

(No Model.)

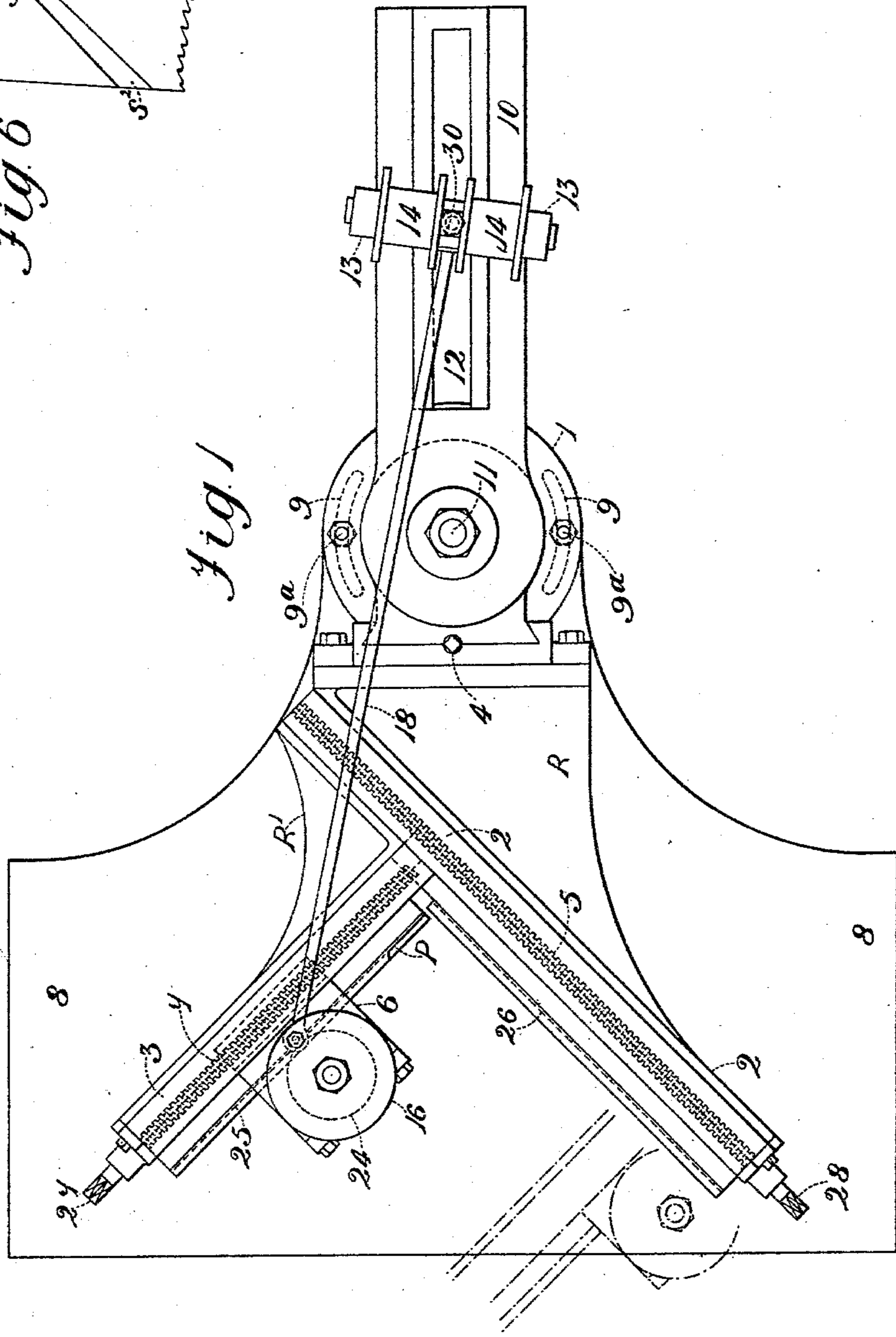
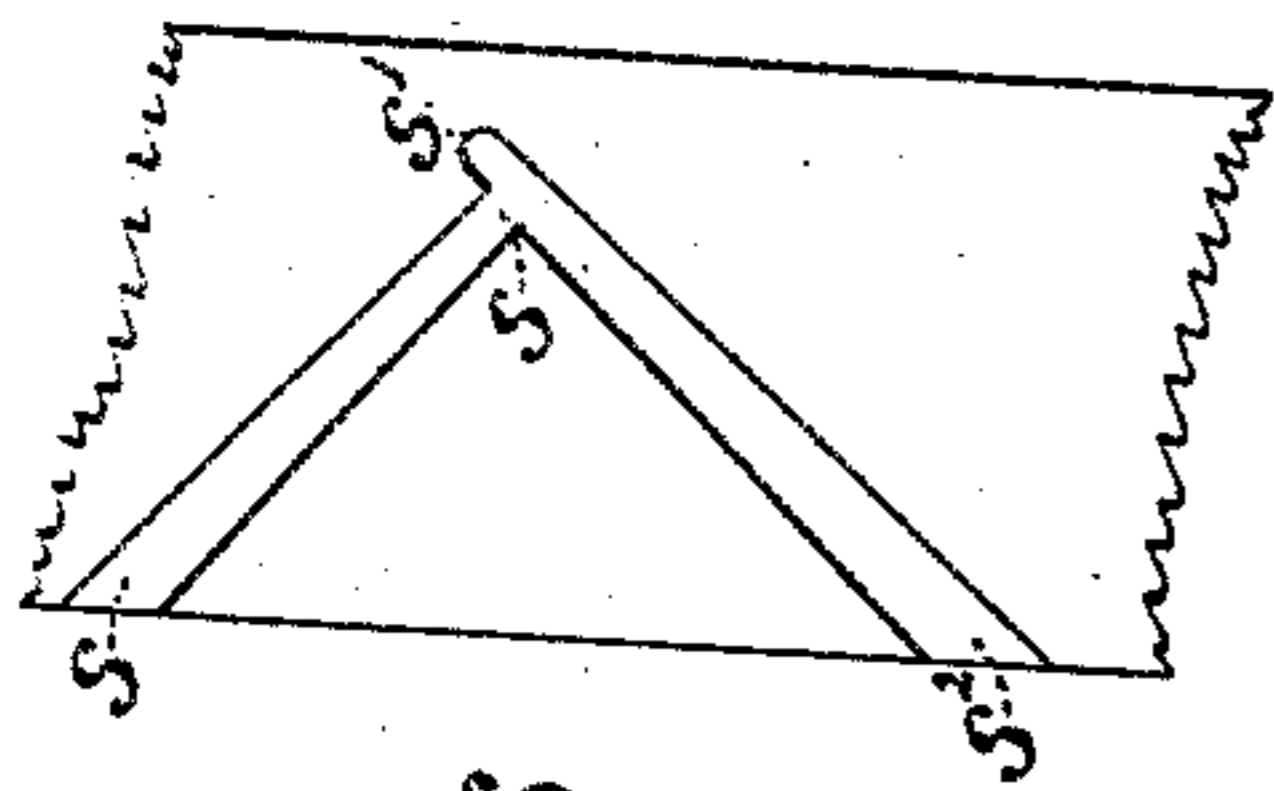
2 Sheets—Sheet 1.

W. LISTER & J. CARDWELL.

# MACHINE FOR CUTTING TAPERED GROOVES IN WOOD, METAL, &c.

No. 559,858.

Patented May 12, 1896.



Witnesses

J. A. Harvey.

E. W. Pattison.

*Inventors.*

William Sister  
John Cardwell,  
by their attorney  
Abram Hall Chapman

(No Model.)

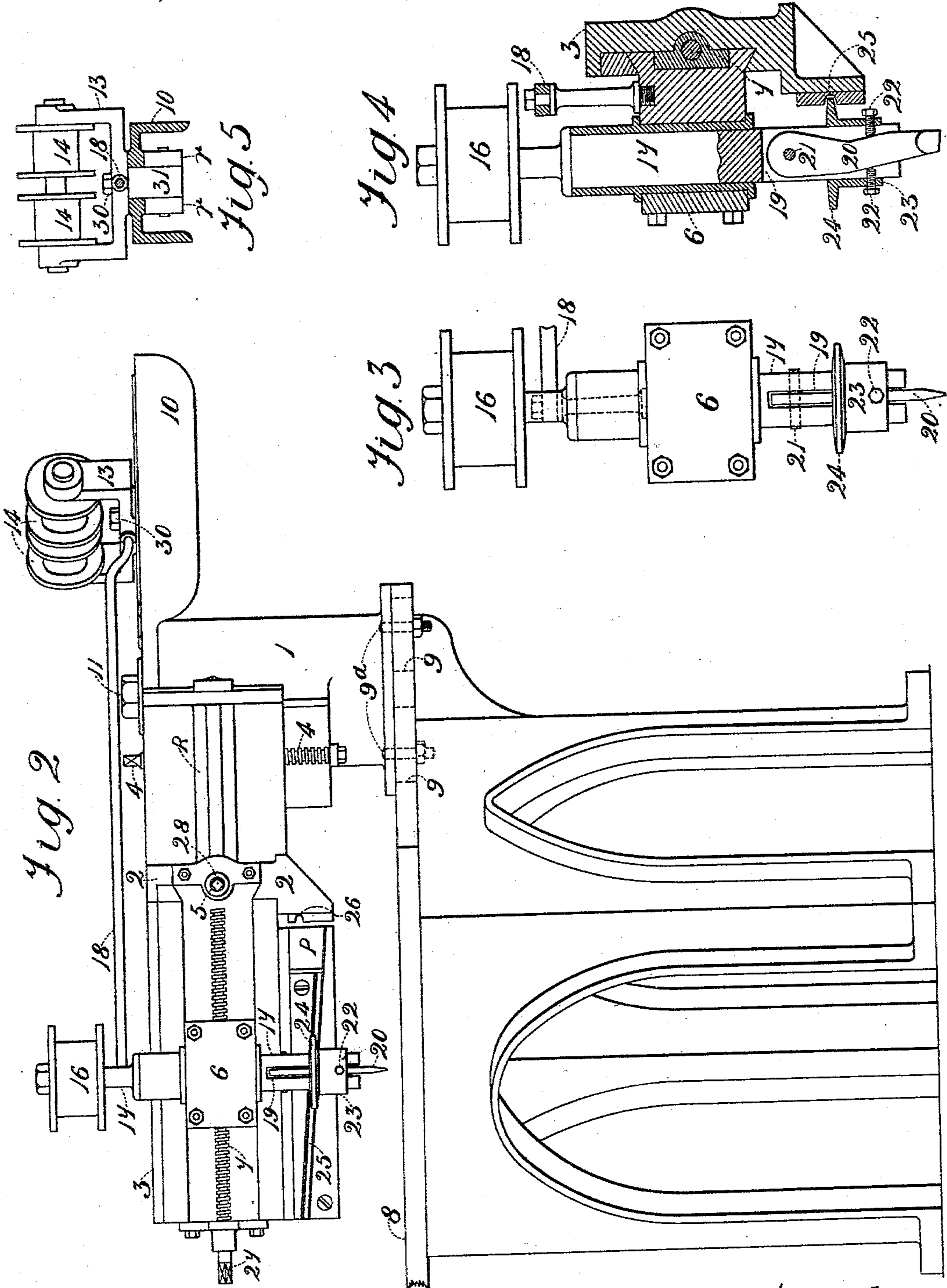
2 Sheets—Sheet 2.

W. LISTER & J. CARDWELL.

MACHINE FOR CUTTING TAPERED GROOVES IN WOOD, METAL, &c.

No. 559,858.

Patented May 12, 1896.



Witnesses

J. A. Harvey,  
C. W. Pattison,

Inventors  
William Lister  
John Cardwell  
by their attorney  
A. H. H. H. H. H.

# UNITED STATES PATENT OFFICE.

WILLIAM LISTER AND JOHN CARDWELL, OF SUNDERLAND, ENGLAND.

MACHINE FOR CUTTING TAPERED GROOVES IN WOOD, METAL, &c.

SPECIFICATION forming part of Letters Patent No. 559,858, dated May 12, 1896.

Application filed February 11, 1896. Serial No. 578,943. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM LISTER and JOHN CARDWELL, subjects of the Queen of Great Britain and Ireland, and residents of Sunderland, county of Durham, England, have invented certain Improvements in Machines for Cutting Tapered Grooves or Slots in Wood, Metal, and the Like, of which the following is a specification.

10 This invention relates to improvements in machines for cutting tapered grooves or slots in wood, metal, and the like, and in order to practically illustrate the improved construction and working thereof we will describe  
15 our invention as applied to the purpose of cutting tapered grooves in stair-stringer beams, such grooves or trenches being afterward intended to be fitted with the ordinary stair risers and treads in common use.

20 Referring to the accompanying drawings, Figure 1 shows a general plan view, and Fig. 2 is an elevational view looking at the machine from the point marked N in Fig. 1. Fig. 3 is an enlarged front elevation, and Fig.  
25 4 an enlarged sectional elevation at right angles to Fig. 3, of part of the apparatus shown in Figs. 1 and 2. Fig. 5 is a cross-sectional elevation, and Fig. 6 a diagrammatic view, all hereinafter fully explained, and in the  
30 following description like marks of reference designate like parts.

Referring to the drawings, on the pedestal 1 is mounted, as shown, the double-armed stair trenching or grooving apparatus, consisting of a long arm 2, corresponding to the  
35 tread-trench, and a short arm 3, corresponding to the riser-trench. The whole of this double-armed structure is capable of slight vertical adjustment by the screw 4, operating  
40 after the well-known manner of a slide-rest device in an ordinary lathe. The arm 3 is likewise capable of being worked backward and forward along the arm 2 by a screw 5, and the bracket 6 on the arm 3 is likewise  
45 capable of being worked backward and forward along the arm 3 by a screw 7, the several motions effected by the screws 4, 5, and 7 on, respectively, the double-armed apparatus as a whole with regard to the pedestal on  
50 the short arm with regard to the long arm and on the bracket with regard to the short arm being precisely analogous to the travers-

ing-screw motion of an ordinary lathe slide-rest device. The pedestal is capable of a slight horizontal radial motion on its table 8  
55 by simply adjusting the screw-studs 9<sup>a</sup> with regard to the slots 9 in the table, as shown. The tail-table 10 is pivoted to the pedestal at 11, and in a groove 12 thereof a block 31, carrying a pivoted bracket 13, is adapted to slide  
60 backward and forward to the required extent, as hereinafter described. The tail-table is thus capable of a slight radial motion round its center at 11.

The bracket 13 carries the pulleys 14 for  
65 conveying a belt to and from the pulley 16, mounted on the spindle 17, working in and supported by the bracket 6. A connecting or distance rod 18 connects the pivoted bracket 13 with the bracket 6, so as to maintain a constant distance between the pulleys 14 and  
70 the pulley 16. Further, we provide a slit 19 in the base of the spindle 17, in which slit a peculiarly-formed knife 20 is hung, as at 21. Adapted to act in conjunction with the cam-  
75 shaped or inclined backs or sides of the knife are studs or projections 22, fitted in the collar 23, which again is adapted to work up and down the spindle by means of its flange or  
80 extension 24, working in the inclined grooves 25 and 26 of, respectively, the arms 3 and 2, and according to the shape or inclination of the back or edges of the knife 20 so may the amount of its eccentricity and consequent  
85 taper in the trench, groove, or slot to be made be varied or modified, as herein described.

Now supposing we wish to form in a stair-stringer beam taper-trenches of the form shown in Fig. 6, the bracket 6 will in the first  
90 instance have been traversed along to the outer end of the short arm 3 and the short arm will have been traversed along to the inner end (nearest the pedestal) of the longer arm 2. The wood beam being in position, the belting will be put in motion to drive  
95 pulley 16 and rotate the spindle and knife. The attendant will then, by a handle at 27, traverse the bracket 6 and spindle and knife inward toward the long arm 2, (thus grooving the wood,) and as this happens the collar  
100 23, owing to the working of its flange 24 in the descending groove 25, will be lowered on the spindle, and one of the studs 22 opposite the inclined back of the knife will in conse-

quence push the knife slightly and gradually over to the required extent, thus varying the degree of eccentricity of the knife and causing a tapered groove to be cut until the  
 5 bracket and spindle reach the inner end of the short arm, when the flange of the collar will then gear with the opposite or ascending groove of or in the longer arm 2. The part S S, Fig. 6, will then have been cut.  
 10 The handle at 28 will then be utilized to traverse the short arm, bracket, spindle, and knife, first, inward to S' and then outward along the long arm to S<sup>2</sup>, Fig. 6, and in doing this the flange of the collar working in the  
 15 now ascending groove will be raised on the spindle, which will have the effect of causing one of the studs to again actuate the inclined back of the knife in manner and for the purpose hereinabove already described, and when  
 20 the bracket has traveled to or nearly to the outer end of the long arm (see dot-and-dash lines, Fig. 1) the necessary tapered grooves will have been completed, as shown in Fig. 6. The opposite sides of the knife 20, against  
 25 which the studs 22 abut and work, are of course parallel with each other.

When the bracket reaches the inner end of the short arm and at the point when the flange of the collar gears with the inclined  
 30 groove in the long arm in order to allow the collar to rise in the ascending groove, a portion P of the metal of the short arm is cut away, as shown. As the bracket 6 moves from the outer end of the short arm inwardly  
 35 the rod 18 pushes the pulley-bracket 13 away along the grooved path in the tail-table, and owing to the special arrangement shown and described the pulley-bracket 13 is always kept at a constant distance from the bracket 6,  
 40 and the lead of the belt is also always kept true in whatever position the bracket 6 may be with regard to the bracket 13 and to the arms 2 and 3.

Fig. 5 shows in sectional view how the  
 45 bracket 13 is arranged on the tail-table with friction-rollers *r* to facilitate its easy travel along the slot 12 and the pin 30 in the block 31, whereon it is pivoted.

In Figs. 1 and 2 R is a rib of arm 2, and R' a rib of arm 3.

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

1. The combination with a spindle 17 having a basal slit 19 therein containing a hung knife 20 the spindle being capable of revolution and traversing motion along the arm or arms of the machine of a collar 23 adapted to ascend or descend on the spindle by means of the gearing of its flange 24 with an inclined groove in the arm or arms of the machine and  
 60 so to vary by means of studs or projections 22 therein acting on the inclined back of the aforesaid knife the position of the latter so as to enable a tapered groove or slot to be cut the several parts being arranged combined or  
 65 adapted to operate substantially as and for the purposes herein set forth.

2. The combination with the arm 2 adjustably mounted on the pedestal 1 of the arm 3 capable of being traversed along the arm 2,  
 70 the arm 3 being provided with a bracket 6 capable of being traversed along itself and carrying a spindle 17 having a slit 19 containing a hung or pivoted knife 20 the knife being capable of automatic adjustment as to its  
 75 center or position for the purpose of forming tapered grooves by means of the collar 23 with its studs 22 and flange 24 gearing with the grooves 25 and 26 in the arms of the machine the spindle-pulley 16 being driven by  
 80 belting from pulleys 14 mounted in a pivoted bracket 13 adapted to work in a groove 12 of the tail-table 10 the pulleys 14 and 16 being kept at a constant distance from each other  
 85 by the rod 18 all these parts being arranged combined or adapted for working substantially as herein set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM LISTER.  
 JOHN CARDWELL.

Witnesses:

J. C. MORTON,  
 J. TEMPLE.