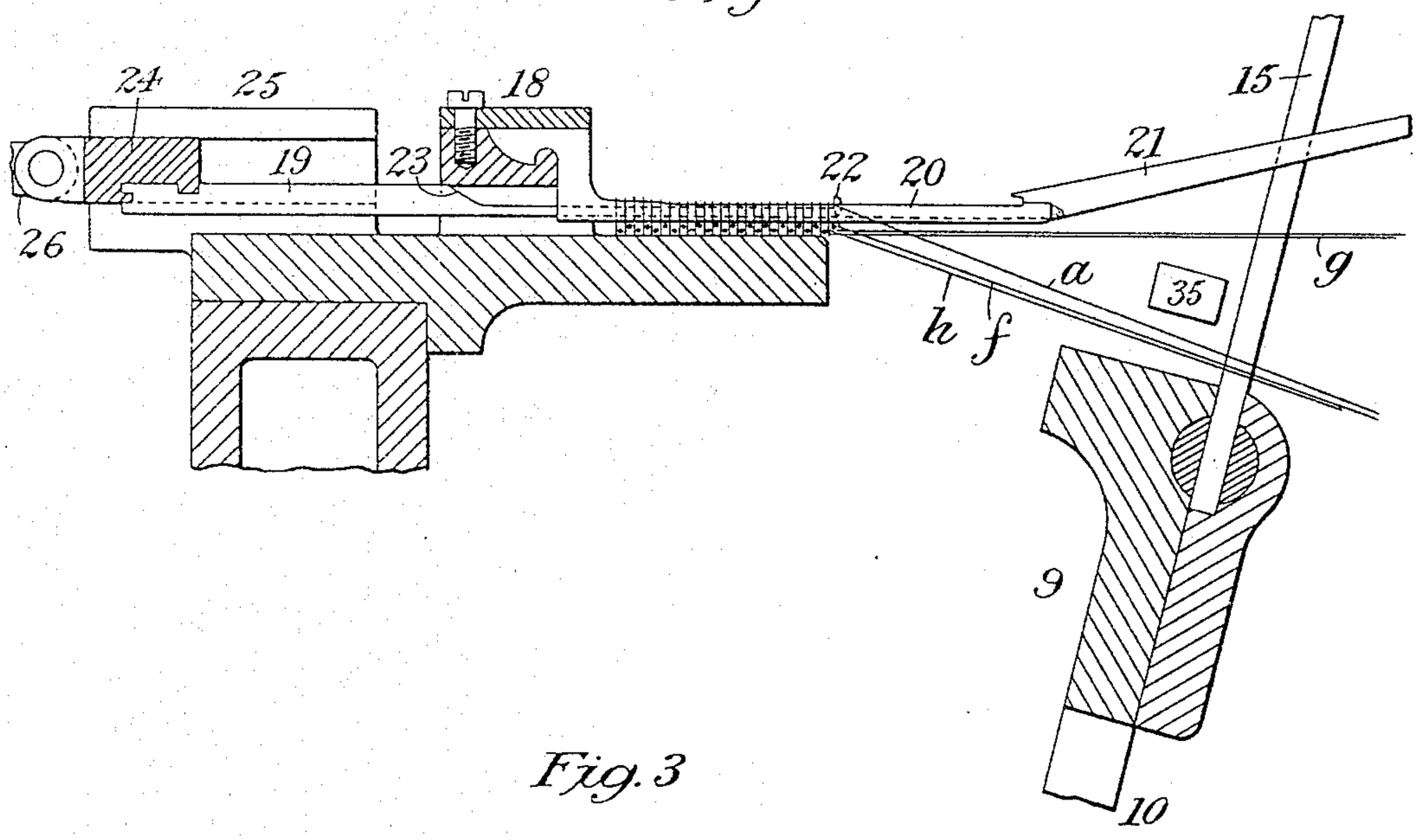

Fig. 3

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3 SHEETS—SHEET 3.

Fig. 4

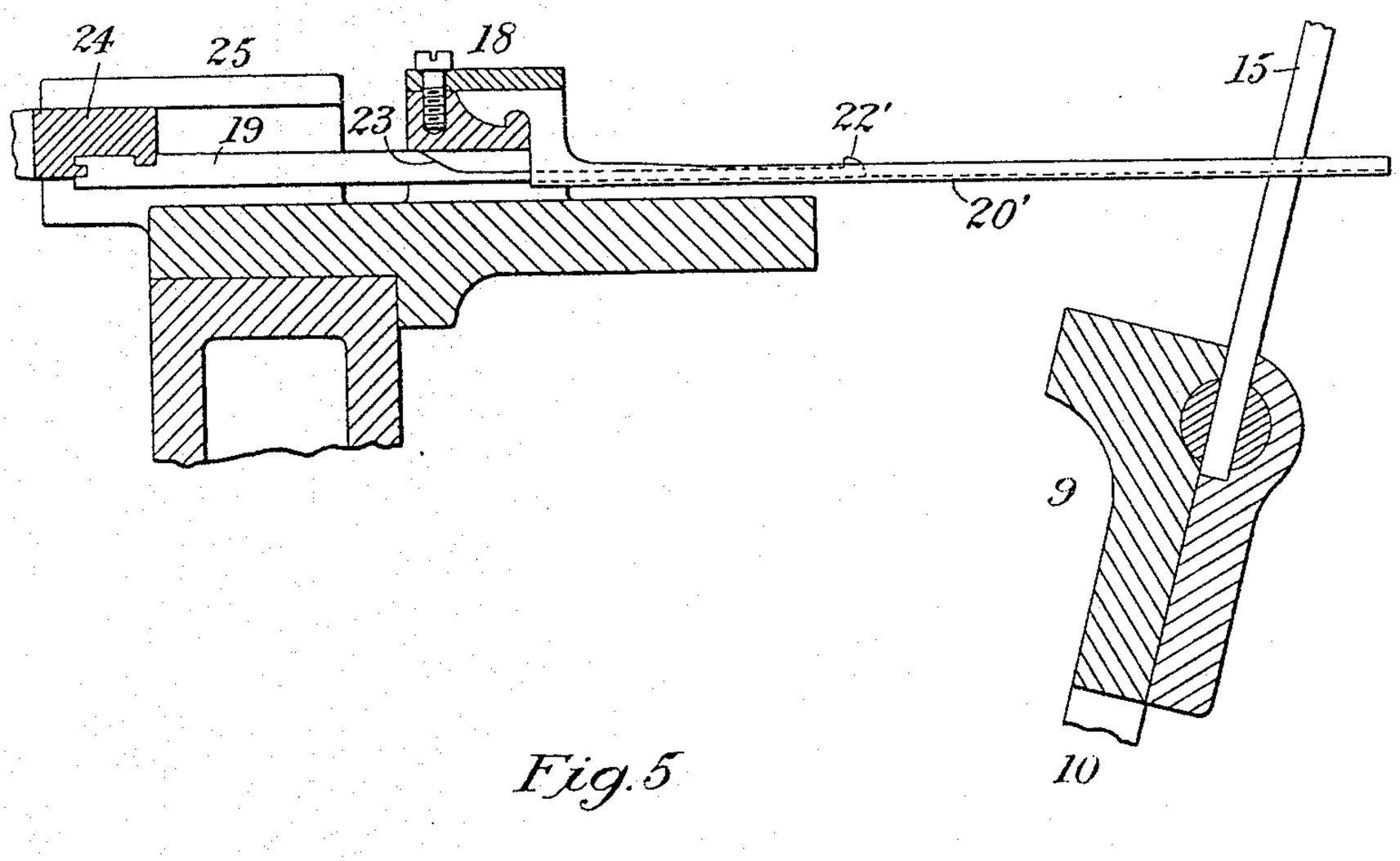


Fig. 5

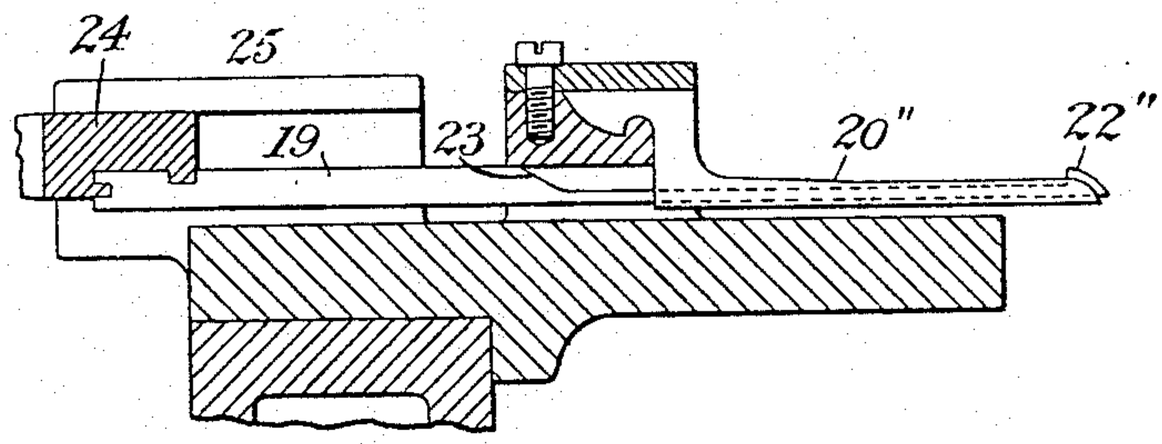
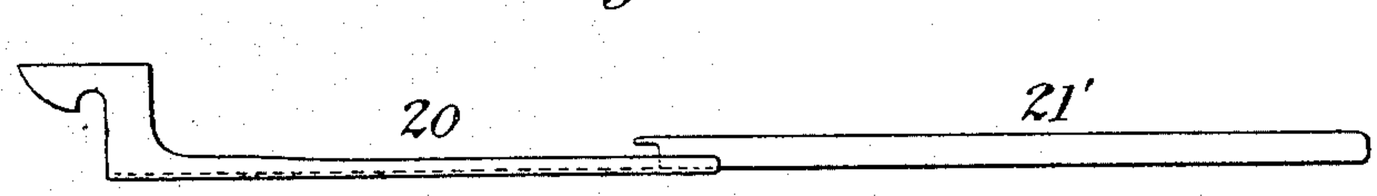


Fig. 6



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UNITED STATES PATENT OFFICE.

THOMAS BENTON DORNAN AND NATHANIEL MARCUS SHINN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO ROBERT DORNAN AND THOMAS BENTON DORNAN, OF PHILADELPHIA, PENNSYLVANIA.

PILE-FABRIC LOOM.

No. 799,594. Specification of Letters Patent. Patented Sept. 12, 1905.

Application filed April 12, 1905. Serial No. 255,245.

To all whom it may concern:

Be it known that we, THOMAS BENTON DORNAN and NATHANIEL MARCUS SHINN, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Pile-Fabric Looms, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

This invention relates to pile-fabric looms, and more particularly to such looms in which longitudinal pile-wires are employed. Heretofore by reason of the crossing of pile-forming warp-threads over longitudinal pile-wires the pile-forming warp-threads have been elevated above the other lower threads of the shed by reason of the position of the loops or bights of the pile-forming warp-threads upon the pile-wires, so as to materially diminish or decrease the height of the opening of the shed as a whole. The diminution of the opening of the shed has been objectionable for various reasons, among others that it required the employment of a shuttle of smaller size, and therefore smaller capacity, than ordinarily used.

One of the objects of our invention is the control of the pile-forming warp-threads so as to bring them nearly or substantially in alinement with the other lower threads of a shed, thereby obviating the objections heretofore existing and permitting the employment of a shuttle of ordinary or large dimensions.

The location of the bights or loops of the pile-forming threads upon the pile-wires at a substantial distance in rear of the cloth-line has also necessitated the forcing of the pile-forming warp-threads forward into proper position by the weft-thread when carried forward by the beat of the lay, producing considerable and variable resistance and tension and affecting the uniformity of the pile-forming and weaving operation, and these objections are also overcome by the control of the pile-forming warp-threads in accordance with our invention.

Other objects of our invention are to effectively and economically cut the pile for the production of a Wilton, velvet, or other cut-pile fabric and to thus cut the pile without the addition of other parts than are required for controlling the warps.

We will now particularly describe the constructions embodying our invention, illustrated in the accompanying drawings, and will thereafter point out our invention in claims.

Figure 1 is a longitudinal vertical section of the principal parts of a loom with the lay in extreme forward position. Fig. 2 is an enlarged longitudinal vertical section showing a pile-wire and warp-controller and adjacent parts with the lay in extreme backward position. Fig. 3 is a plan view of the pile-wires, warp-controllers, and adjacent parts with middle portions of the width of the loom broken away. Fig. 4 is a view, similar to Fig. 2, of a modified construction of pile-wire and warp-controller. Fig. 5 is a similar view of another modified construction. Fig. 6 is a side elevation of a pile-wire of another modified construction.

The drawings illustrate only such parts of the loom as are required for an understanding of our invention.

The figuring-warps *a*, *b*, *c*, *d*, and *e* are controlled by figuring-harness comprising cords 1, 2, 3, 4, and 5, respectively, which would be actuated by suitable jacquard or other mechanism to lift the pile-forming threads selected to form the pile and to lower the same to enter the shed while the lay is in forward position. The binder warp-threads *f* and *g* and the stuffer warp-thread *h* are controlled by heddles 6, 7, and 8, respectively, and may be operated in any usual manner.

The lay 9 is carried on swords 10 on a rock-shaft 11 and is actuated through connecting-rods 12 by cranks 13 on the main shaft 14. The reed 15 may be of any usual or suitable construction, and suitable means may be provided for crossing the pile-forming warp-threads, such as the vertically-moving crossing-reed of Patent No. 733,434 to Nathaniel M. Shinn, dated July 14, 1903. Such a crossing-reed 16 is indicated in the drawings, shown as vertically movable in stationary guides 17, the actuating means for this crossing-reed not being shown. This crossing-reed forms no part of the present invention, and is therefore not particularly shown and need not be further described, as many devices are well known in the art for effecting the crossing of pile-forming warp-threads over longitudinal pile-wires.

Several modified constructions of pile-wires

are shown in the drawings. We will first particularly describe the construction shown in Figs. 1, 2, and 3. Here each pile-wire is composed in part of a longitudinally-channeled horizontal portion 20 and an upwardly-inclined unchanneled rear extension 21. The channeled portion may be conveniently formed by folding along its lower edge a piece of thin sheet metal—such as tin, sheet iron or steel—with the two parts of the folds separated at such a distance as to provide the proper channel between them, while the unchanneled rear extension 21 may be made of a flat piece of sheet metal entering the channel at the rear end of the channel portion and suitably secured therein, as by solder, filling in the corner so that the thread will freely pass the joint. These rear extensions of the pile-wires pass through the dents of the reed and are at all times within the reed during the movement thereof. The pile-wires are shown as supported at their front end in a lock-bar 18, which may be of any suitable construction. The warp-controllers enter and reciprocate longitudinally in the longitudinal channels in the pile-wires and may be conveniently made of thin sheet metal, preferably steel, each warp-controller 19 having a pile-loop engager or hook 22 and being narrower than the height of the channel in the pile-wire for a considerable distance in advance of such pile-loop engager and of increasing width and provided with an oblique knife-edge 23 at a part thereof so located that the knife-edge will properly cut the pile as the controller approaches its extreme rearward position. Each warp-controller 19 is guided at the bottom of the channel of the pile-wire in which it reciprocates and may also be guided by bottom of the lock-bar 18, as shown, and is held at its rear end in a reciprocating transverse bar 24, fitted to slide longitudinally of the loom in suitable bearings 25 at the sides of the loom and shown as actuated by means of connecting-rods 26, a rock-frame 27, connecting-rod 28, and cam-actuated arm 29, this cam-actuated arm carrying the cam-roller 30, working in a cam-groove 31, shown as formed in a gear-wheel 32, meshing with a gear-wheel 33 on the main shaft, these two gears having an equal number of teeth, so that the cam will make one rotation for each beat of the lay and the cam being shaped so as to cause one reciprocation of the warp-controllers for each beat of the lay. In Fig. 1 the extreme rearward position of the warp-controllers is shown. In this position the pile-loop engagers 22 pass under overhanging spurs at the front ends of the rear extensions 21 of the pile-wires, so that the loops or bights of the pile-forming warp-threads may pass freely forward over the pile-wires as the pile-forming warp-threads are lowered to the bottom of the shed and may occupy positions on the pile-wires slightly in advance of the pile-loop engagers 22. The following forward movement of the warp-controllers will carry the pile-loop engagers 22 into contact with the loops of the warp-threads passing over the pile-wires, and as the forward movement of the warp-controllers continues the pile-loop engagers will carry the loops forward substantially to the cloth-line. This position is shown in Fig. 2, the warp-controllers then having reached their extreme forward position. The pile-forming warp-threads will have been carried so far forward by the forward movement of the warp-controllers that they will be very nearly in alinement with the lower warp-threads of the shed, and this will permit a large shuttle—such as 35, Fig. 2—to be shot through the shed. The loops of the pile-forming warp-threads will also have been carried forward to substantially their final position for the beating-up operation. As the lay moves forward the warp-controllers are moved rearward, and as they approach their extreme rearward position the knife-edges 23 sever the portions of the pile which have traversed sufficiently forward to be intercepted by these knife-edges. The upper face of each pile-wire is slightly higher at the points of cutting, so as to put the pile under such tension as will assure a satisfactory cutting operation, and it will be observed that this cutting operation is effected by a somewhat quick movement in a direction opposite to that of the forward movement of the woven fabric, this cutting movement being repeated after each beat of the lay and that the pile is cut without waste. It will also be observed that the warp-controller is not subject to any friction from the pile, as it terminates below the tops of the walls of the channel in which it slides, and that the height of the pile is determined by the height of the channeled portions of the pile-wires at and in proximity to the cloth-line.

In the modified construction of pile-wire shown in Fig. 6 the rear extension 21′ of the pile-wire is of the same general construction as shown in Figs. 1, 2, and 3, but is arranged in horizontal position, whereby the extent of lift of the pile-forming warp-threads may be diminished; but the clearance above the shuttle is also diminished.

In Fig. 4 a pile-wire 20′, which is horizontal throughout its length, is also shown; but here the pile-wire is of one integral piece of folded metal, and as the pile-wire is of uniform height at all points in rear of the point of cutting the pile-loop engager 22′ of the warp-controller has an easy incline at its exposed rear end, so that the loop of the pile-warp will ride easily over it.

In all of the constructions heretofore particularly described the pile-wires have been so constructed as to penetrate the reed in all positions thereof. In the modified construction shown in Fig. 5 a short pile-wire 20″,

extending but slightly beyond the cloth-line, in accordance with Patent No. 730,438 to Thomas Benton Dornan, dated June 9, 1903, is employed in conjunction with the movable warp-controller, this warp-controller having a pile-loop engager 22″ with a gently-sloping rear end and being reciprocated, as above described, so as to be moved rearward to receive directly over it the loop of the pile-forming warp-thread, and then to be moved forward so that its pile-loop engager 22″ will carry the loop forward substantially to the cloth-line. The rear end of the pile-wire 20″ is also easily inclined, so that the loop will not catch thereon.

It is obvious that various other modifications may be made in the constructions shown and above particularly described within the principle and scope of our invention.

What we claim, and desire to secure by Letters Patent, is—

1. A pile-wire provided with a longitudinally-movable warp-controller.

2. A pile-wire provided with a longitudinally-movable pile-warp controller.

3. A longitudinal pile-wire provided with a longitudinally-movable warp-controller.

4. A longitudinal pile-wire provided with a longitudinally-movable pile-warp controller.

5. A channeled pile-wire in combination with a warp-controller movable in the channel thereof.

6. A channeled pile-wire in combination with a pile-warp controller movable in the channel thereof.

7. A channeled longitudinal pile-wire in combination with a warp-controller longitudinally movable in the channel thereof.

8. A channeled longitudinal pile-wire in combination with a pile-warp controller longitudinally movable in the channel thereof.

9. A pile-wire provided with a longitudinally-movable warp-controller and pile-cutter.

10. A pile-wire provided with a longitudinally-movable pile-warp controller and pile-cutter.

11. A longitudinal pile-wire provided with a longitudinally-movable warp-controller and pile-cutter.

12. A longitudinal pile-wire provided with a longitudinally-movable pile-warp controller and pile-cutter.

13. A channeled pile-wire in combination with a warp-controller and pile-cutter movable in the channel thereof.

14. A channeled pile-wire in combination with a pile-warp controller and pile-cutter movable in the channel thereof.

15. A channeled longitudinal pile-wire in combination with a warp-controller and pile-cutter longitudinally movable in the channel thereof.

16. A channeled longitudinal pile-wire in combination with a pile-warp controller and pile-cutter longitudinally movable in the channel thereof.

17. A longitudinal pile-wire in combination with warp-crossing and shed-forming and weft-inserting mechanism, a longitudinally-moving warp-controller arranged to engage the loop of a warp-thread crossed over the pile-wire, and means for actuating the warp-controller to carry such loop forward.

18. A longitudinal pile-wire and warp-crossing and shed-forming and weft-inserting mechanism and a lay, in combination with a longitudinally-moving part having a pile-loop engager thereon and a pile-cutter thereon, and means for actuating such part so as to carry forward the loop of pile warp-thread crossed over the pile-wire and to sever the pile by rearward movement.

19. A channeled longitudinal pile-wire and warp-crossing and shed-forming and weft-inserting mechanism and a lay, in combination with a part longitudinally movable in the channel of the pile-wire and having a pile-loop engager thereon, and means for actuating such part.

20. A channeled longitudinal pile-wire and warp-crossing and shed-forming and weft-inserting mechanism and a lay, in combination with a part longitudinally movable in the channel of the pile-wire and having a pile-loop engager and a pile-cutter thereon, and means for actuating such part.

21. The combination of a longitudinal pile-wire having a channeled part and an unchanneled rear extension, with warp-crossing and shed-forming and weft-inserting mechanism and a lay, a part longitudinally movable in the channeled part of the pile-wire and having a pile-loop engager thereon, and means for actuating such movable part, substantially as described.

22. The combination of a longitudinal pile-wire having a channeled part and an unchanneled rear extension, with warp-crossing and shed-forming and weft-inserting mechanism and a lay, a part longitudinally movable in the channeled part of the pile-wire and having a pile-loop engager and pile-cutter thereon, and means for actuating such movable part, substantially as described.

In testimony whereof we have affixed our signatures in presence of two witnesses.

THOMAS BENTON DORNAN.
NATHANIEL MARCUS SHINN.

Witnesses:
OSCAR RIGHTER,
WILLIAM F. LARER.