Nov. 6, 1928. 1,690,100

G. E. BULL

MACHINE FOR FORMING FABRIC STRUCTURES

Filed May 25, 1927 5 Sheets-Sheet 1

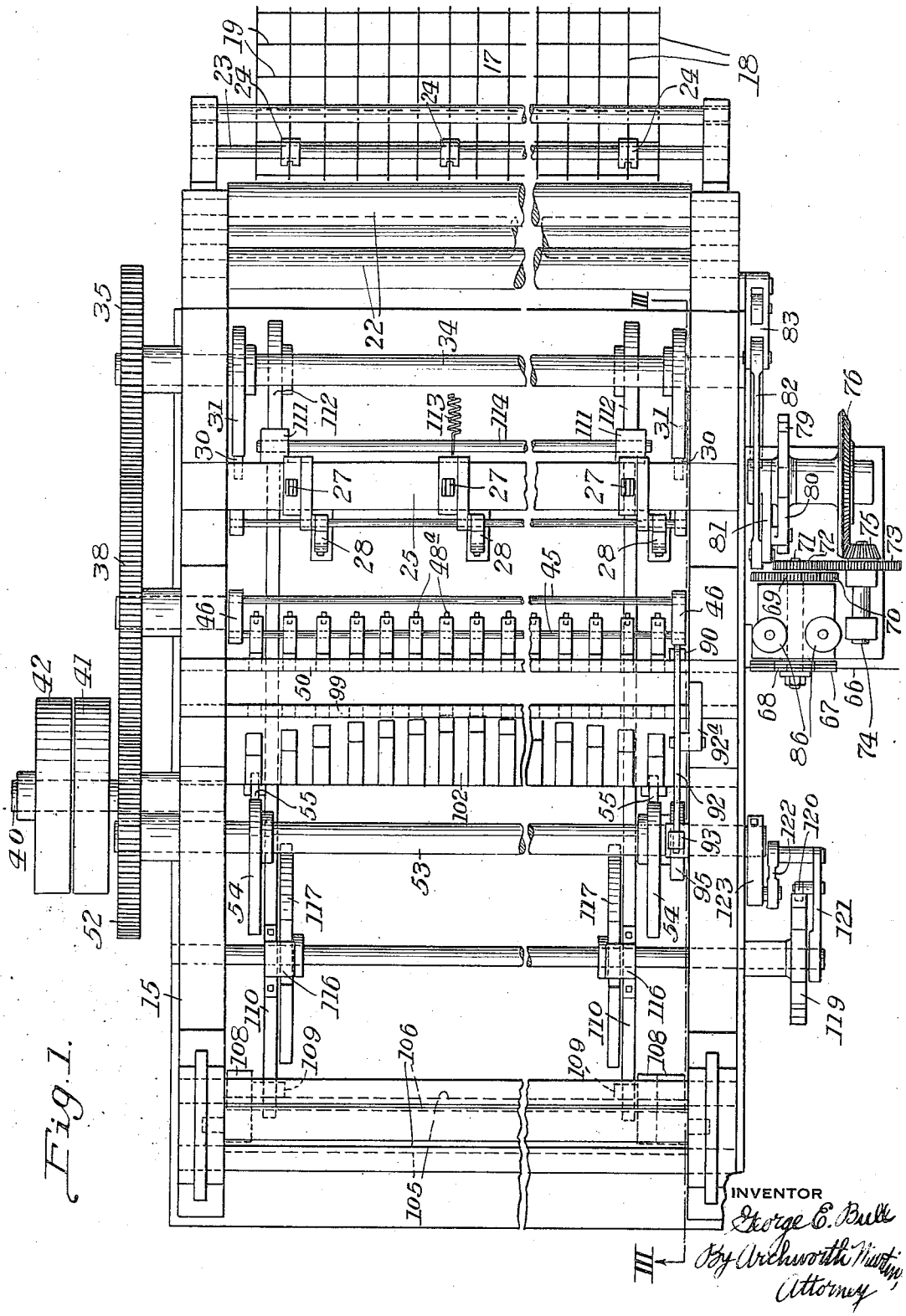


Fig. 1.

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MACHINE FOR FORMING FABRIC STRUCTURES

Filed May 25, 1927 5 Sheets-Sheet 2

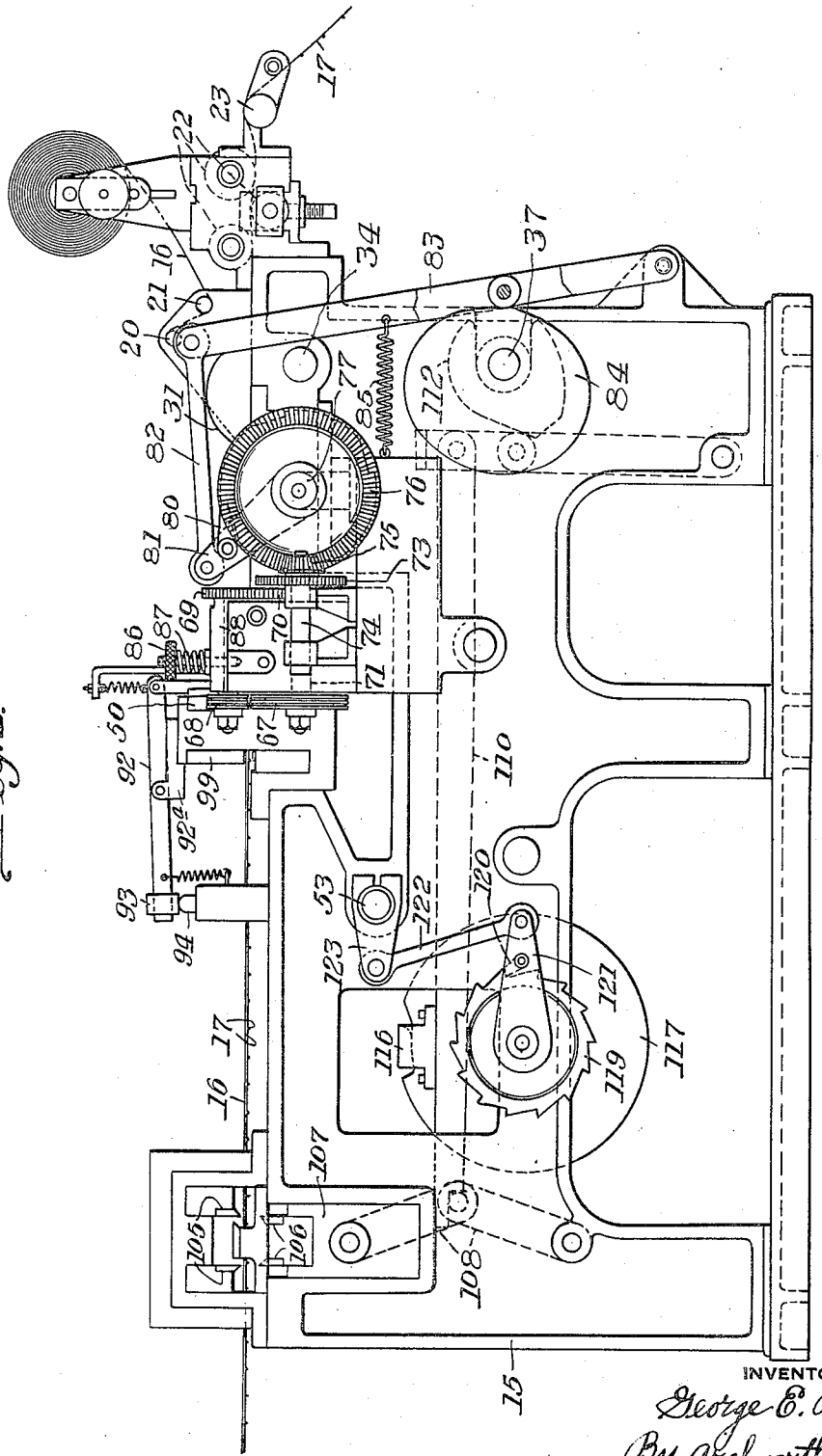


Fig. 2.

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MACHINE FOR FORMING FABRIC STRUCTURES

Filed May 25, 1927 5 Sheets-Sheet 3

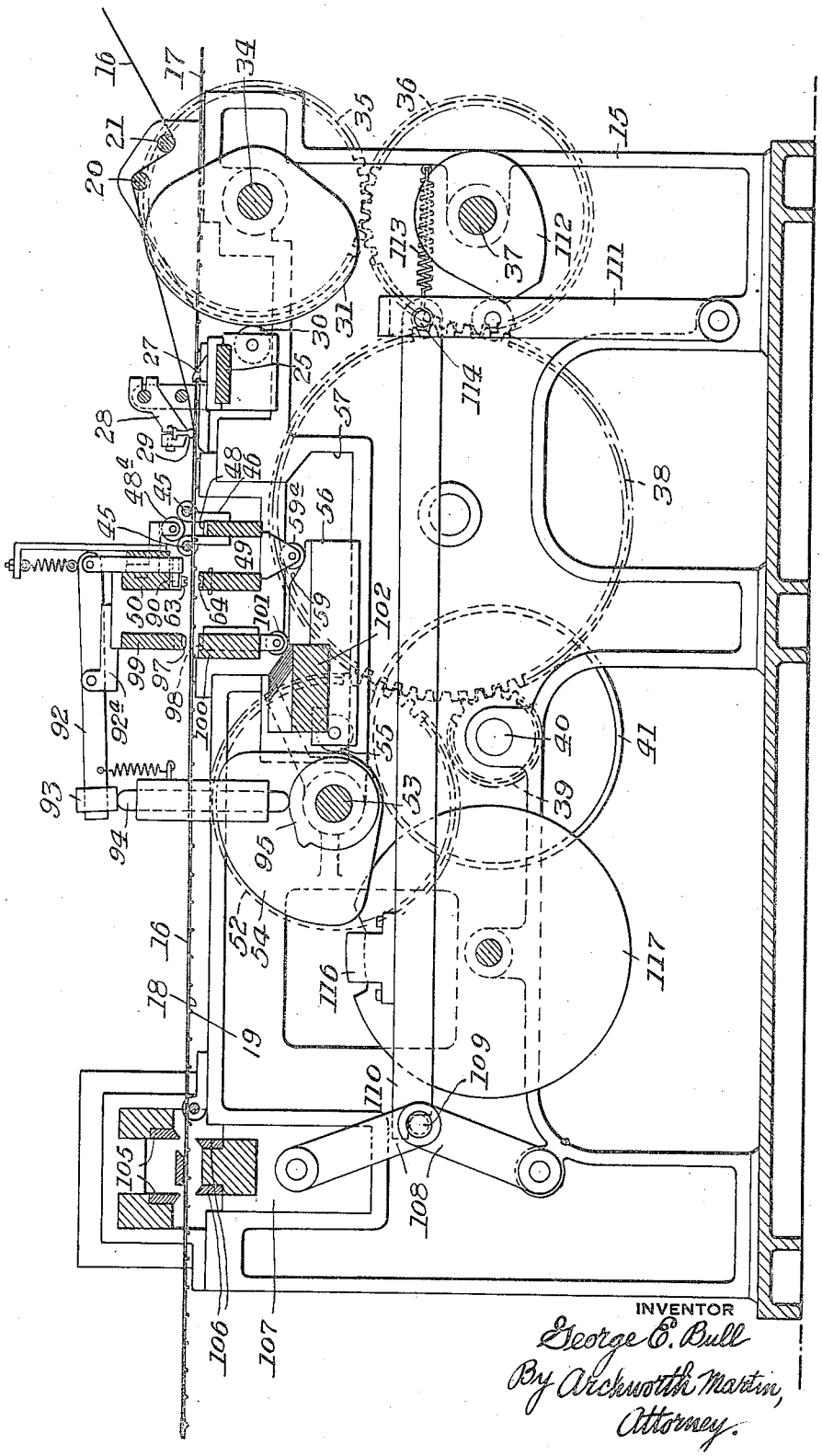


Fig. 3.

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MACHINE FOR FORMING FABRIC STRUCTURES

Filed May 25, 1927 5 Sheets-Sheet 4

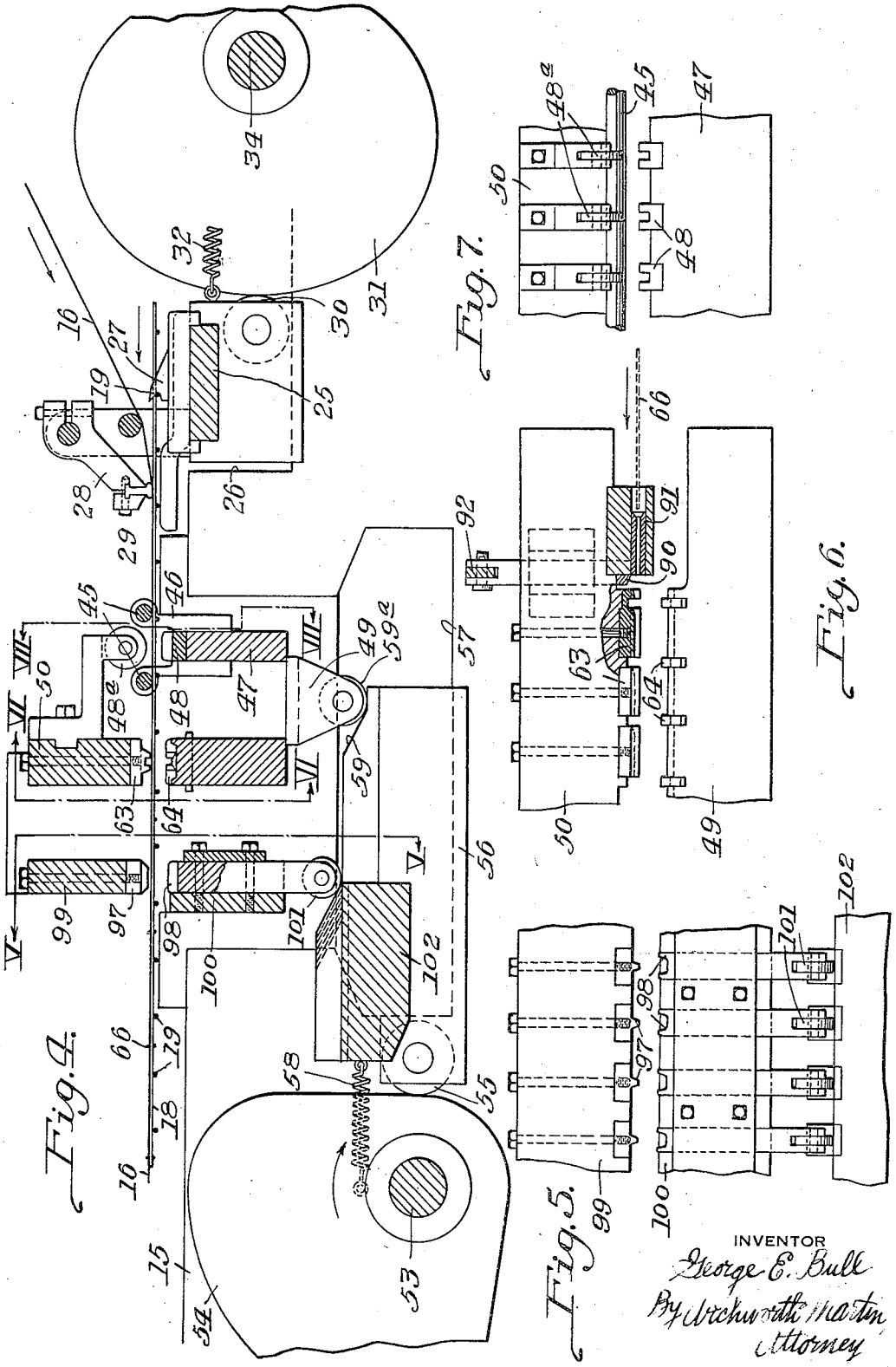


Fig. 4.

Fig. 7.

Fig. 6.

Fig. 5.

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Nov. 6, 1928. 1,690,100

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MACHINE FOR FORMING FABRIC STRUCTURES

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Fig. 8.

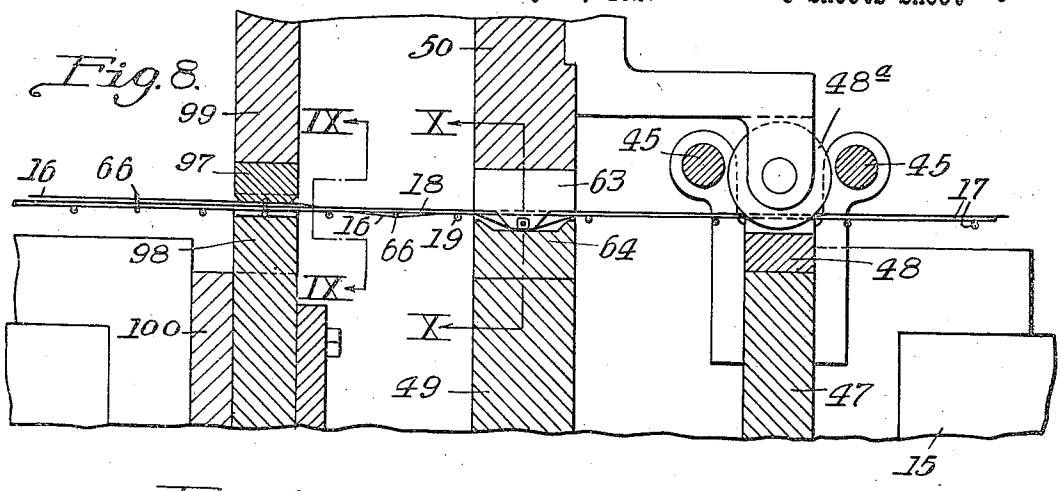


Fig. 9.

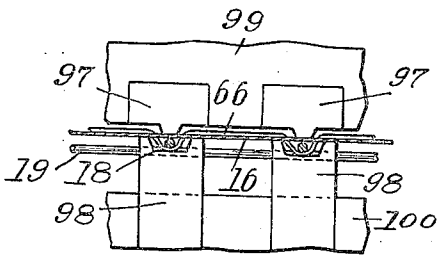


Fig. 10.

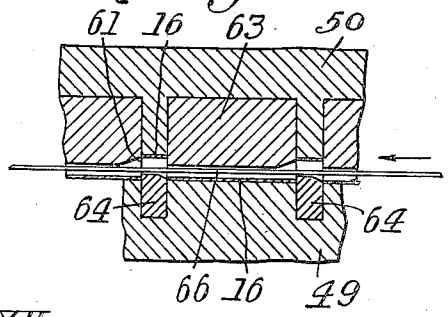
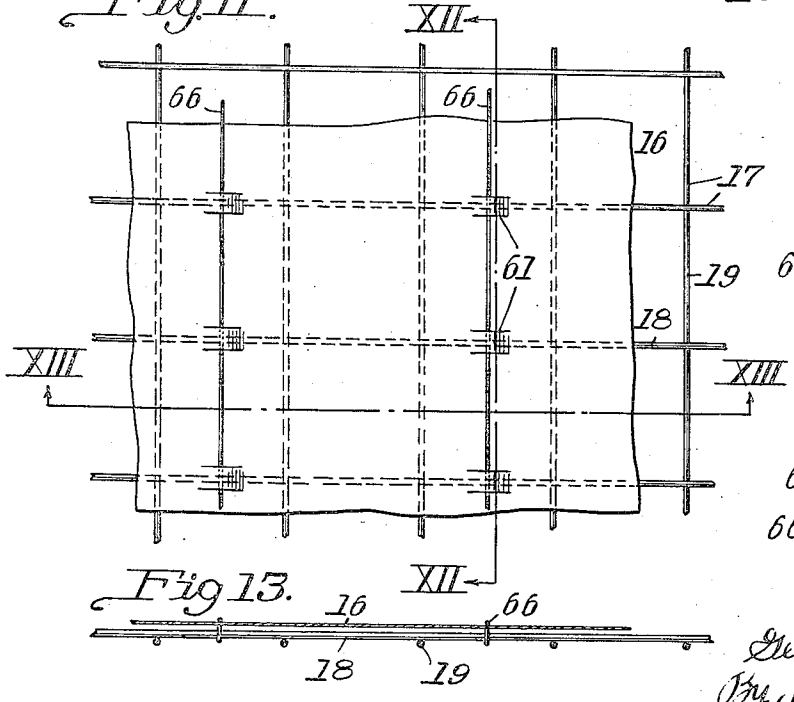


Fig. 11.



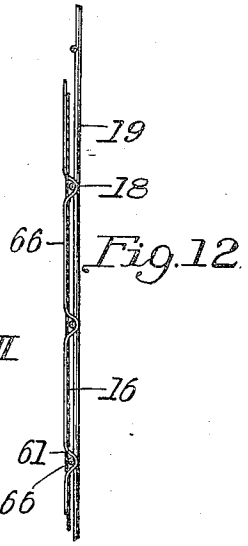


Fig. 12.

Fig 13.

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Patented Nov. 6, 1928. 1,690,100

UNITED STATES PATENT OFFICE.

GEORGE E. BULL, OF BELLE VERNON, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH STEEL COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

MACHINE FOR FORMING FABRIC STRUCTURES.

Application filed May 25, 1927. Serial No. 194,112.

My invention relates to machines for forming fabric structures, and more particularly to those of the general type described in my Patent No. 1,485,827, issued March 4, 1924.

In my patent referred to, the fabric structure is composed of a wire mesh backed by a paper sheet, the mesh serving as reinforcement for plaster, stucco or the like, and the sheet serving as a backing to afford support to the plaster while it is being applied. In the structure of said patent, a backing sheet is held in place against the rear surface of a wire mesh, by means of bends in the wire mesh that extend through the backing sheet and by rods which extend between said bends and the rear face of the sheet, as shown in Fig. 18 of the patent.

My present invention has for one of its objects the provision of a machine whereby fabric structure such as shown in Patent No. 1,597,507, issued to Edward L. Benedict on August 24, 1926, may be formed.

Another object of my invention is to provide apparatus for forming plaster ground structures wherein a backing sheet may be attached to a mesh-like sheet without distorting the mesh sheet, and supported in spaced relation to the mesh.

Another object of my invention is to simplify and improve generally machines for making plaster ground structures.

Broadly stated, my invention comprises means for advancing wire fabric and a paper backing therefor in superposed relation with respect to one another, slitting the paper; deflecting slit portions of the paper to a plane at the side of the wire fabric opposite to that against which the paper lies; inserting a thread or retaining wire between the deflected portions of the paper and the back of the wire fabric, and thereafter forming bends in the thread wire to permit the whole body of the paper to lie in a plane to the rear of the wire fabric and in spaced relation thereto, somewhat after the manner shown in said Patent No. 1,597,507, in order to permit embedment of the wire mesh in the plaster or other stucco material, and the bends serving also to prevent the thread wire from sliding out of position.

One form which my invention may take is shown in the accompanying drawing, wherein Figure 1 is a plan view of the machine; Fig. 2 is a side elevational view thereof; Fig. 3 is a longitudinal sectional view, taken on the line III—III of Fig. 1, Fig. 4 is a view of a portion of the apparatus of Fig. 3, on an enlarged scale; Fig. 5 is a view taken on the line V—V of Fig. 4; Fig. 6 is a view taken on the line VI—VI of Fig. 4; Fig. 7 is a view taken on the line VII—VII of Fig. 4; Fig. 8 is a view of a portion of the apparatus of Fig. 4, but on a still further enlarged scale; Fig. 9 is a view taken on the line IX—IX of Fig. 8; Fig. 10 is a view taken on the line X—X of Fig. 8; Fig. 11 is a fragmentary plan view of fabric structure formed by the apparatus of the other figures; Fig. 12 is an end elevational view of the structure of Fig. 11, and Fig. 13 is a side elevational view thereof.

Sheet-feeding mechanism.

Referring now to Figs. 1, 2 and 3, I provide a framework 15 upon which the moving parts of the mechanism are supported. A roll of paper 16 or other backing material is suitably mounted to permit unwinding movement thereof by the feeding mechanism to be hereinafter described. Wire fabric 17 that is composed of strand wires 18 and stay wires 19 is supplied from any suitable source as from a roll (not shown). The paper sheet 16 is passed around suitable tension rolls 20 and 21 to avoid unnecessary slack, and the wire fabric sheet is drawn between straightening rolls 22. The wire also passes over a rod 23 that is supported in the frame of the machine and is provided with slotted guide blocks 24, whose slots engage certain of the strand wires 18 to hold the wire fabric properly alined or centralized with respect to the apparatus.

As the wire mesh 17 and the backing sheet 16 enter the machine they are brought into engagement with a feed slide 25 that is slidably mounted at each end in a slideway 26 and is provided with blocks 27. These blocks are hooked at their forward ends, as shown more clearly in Figs. 3 and 4, and are provided with grooves in their top surfaces that engage certain of the strand wires 18 to supplement the guiding action of the guide blocks 24. The hooks catch behind one of the stay wires 19 when the slide 25 is retracted, in order to draw the wire mesh 17 forward as the slide is advanced. The paper 16 is ad-

vanced with the wire, by means of dogs or pawl-like devices 28 that are pivotally mounted on the slide 25 and are provided with rubber pads 29 that engage the paper. During retractive movement of the slide 25, the dogs 28 slide freely upon the paper, but during advancing movement of the slide, they will tend to turn in a counter-clockwise direction and jam upon the paper, holding it in tight engagement with the wire, so that the paper and wire will advance in synchronism with the slide.

The slide 25 carries a cam roller 30 at each end that is engaged by a cam 31. Springs 32 yieldably hold the slide 25 in retracted position with the rollers 30 in engagement with the cam discs 31. The cam disc 31 is secured to a shaft 34 that is journaled in the side frame and which is provided with a gear wheel 35. The gear wheel 35 meshes with a gear wheel 36 that is mounted upon a shaft 37 and in turn meshes with a gear wheel 38. The gear wheel 38 is driven from a pinion 39 that is secured to a shaft 40 which is driven by a pulley 41, from any suitable source (not shown). A pulley 42 may be loosely mounted on a shaft 40 to permit shifting of a driving belt (not shown), so that the shaft 40 will not be driven by the belt.

It will be seen that as the shaft 34 and its cam discs 31 are driven through the connections just described, the slide 25 will be reciprocated to effect intermittent advancing movement of the sheets 16 and 17. The cam discs 31 are provided with dwell surfaces of such length that the slide 25 will remain at rest during a period substantially equal to one-half of the time required for the shaft 34 to make a complete revolution. During these pauses in movement of the fabric and paper, certain operations are performed which will be now described.

Slitting mechanism.

The paper sheet 16 and the fabric 17 are advanced beneath a pair of rods 45 whose ends are supported in brackets 46 that are connected to a bar 47 that is provided with slitting dies 48 (Fig. 7) and is mounted on a vertically movable slide 49. Upper slitting dies 48^a, which may be in the form of rollers, are carried on a cross bar 50 whose ends are rigidly connected to the framework of the machine. The pinion 39 drives a gear wheel 52 that is mounted on a shaft 53, to which is secured a pair of cams 54. The cams 54 engage cam rollers 55 that are mounted in the ends of a slide 56. The slide 56 is supported in slideways 57 and is normally held in retracted position, with the rollers 55 against the cams 54 by a spring 58. The slide 56 carries a cam block 59 at each end that engages rollers 59^a on the vertically movable slide 49, so that movement of the slide 56 to the right will elevate the slitting dies 48 into operative relation to the upper slitting dies 48^a to cut slits in the paper as indicated at 61, (Fig. 11) for a purpose to be hereinafter described. The cams 54 are so positioned relative to the cam 31, and the gearing through which these cams are driven is so arranged that the slitting operation will occur when the paper and fabric are stationary between their intermittent advancing movements.

Threading mechanism.

When the slide 56 is withdrawn and the slitting dies 48 permitted to descend from operative position, the sheets are advanced another step to bring the slits 61 between threading dies 63 and 64. The upper threading dies 63 are mounted on the cross bar 50, while the lower threading dies 64 are mounted upon the vertically movable slide 49, which, as above explained, is operated through horizontal movements of the slide 56 by the cam 54. When the slitted portions are between the dies 63 and 64, the slide 49 is moved upward, so that the wider dies 63 will deflect that portion of the paper between the slits 61 downward between two adjacent dies 64, and between adjacent strand wires 18, so that the deflected portions of the sheet will be below the plane of the fabric, while the narrow undeflected portions between adjacent slits 61 remains above the fabric. This arrangement permits the insertion of thread wires 66 between the lower face of the mesh 17 and the upper surface of the wider deflected portions of the paper sheet, as shown more clearly in Fig. 11.

The dies 63 and 64 are grooved, as shown more clearly in Figs. 4 and 6, to guide the thread wire 66 when it is slid into position in the direction indicated by the arrow in Figs. 6 and 10. The thread wire 66 is fed in from the side of the machine (Fig. 1) by suitable feed rolls 67 and 68. As shown more clearly in Fig. 2, the shaft which carries the feed wheel 68 carries also a gear wheel 69 that meshes with a gear wheel 70 that is mounted on a shaft 71 to which the feed wheel 67 is secured. The shaft 71 also carries a gear wheel 72 that meshes with a gear wheel 73. The gear wheel 73 is mounted on a counter-shaft 74 that also carries a bevel gear wheel 75. A bevel gear wheel 76 has driving connection with the gear wheel 75 and is mounted upon a shaft 77 that is intermittently rotated to advance the thread wire 66 between the feed rolls 67 and 68 and through the threading dies 63 and 64.

A ratchet wheel 79 is secured to the shaft 77 and is operated by a pawl 80 which is loosely mounted on a rocker arm 81. The rocker arm is oscillated by a link 82 which is connected to the upper end of a cam lever 83. The cam lever 83 carries a roller which contacts with a cam 84 that is mounted on the

shaft 37, the lever 83 being held against the cam 84 by a spring 85. The shaft of the feed roller 68 is mounted in a movable bearing 88, so that tension may be exerted by a thumb nut 86 which bears against a spring 87 that seats on the upper side of the shaft bearing 88 to vary the pressure of the roller 68 upon the wire. The rollers 68 are provided with a plurality of grooves, so that the thread wire can be shifted from one to the other, as they become worn.

The reduction gearing 76—75—73—72—70 is such that when the link 82 is given a full stroke to the right, the forward end of the thread wire 66 will be advanced across the machine, through all of the dies 63—64. In order to cut that portion of the thread wire advanced past the feed rollers 67 and 68, I mount a cutting knife 90 between the entrance to the dies 63 and 64 and a guide block 91, as shown in Figs. 1, 3 and 6. The block 91 has a perforation through which the wire 66 is advanced and functions also as a shear block when the knife 90 descends. The knife 90 is pivotally connected to a lever 92 that is in turn pivotally mounted upon a bracket 92^a. The left hand end of the lever is weighted at the lever 93 and this weight is engaged by a plunger 94 that rests upon a cam 95. The cam 95 is mounted on the shaft 53 so that the knife is intermittently operated to cut off lengths of thread wire.

The feeding and cutting mechanisms are so timed that they will operate during intermission in the advance of the sheets 16 and 17.

Crimping mechanism.

In order that the paper sheet 16 will not be held too snugly against the mesh 17, but in slightly spaced relation thereto, to permit complete embedment of the wire mesh in the plaster, as described in detail in the Benedict patent above referred to, I provide crimpers which will form bends in the threading wire, to permit the wider portions 16^a (Fig. 9) of the paper sheet to be supported by the thread wire in spaced relation to the wire mesh. These bends also hold the thread wires 66 from sliding out of position.

Crimping dies 97 and 98 are shown more clearly in Figs. 4 and 5. The upper dies 97 are mounted upon a fixed cross bar 99, while the lower dies 98 are slidably supported in guides 100. The lower portions of the dies 98 carry rollers 101 that are engaged by cam surfaces on a cam bar 102. The bar 102 is secured to the slide 56 which is operated by the cams 54 as above described. The rollers 101 each engage a given inclined cam surface on the bar 102, and these surfaces are successively offset from the middle of the machine toward each side thereof, so that the two innermost dies 98 are first raised as the slide 56 is advanced to the right to put a crimp in the thread wire at each side of the longitudinal center line of the fabric structure, and the remaining dies 98 are successively brought into action with continued movement of the slide, so that the ends of the wire will be drawn in slightly during the formation of each crimp, and the crimps first formed will remain undisturbed. It will be understood that when the forward end of the sheets 16 and 17 have reached the crimping dies, further operations of slitting, threading and crimping will be simultaneously performed on those portions of the sheet opposite to the respective sets of dies, during pauses in the advance of the sheets.

Shearing mechanism.

While the completed fabric, when it leaves the crimping dies, may be conveniently rolled for transportation, to later be cut into sheets, I show shear mechanism which comprises upper shear blades 105 and lower shear blades 106. The upper shear blades extend across the machine and are fixedly mounted, while the lower shear blades extend across the machine, and are carried by a vertically moving slide 107. The slide 107 is supported on toggle links 108. Each pair of links 108 is provided with a pivot pin 109 that extends past the inner faces of the links such distance as to support the forward end of a notched bar 110. The bars 110 have pivotal connections at their rear ends with supporting levers 111. These levers 111 each carry a cam roller that engages a cam 112 which is secured to the shaft 37, so that as the shaft 37 rotates, the bars 110 are reciprocated longitudinally. The bars 110 are normally held in retracted position by a spring 113 which is connected to a rod 114 whose ends are mounted in the levers 111.

A lug 116 is secured to each of the bars 110 and overlies the edge of a cam disc 117. Each of the discs 117 is provided with a recess into which the lug 116 may fall and permit the notched ends of the bars 110 to engage the pins 109, so that upon the next advancing movement of the bars 110, the shear blades 106 will be elevated to cut a portion out of the fabric structure. When the discs 117 are rotated so that the lugs 116 and the bars 110 are raised, the ends of the bars are thereby elevated to inoperative position with respect to the toggle links 108, so that reciprocating movements of the bars 110 will not be communicated to the knives 106, but the fabric structure permitted to pass between the knives without being severed until it is desired to cut another sheet.

Rotative movement is imparted to the discs 117, by rotating the shaft on which such discs are mounted. A ratchet wheel 119 is secured to one end of the said shaft and is operated by a pawl 120, which is carried upon a rocker arm 121. The rocker arm 121 is connected through a link 122, with a crank 123 that is

secured to the shaft 53, so that as the shaft 53 is driven through operation of the machine, the bars 110 are periodically permitted to move into operative engagement with the toggle links to operate the shears and cut off sheets of a desired length, since each time that the discs 117 complete a revolution, the lugs 116 and the bars 110 are permitted to descend so that the notched ends of the bars 110 engage the toggle links.

While the shears 105 and 106 can, of course, be arranged to make a single cut instead of two cuts, I find it desirable to cut a section of the fabric structure out between two adjacent thread wires, so that there will be a thread wire adjacent to each end of each sheet, so hold the ends of the paper and wire mesh in assembled relation at such points, because otherwise the paper would in many cases become turned back and torn during shipping and handling.

I claim as my invention:

1. Apparatus for attaching a backing sheet to a mesh sheet, comprising means for deflecting portions of the backing sheet through the body of the mesh sheet from a plane to one side of the plane of the mesh, means for inserting a retaining member between the rear surface of said deflected portions and the front face of the mesh sheet, and means for forming bends in said retaining member, of such depth as to permit the backing sheet to be returned to its initial position.

2. Apparatus for attaching a backing sheet to a mesh sheet, comprising means for slitting the backing sheet at a plurality of points, means for deflecting portions intermediate said slits through the mesh sheet, and means for inserting a retaining member between such deflected portions and the adjacent side of the mesh structure.

3. Apparatus for attaching a backing sheet to a fabric structure composed of strands wires and stay wires, of means for deflecting portions of the backing sheet through the space between certain of said wires, means for passing a retaining member between said deflected portions and the adjacent wires, and means for forming bends in said retaining member in those portions thereof which lie against said wires, to permit return of the deflected sheet portions to their initial positions.

4. Apparatus for attaching a backing sheet to a mesh sheet composed of wires, comprising means for forming slits in the backing sheet to each side of adjacent wires, deflecting those portions of the sheet that are disposed intermediate the wires and between said slits and means for passing a retaining member between said deflecting portions and said wires.

5. Apparatus for attaching a backing sheet to a mesh sheet having a plurality of longitudinally extending wires, comprising means for deflecting portions of the backing sheet between said wires, means for passing a retaining member between said deflected portions and said wires, and means for forming crimps in said retaining members, in the form of bends partially surrounding adjacent wires and which permit return of the deflected portions of the sheet to their initial positions.

6. Apparatus for attaching a backing sheet to a mesh sheet having a plurailty of longitudinally extending wires, comprising means for deflecting portions of the backing sheet between said wires, means for passing a retaining member between said deflected portions and said wires, crimpers for forming crimps in said retaining members, in the form of bends partially surrounding adjacent wires and which permit return of the deflected portions of the sheet to their initial positions, and means for operating those crimpers adjacent to the longitudinal center line of the fabric structure in advance of those adjacent to the longitudinal edges thereof.

7. Apparatus for attaching a backing sheet to a mesh sheet having a plurality of longitudinally extending wires, comprising means for deflecting portions of the backing sheet between said wires, means for passing a retaining member between said deflected portions and said wires, crimpers for forming crimps in said retaining members, in the form of bends partially surrounding adjacent wires and which permit return of the deflected portions of the sheet to their initial position, and means for first actuating a crimper remote from one end of the retaining member and successively actuating crimpers disposed between the first-named crimper and said end progressively toward said end.

8. Apparatus for attaching a backing sheet to a mesh sheet, comprising means for intermittently advancing the fabric and mesh sheets, and means for slitting the backing sheet; deflecting portions thereof through the mesh and for passing a threading member between the deflected stay portions and the wire mesh, simultaneously, during pauses in the advancing movement of the sheets.

9. Apparatus for attaching a backing sheet to a mesh sheet comprising means for intermittently advancing the fabric and mesh sheets, and means for slitting the backing sheet; deflecting portions thereof through the mesh, passing a retaining member between the deflected portions and the wire mesh and forming bends in said retaining member to permit the deflected portions to return to their initial position, simultaneously, during pauses in the advancing movement of the sheets.

10. Apparatus for attaching a backing sheet to a mesh sheet, comprising means for threading a retaining member between portions of the rear surface of the backing sheet and front portions of the mesh sheet, and means for forming bends in those portions of the retaining member that are disposed to the front of the mesh sheet, of such depth as to permit the backing sheet to lie substantially entirely behind the mesh sheet.

In testimony whereof I, the said GEORGE E. BULL, have hereunto set my hand.

GEORGE E. BULL.