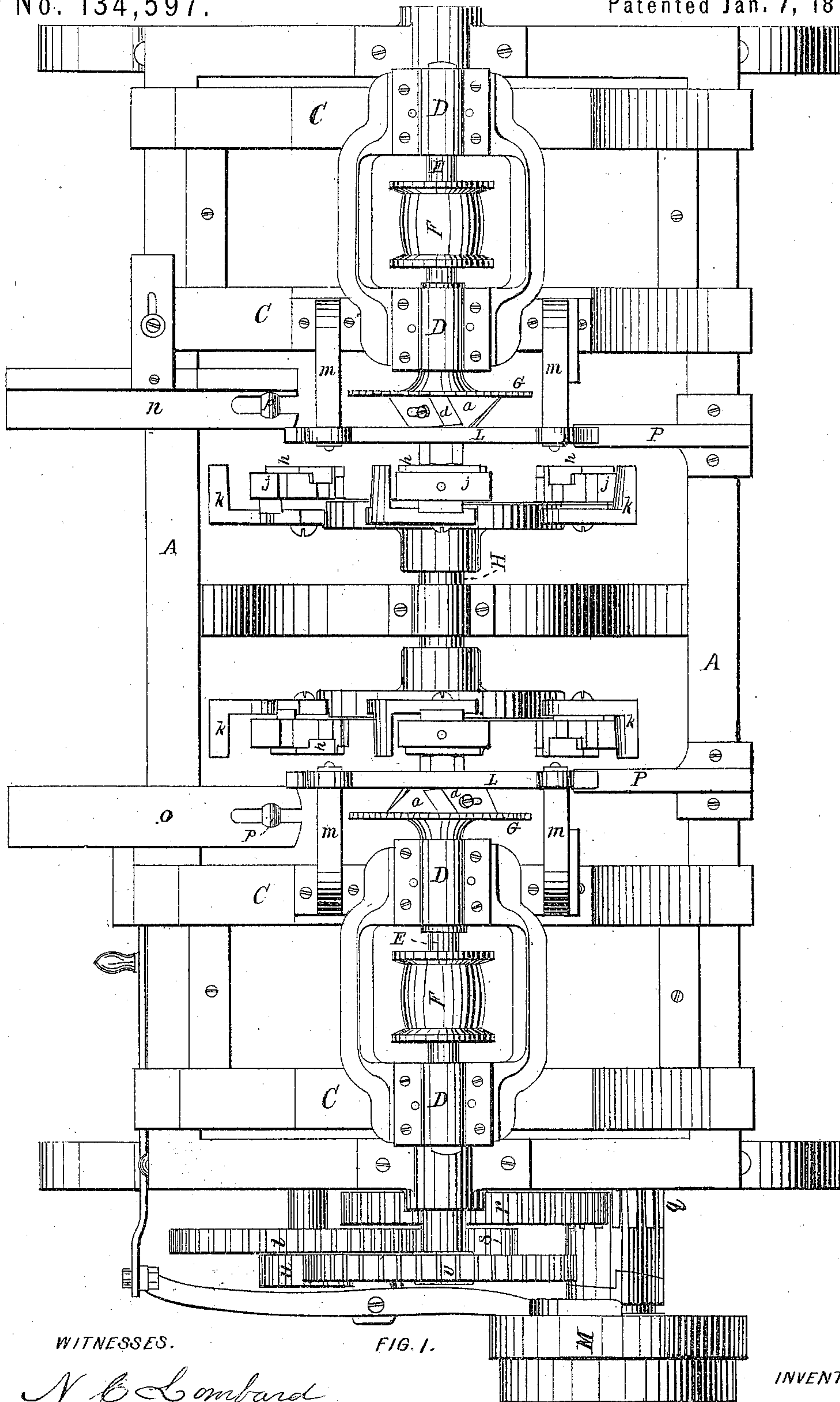


S. S. GRAY.
Machines for Crozing and Chamfering Staves.
 No. 134,597. Patented Jan. 7, 1873.



WITNESSES.

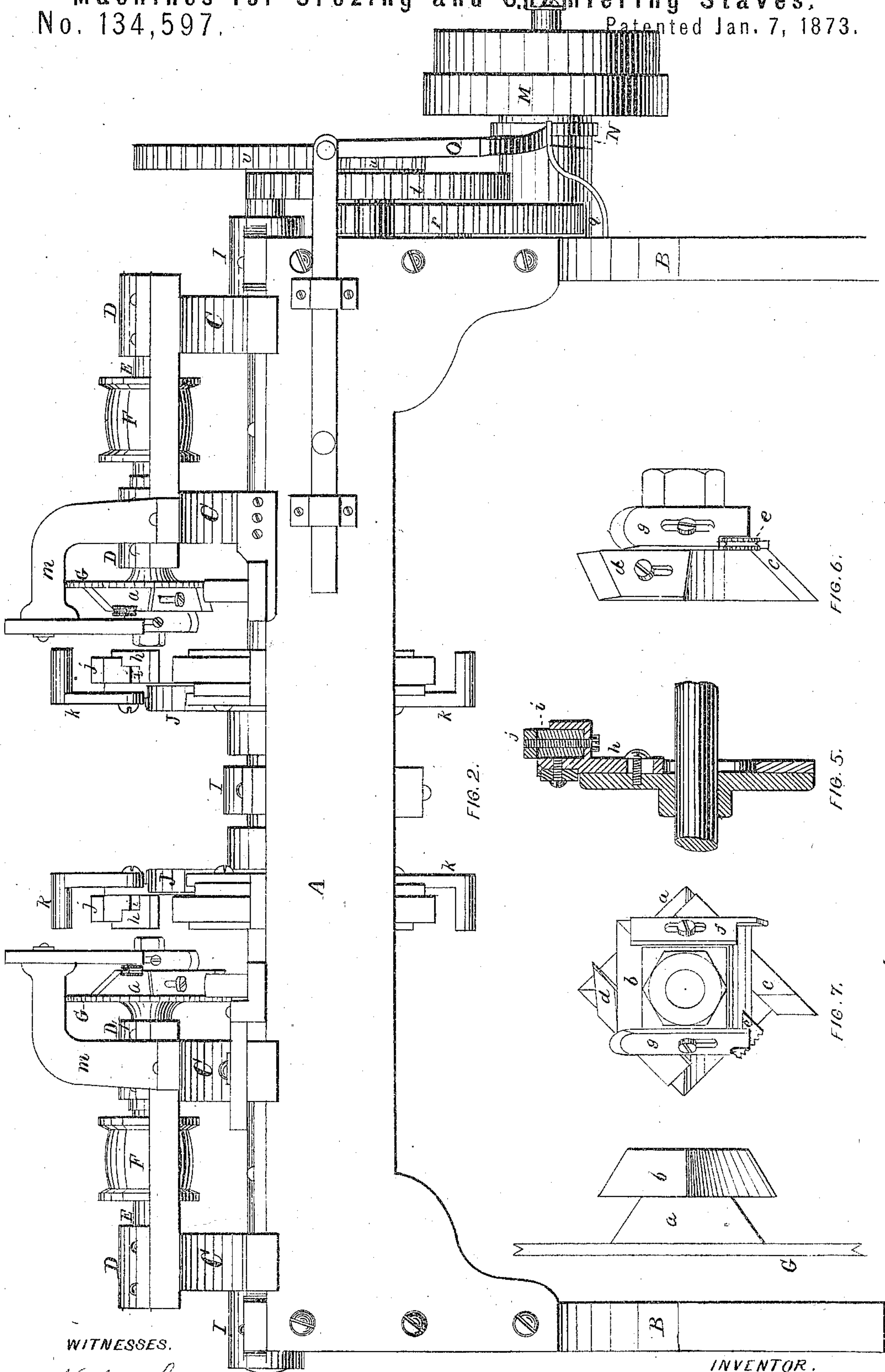
FIG. 1.

INVENTOR.

N. B. Lombard
Frank H. Rogers

Solomon S. Gray

3 Sheets--Sheet 2.
S. S. GRAY.
Machines for Crozing and Chamfering Staves.
 No. 134,597.
 Patented Jan. 7, 1873.



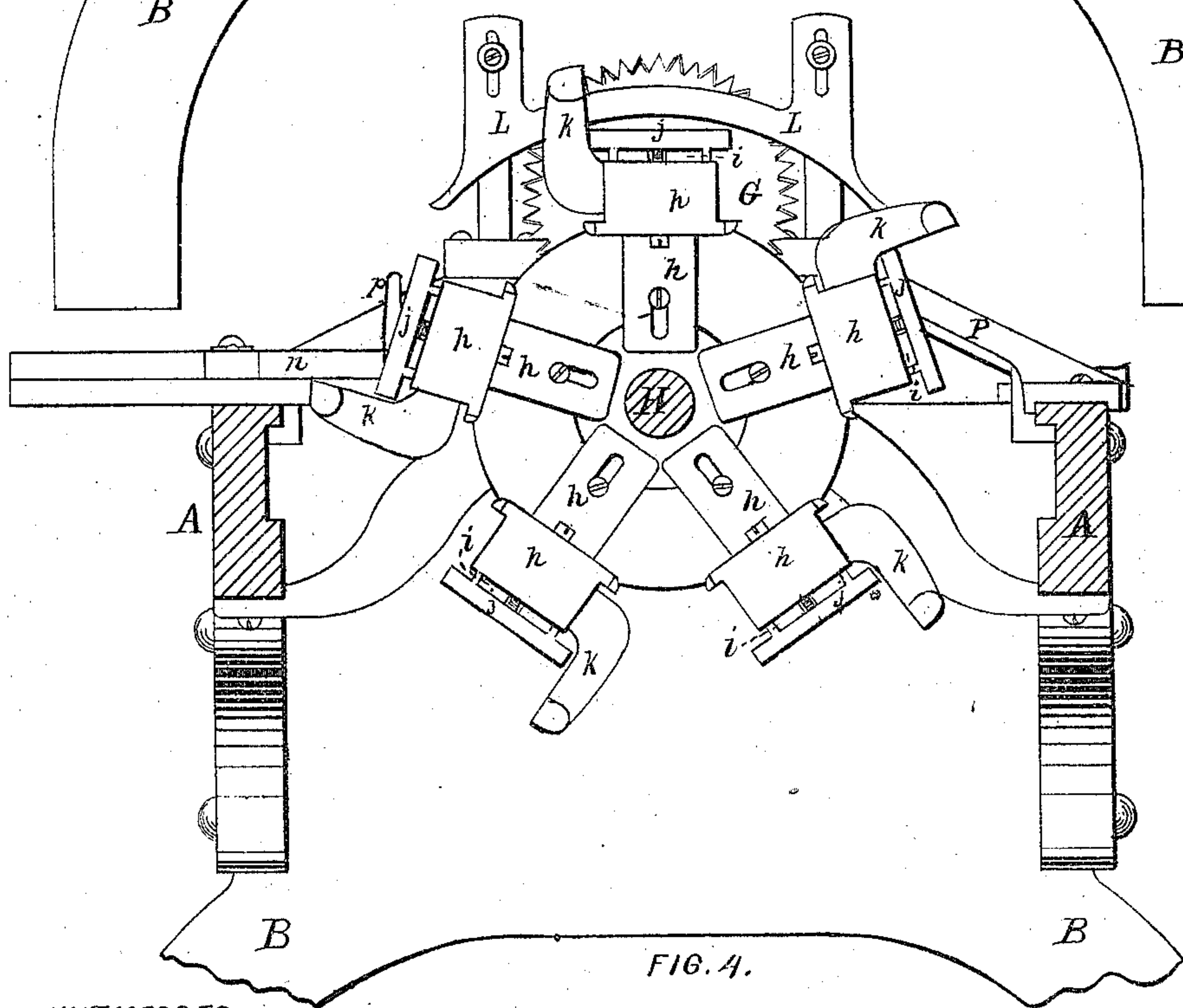
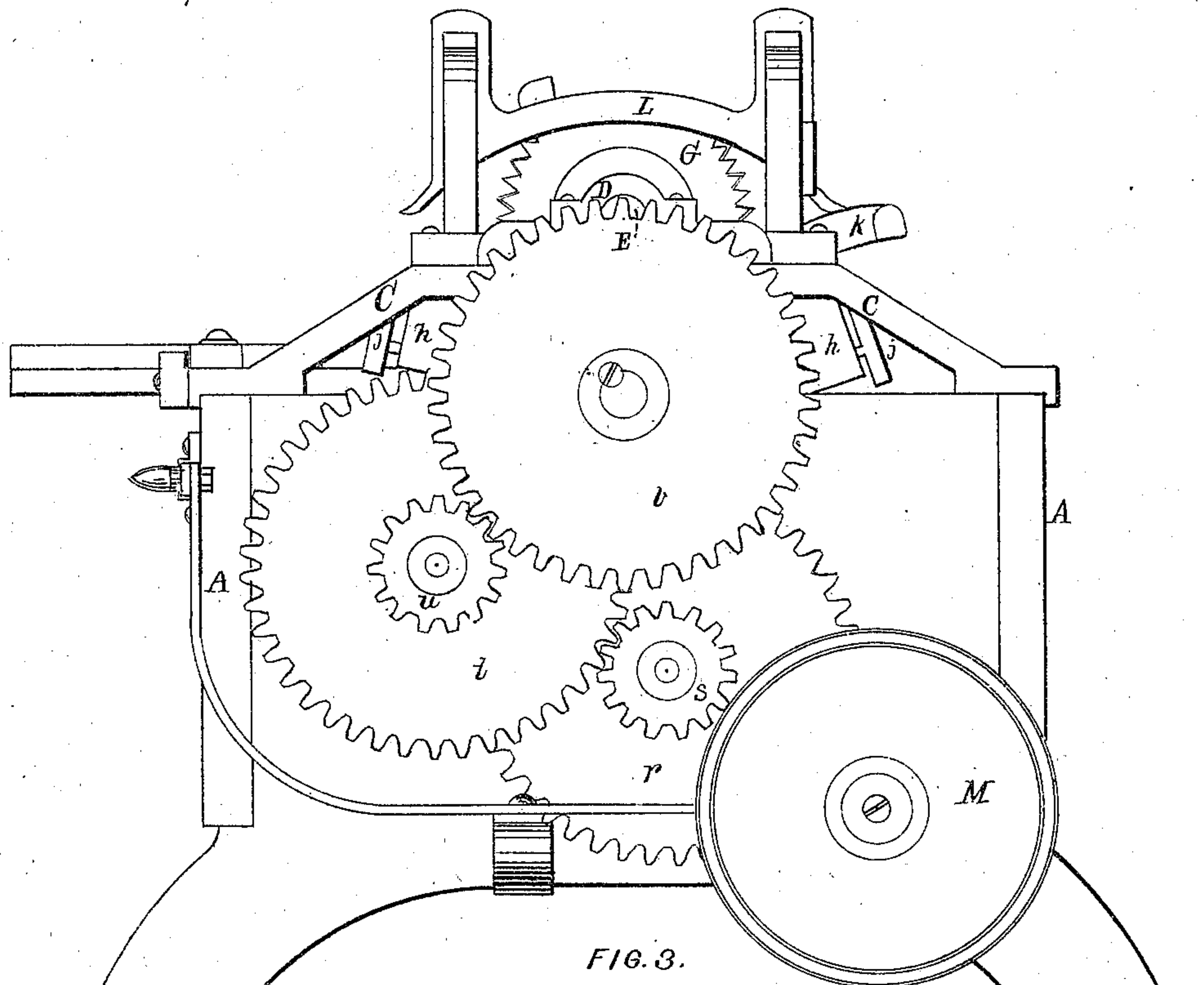
WITNESSES.

N. C. Lombard
J. M. Rogers.

INVENTOR.

Solomon S. Gray

S. S. GRAY.
Machines for Crozing and Chamfering Staves.
 No. 134,597. Patented Jan. 7, 1873.



WITNESSES.

N. C. Lombard
R. E. Rogers

INVENTOR.

Solomon S. Gray

UNITED STATES PATENT OFFICE.

SOLOMON S. GRAY, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR CROZING AND CHAMFERING STAVES.

Specification forming part of Letters Patent No. 134,597, dated January 7, 1873.

To all whom it may concern:

Be it known that I, SOLOMON S. GRAY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Machines for Crozing and Chamfering Staves, of which the following is a specification:

The object of my invention is the production of a machine that will cut the staves to a length, chamfer the ends, cut the crozing, and gage the stave to an even thickness, completely finishing the ends ready to receive the heads at one operation.

To accomplish this object I employ two circular saws mounted upon suitable shafts arranged in bearings upon movable frames or stands, arranged to slide upon the fixed bed of the machine, the axes of said shafts being in the same line, and each of said shafts being provided with a pulley, by means of which and a belt leading thereto it is made to revolve. Each of said shafts also carries a double cutter-head, upon which are secured cutters for cutting the bevels of the chine, for cutting the crozing, and for rounding out that portion of the stave just inside of the crozing, commonly called howeling, said cutters being secured to beveled surfaces on the cutter-heads, so that one edge or side of said cutters is nearer the axis of the cutter-heads than the other, and having their cutting ends so shaped in the case of the cutters for cutting the chamfers and the howeling that the corner of the cutter on the edge nearest to the axis of the cutter-head shall strike the wood first, in such a manner as to cut the same with a drawing stroke. To cut the croze I use a saw-toothed double-spur cutter to cut the vertical sides of the croze, and determine its width with a narrow chisel-shaped spur-cutter to clean out the croze to the proper depth, all of the above cutters being secured to a double cutter-head, or a single head provided with two distinct series of inclined cutter-seats, said cutter-heads being secured to the end of the saw-shaft immediately in contact with the side of the saw. I feed the stave to the saw and cutters by means of a rotary feed-bed, the ends of the staves resting upon yielding surfaces and working in combination with rigid but adjustable guide-bars curved to the radius of the chine of the

barrel to be made, said curved guide-bars being adjusted to the proper distance from the cutters to give the desired thickness to the chine, the yielding surface on which the stave rests allowing the outer surface of the stave to pass the cutters always at the same distance therefrom, whatever the thickness of the stave may be, unless the rigid curved guide-bars against which the outer surface of the stave bears are adjusted to a different thickness.

Figure 1 of the drawing is a plan of my improved machine. Fig. 2 is a front elevation. Fig. 3 is an end elevation. Fig. 4 is a transverse section on line *xx* on Figs. 1 and 2. Fig. 5 is a section through the axis of one of the disks that carry the yielding bearings upon which the staves rest while being fed to the cutters; and Figs. 6 and 7 are, respectively, side and end elevations of the cutters and cutter-head. Fig. 8 is a plan of the cutter-heads with the cutters removed.

In the drawing, A is the bed or main frame of the machine, supported on the legs B B, and having fitted to its upper side and secured thereto the stands C C, to which are bolted the journal-boxes D D, in which are mounted the cutter-shafts E E. Said shafts are each provided with a pulley, F F, by means of which and a belt, leading thereto from any suitable driving-shaft, they are made to revolve. Each of said shafts E E has mounted upon its inner end a circular saw and a pair of cutter-heads, *a b*, made rectangular in form and having their outer sides inclined, as shown, to which surfaces the various cutters are secured. These cutter-heads are secured to the extreme inner ends of the shafts E E, and in close contact with the inner faces of the circular saws G G. The cutter-heads *a a* have secured thereto the cutters *c* and *d*, which, respectively, cut the bevel of the chine and that portion of the howeling that is outside of the crozing. The cutter-head *b* has secured thereto the crozing-saw cutter *e*, and the clearer *f*, and the howeling-cutter *g*. The cutters *c*, *d*, and *g*, have their ends so shaped and are so placed upon the inclined sides of the cutter-heads that the corner of the cutter on the edge nearest to the axis of the cutter-head will strike the wood first, and thus give a drawing stroke, which causes a clean, smooth

cut to be made without splintering. The howeling-cutter *g* has a rounded cutting end, but owing to its inclined position on the cutter-head it makes a drawing cut. The crozing-saw cutter *e* is made with two rows of saw-teeth, the distance apart being equal to the width of crozing desired, and they serve to cut down the vertical sides of the croze, and the clearer *f*, which is a chisel-cutter, cleans out the chips from the groove to a uniform depth. The stands *C C* are so fitted to the bed *A* that they may be adjusted thereon, so as to place the saws *G G* at a greater or less distance from each other to suit the length of stave to be cut. Directly beneath the cutter-shafts *E E*, and parallel with the same, is the shaft *H*, mounted in the bearings *I I* on the bed *A*. *J J* are two metal disks mounted on said shaft *H*, to each of which are secured any suitable number of feed-stands, *h*, in such a manner that they may be adjusted to a greater or less distance from the axis of the shaft to adapt the same to different sizes of barrels. Each of said feed-stands is provided with a pocket to receive a rubber or other spring, *i*, and a follower or cap-plate, *j*, resting upon said spring, and upon which the inner surface of the stave rests while being fed to the saw and cutters. The feed-stands *H* are also provided with a projecting horn or arm, *k*, which serves to pick up the stave from its resting-place as the shaft *H* revolves, and to keep it in a parallel position and compel it to move forward over the cutters. *L L* are guide or gage bars, the under edges of which are curved to the radius of the barrel for which the staves are intended, and are located so that the under edges thereof are just the desired thickness of the stave from the cutters, said bars being secured to the stands *m m*, in such a manner that they may be raised or lowered, as may be desired. To the two inner stands *C C* are secured the rest-bars *n* and *o*, to the inner ends of which are attached the adjustable fingers *p* and *p*, against which the inner face of the stave is placed to await being picked up by the horns *k* as the shaft *H* revolves. The shaft *H* is made to revolve by the pulley *M* and the gears *q r s t u v*. A clutch, *N*, is formed on the pulley *M*, and is provided with a shipper, *O*, by means of which said pulley may be thrown out of or into gear at the will of the operator. *P P* are two inclined guide-arms, onto which the stave is delivered from the rotary feed-cylinder after it has passed the cutters.

The operation of my improved machine is as follows: The cutter-shafts *E E* being set in motion, the clutch *N* is thrown into gear by the shipper *O*, so that the motion of the

pulley *M* is transmitted through the train of gears shown in Fig. 3 to the shaft *H*, causing it to revolve at a suitable speed for feeding the staves to the cutters and saws. A stave is placed on the machine with one edge resting on the rest-bars *n* and *o*, and its inner face resting against the fingers *p p*, and as the shaft *H* revolves the stave is taken up by the arms *k k* striking its edge and carrying it forward toward the cutters, its inner face resting on the followers *j*, and its outer face bearing against the rigid guide-bars *L L*, which are adjusted to the proper height above the cutters to give the desired thickness to the stave, the follower *j* yielding more or less as the stave is thicker or thinner, the rotary motion of the shaft *H* causing the stave to be brought in contact with the saws *G G*, which cut the stave to the proper length, and also in contact with the various cutting-tools on the cutter-heads *a* and *b*, which cut the crozing, howel the stave, and chamfer the chine. As the shaft *H* continues to revolve the stave is discharged onto the arms *P P*, whence it falls to the floor. When one stave has been taken up by the feed-cylinder and moved toward the cutters, another stave is placed on the rest-bars *n* and *o* in position to be taken up by the next succeeding arms *k k*.

I am aware that a rotary feed-cylinder has been used to feed staves to two saws, and two sets of cutters so arranged as to operate upon both ends of a stave at the same time to cut it to the desired length, and to cut the crozing, howel the stave, and chamfer the chine, and therefore I do not claim this arrangement, broadly; but

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a machine for finishing the ends of barrel-staves, a rotary feed-cylinder mounted in fixed or rigid bearings, and provided with the yielding followers *j j* arranged on its periphery to support the stave, in combination with the guide and gage bars *L*, arranged and operating as described, for the purpose specified.

2. The cutters *c*, *d*, and *g* formed and arranged on inclined surfaces on the cutter-heads *a* and *b*, that that portion of the cutting-edges of said cutters which describes the smallest circle shall strike the wood first and give a drawing cut, substantially as described.

Executed at Boston this 7th day of May, 1872.

SOLOMON S. GRAY.

Witnesses:

N. C. LOMBARD,
FRANK K. ROGERS.