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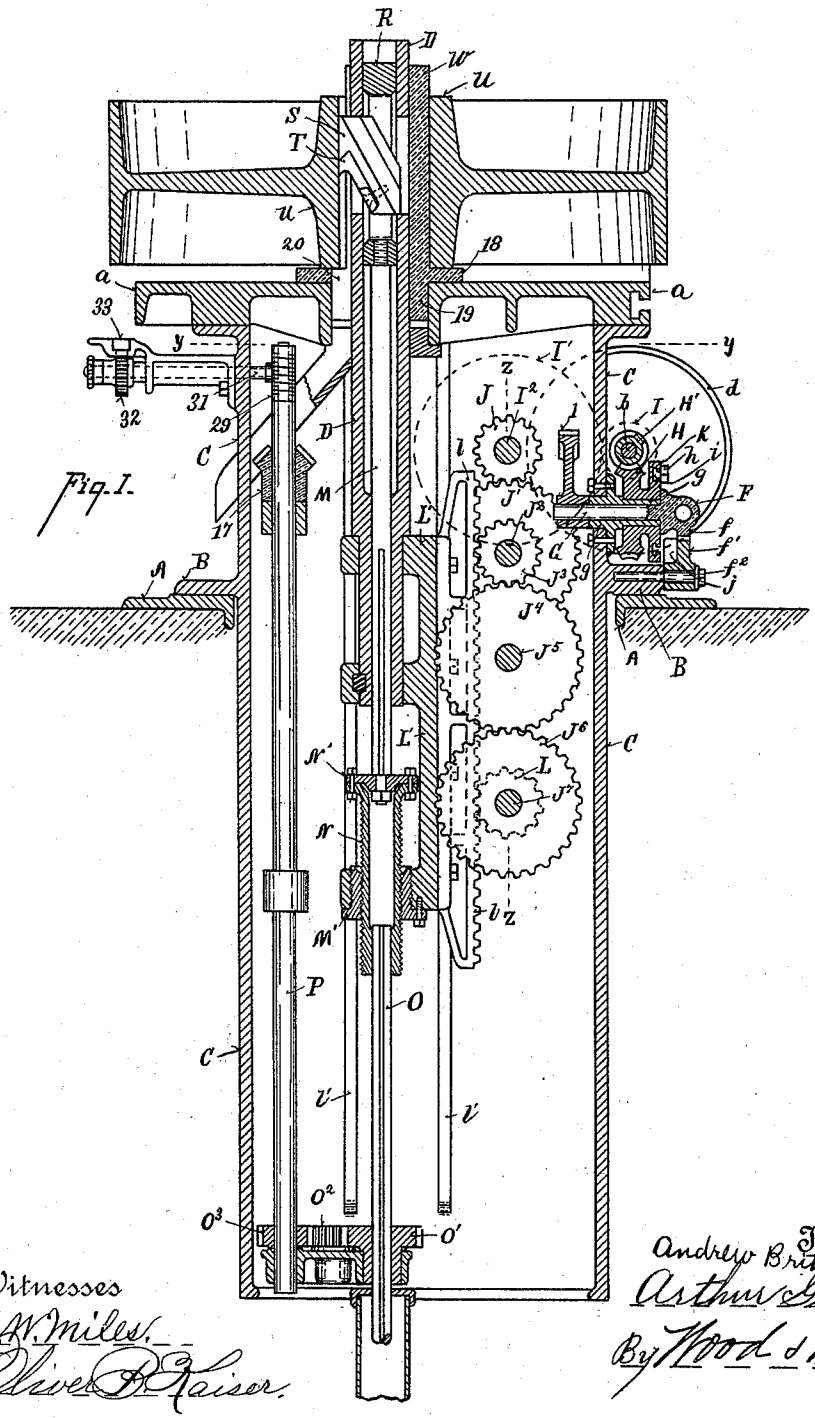
A. GIESLER & A. BRITT.

SPLINING MACHINE.

No. 540,095. Patented May 28, 1895.



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A. GIESLER & A. BRITT.

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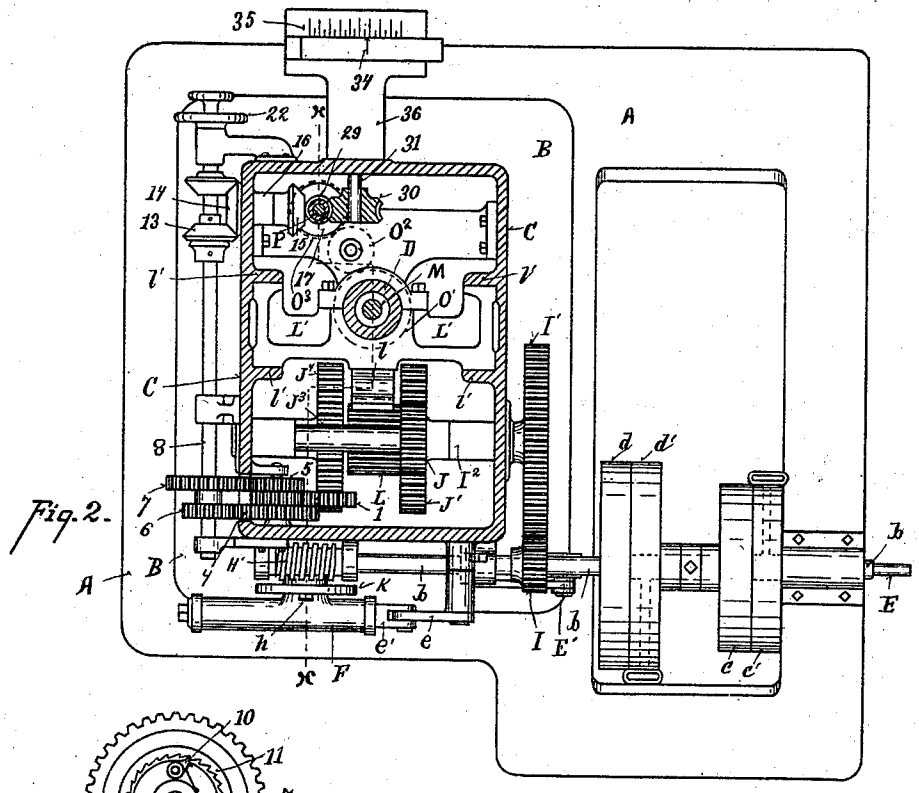

Fig. 2.

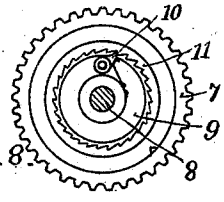

Fig. 8.

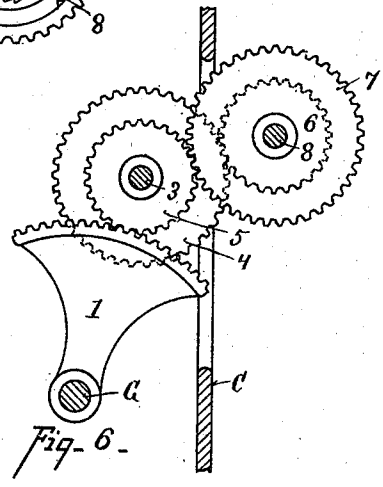

Fig. 6.

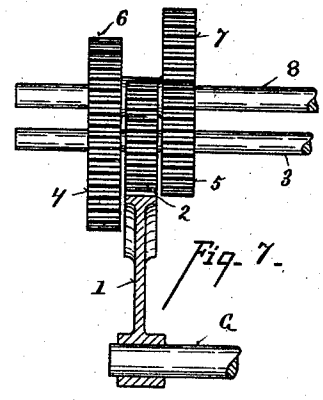

Fig. 7.

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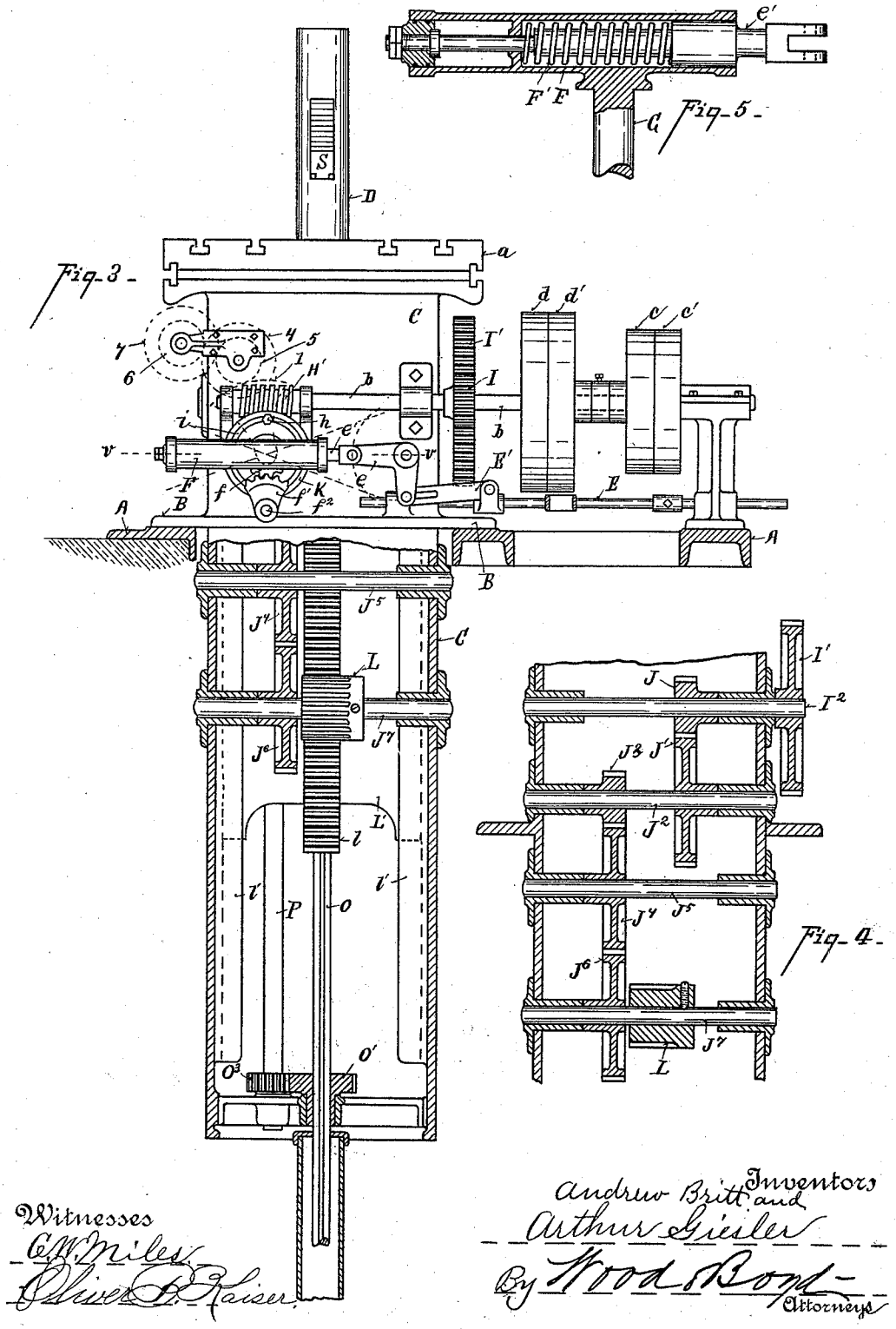

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SPLINING MACHINE.

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Fig. 9.

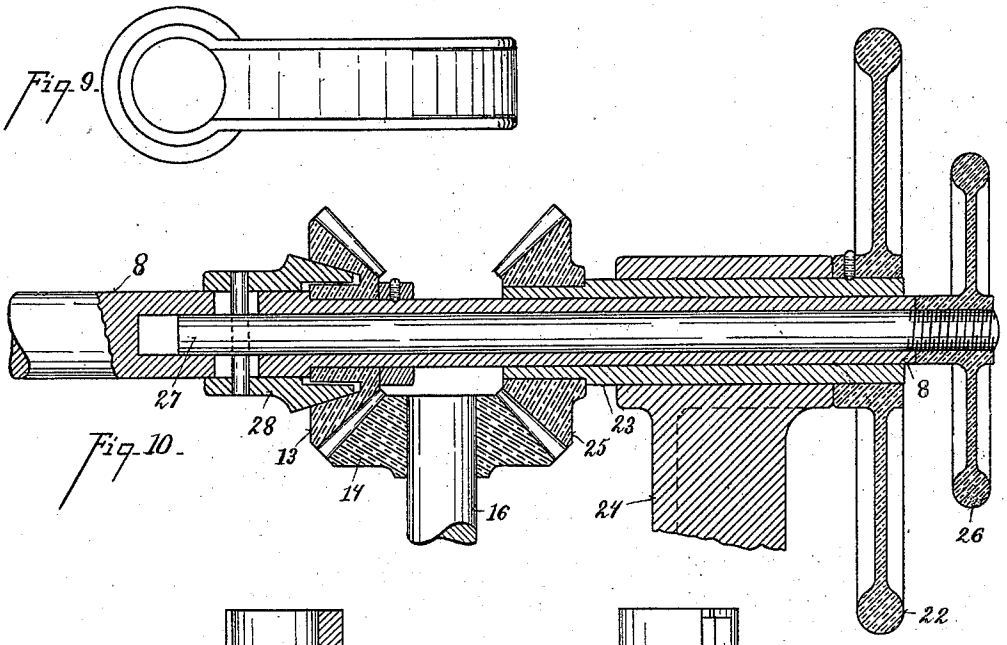

Fig. 10.

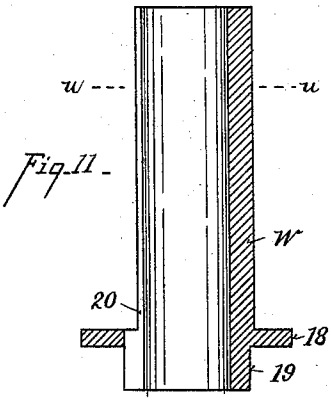

Fig. 11.

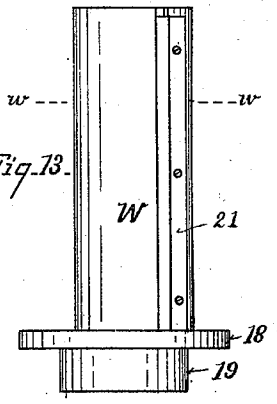

Fig. 13.

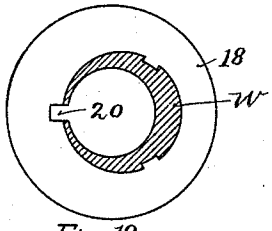

Fig. 12.

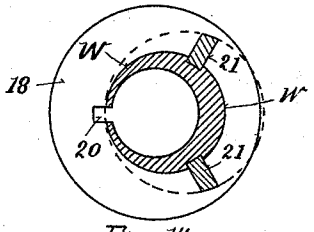

Fig. 14.

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SPLINING MACHINE.

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Fig. 15.

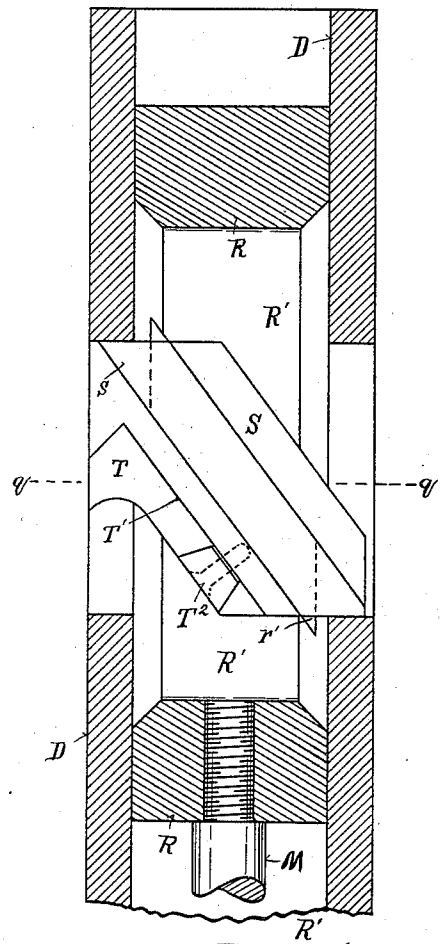


Fig. 16.

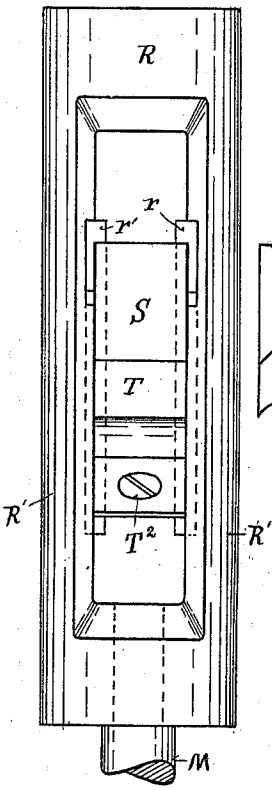
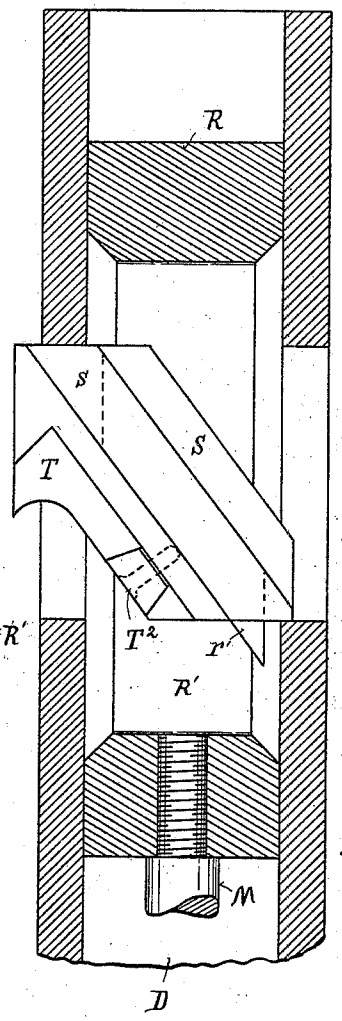


Fig. 17.



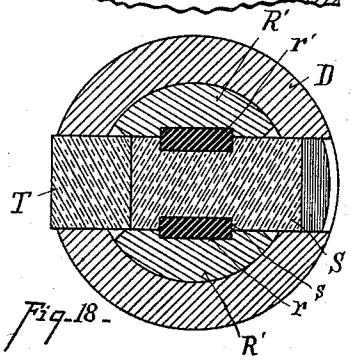


Fig. 18.

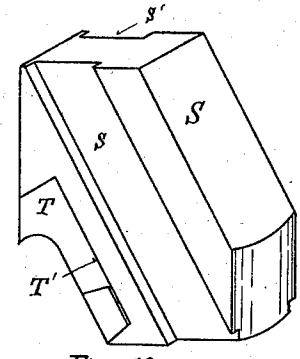


Fig. 19.

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UNITED STATES PATENT OFFICE.

ARTHUR GIESLER AND ANDREW BRITT, OF DAYTON, OHIO, ASSIGNORS TO THE STILWELL-BIERCE & SMITH-VAILE COMPANY, OF SAME PLACE.

SPLINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 540,095, dated May 28, 1895.

Application filed November 15, 1894. Serial No. 528,883. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR GIESLER and ANDREW BRITT, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Splining-Machines, of which the following is a specification.

Our invention relates to a machine for splining hubs, sleeves, pulleys or cylinders.

One of the objects of the invention is to provide mechanism for automatically operating the spindle which carries the tool stock and cutter so that the shipping mechanism is operated to reverse the direction at the end of each stroke. In order to retract the spindle for a second cut it is necessary to retract the tool so that it will pass back and then be fed or set up for a second cut. This feeding must take place before the belt is shifted and we accomplish this result automatically by connecting the feed mechanism by a train of gears to the tripping mechanism which operates to feed the tool before the trip occurs which shifts the belt. Hence the train of gears for operating the feed and tripping mechanism for shifting the belt are operated intermittently in time movements with each other. The spindle which carries the knife is made hollow and the feeding devices are arranged to operate a shaft located within the hollow spindle so that a knife feeding mechanism may be operated positively and conveniently without interfering with the other mechanism of the machine.

The features of our invention will be more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a central vertical section on line *x x*, Fig. 2. Fig. 2 is a section on line *y y*, Fig. 1. Fig. 3 is a rear elevation, partly in section, of Fig. 1. Fig. 4 is a cross-section on line *z z*, Fig. 1. Fig. 5 is a section of the tripping device on line *v v*, Fig. 3. Fig. 6 is an elevation of the gear for driving the feed-shaft. Fig. 7 is a side elevation of Fig. 6. Fig. 8 is a detailed view of one of said gears shown in Fig. 7. Fig. 9 is a plan view of the chip-spout. Fig. 10 is a horizontal section through the gears 13, 14, 25. Fig. 11 is a cross-section of the pulley-supporting sleeve. Fig. 12 is a section on line *u u*, Fig. 11. Fig. 13 is an elevation of a modification of Fig. 11. Fig. 14 is a section on line *w w*, Fig. 13. Fig. 15 is a central vertical section of the tool stock and head. Fig. 16 is a front view of the tool-stock and yoke. Fig. 17 is a similar view of Fig. 15, showing the tool-head in working position. Fig. 18 is a section on line *q q*, Fig. 15. Fig. 19 is a perspective view of the tool-head.

A represents the sleepers upon which is supported the hollow frame C by means of a flange B.

a represents the bed or table of the machine, on which the pulley or piece to be dressed is supported.

b represents the main driving shaft.

d, *d'*, represent tight and loose pulleys on shaft *b* for driving the same to draw the spindle D downward in which direction it is preferably moved to do the work.

c, *c'*, represent tight and loose pulleys for the reverse speed for moving the spindle D back to position.

E represents the belt shifting shaft to which is attached ordinary belt shifting arms. This is reciprocated backward and forward by means of link E' and bell crank lever *e* loosely hinged to the link E' at one end and to the tripping piston rod *e'* at the opposite end. The knee of the bell crank is journaled to the frame of the machine.

F represents a tripping cylinder. This tripping cylinder is for the purpose of shifting the belt automatically at the end of the upward and downward stroke for moving the spindle quickly into position for a second cut of the tool. To this cylinder is attached a segment *f* the teeth of which mesh with the teeth of the segment *f'* which journals on the stud shaft f^2.

G represents a stud shaft rigidly connected to the barrel of the piston as shown in Fig. 5, which journals in the sleeve *g* secured to the frame C as shown in Fig. 1.

h, *h*, represent tripping dogs attached to the face K of worm gear H which journals on the sleeve *g* and engages with the worm H' on the driving shaft *b*. The dogs *h* are set in the groove *i* of the disk K.

Say it is desired to trip the machine when

the spindle has traveled downward five inches. The engaging faces of the dogs *h* would be set a proper distance apart in the groove *i* to accomplish this result upon the opposite side of the segment *f'*. As said disk revolves once the dogs strike the lug *j* and rock the shaft G and tilts the cylinder F over its center and this reciprocates the belt shifting shaft E.

The coiled spring F' wound around the piston rod *e'* is for the purpose of throwing the shifting shaft E quickly when the cylinder F and bell crank *e* have been thrown over the center line. The spring is compressed when the cylinder F is rocked by the segment F' in either direction and when the spring is released from the dead center it shoots the shaft E quickly into the proper position. This is a very quick and effective means of shifting the belt automatically by the operation of the machine.

The spindle is driven or reciprocated by means of the following train of gears: I represents a pinion splined upon shaft *b* meshing with the gear I' on shaft I^2. Upon this shaft is mounted transmitting gear J which meshes with and drives gear J' on shaft J^2, which in turn transmits motion through gear J^3, to gear J^4, on shaft J^5. J^4, in turn transmits motion to gear J^6, on shaft J^7.

L represents a pinion secured to shaft J^7. It meshes with the rack bar *l* which is rigidly secured to the spindle stock L', which slides in ways *l'* on the frame C. Spindle D is rigidly secured to said stock. This spindle is hollow and in it is splined the feed rod M.

M' represents a nut which taps into the lower end of the stock L'.

N represents a screw threaded sleeve tapping the nut M'. The screw threaded sleeve N is swiveled upon the rod M by means of the head N'.

To the end of the threaded sleeve N is secured a rod O. This rod is splined to the gear O', which meshes with and is driven by the gears O^2, O^3, gear O^3, being splined upon the feed shaft P. This shaft is automatically revolved by the following means:

1 represents a segment secured to the shaft G and meshing with gear 2 on shaft 3, which also carries gears 4, 5. These gears in turn engage respectively with gears 6, 7, on shaft 8. (See Figs. 2, 6, 7, and 8.) These gears are for the purpose of setting the tool T and they are operated as follows: The gear 7, is journaled upon the sleeve 9, (see Fig. 8,) which is secured to the shaft 8. 10 represents a pawl engaging with the internal ratchet 11 on the inner face of the gear 7, which locks the gear to the sleeve when it is turned in one direction and allows it to move backward by the slip of the pawl over the ratchet teeth when it is turned in the opposite direction. Gear 6 is a duplicate of gear 7 except that the ratchet and pawl are set in the reverse direction so that it moves idly when gear 7 is driven forward for feeding, and feeds when the gear 7 is turning as an idler. These respective gears transmit motion to the shaft P by means of the gear 13, on shaft 8, gears 14, 15, on shaft 16, and then in turn to gear 17 on shaft P. Shaft P transmits motion through gears O^3, O^2, O', to shaft O, which in accordance with the direction in which the motion is transmitted moves the feed rod M up or down by means of the nut M' and screw sleeve N.

Shaft M is secured to the yoke frame R. This yoke is mortised so as to receive the tool stock S. This tool stock is provided with ways *s*, *s'*, which receive the gibs *r*, *r'*, which are rigidly connected to the segments R' of the yoke.

T represents the tool or knife secured in a gain T' of the tool stock by means of the set screw T^2.

The tool stock being splined to the gibs at an angle to the vertical line of the shaft M, when said shaft is raised, the tool T is forced inward by the movement of the head S on the gibs, and when the shaft M which is moved by the shaft O, is moved downward, the tool head S moves outward and carries the tool in position for a cut as shown in Fig. 17. Fig. 16, shows the tool stock retracted in the yoke and in the spindle D, and it is brought into this position for moving the spindles upward through the hub U of the pulley.

In order to hold the tool rigidly we provide a supplemental hub W which forms a bearing for the spindle D, and holds it firmly in position against the strains of the tool. This supplemental sleeve is provided with a collar 18 and a downward projected sleeve 19, which seats upon the table *a*. This collar is likewise provided with spline 20, through which the tool passes freely. This supplemental sleeve is made so that pulleys, the hubs of which have a large diameter may be cut with the same tool which is used to dress pulleys with hubs of smaller diameter.

In the modifications shown in Figs. 13 and 14, we employ supplemental strips 21 which are interchangeable with wider or narrower ones, in order to accommodate it to bores of different diameters of pulley hubs.

In order to feed the tool by hand as well as by power we provide the following instrumentalities:—22 represents a hand wheel mounted upon the sleeve 23, which journals in the bracket 24. On this sleeve is mounted the bevel gear 25 which meshes with the gear 14 upon shaft 16, which transmits motion to the shaft P and thence to shaft O for feeding the tool stock. The power feed is thrown in and out of gear by means of the hand wheel 26 on shaft 27, said hand wheel being screw threaded and engaging threads on the rod 27 so as to engage or release the clutch 28 from the miter gear 13, which runs as an idler when the clutch is thus released.

In order to indicate the depth of the cut of the splining tool we provide the following instrumentalities:—29 represents a worm mounted upon the upper end of the shaft P. This worm drives the worm wheel 30 upon the shaft 31,

which in turn drives the spur gear 32, reciprocating the rack 33. The rack 33 carries an indicator point 34, which registers the depth of the cut by means of the scale 35 on the face of the bracket 36, by means of which the operator is enabled to tell the progress of the work and the depth of the cut.

Mode of operation: The tripping cylinder stands normally at an inclination to the horizontal in one direction or the other as indicated in dotted lines, Fig. 3. The belt is on the slow feed pulley *d*, for driving the spindle down to make a cut. The worm gear H′ on the driving shaft *b* turns the disk K. The dog *h* is adjusted so that as soon as the cut is made it will come into contact with the lug *j*. This will rock the tripping piston and bring it back into the horizontal position. It will likewise rock the segment 1, which will immediately start the feeding train and move the knife back through the train of feeding gears by raising the shafts O, M, withdrawing the tool stock within the spindle. This movement will take place at the time the tripping spindle has been raised past the horizontal or the dead center when the piston *e′* will be shot by the spring and shift the belts, throwing the belt from the work pulley *d′* on to the loose pulley *d* and shift the belt from the idle loose pulley *c′* on to the work pulley *c* which operates the train of gears which lift the spindle and this will in turn re-set the tool and shift the belt again bringing the work pulley into operation. Thus the several operations of the machine are performed intermittently in appropriate time movements with each other.

We claim—

1. In a splining machine employing a reciprocating hollow spindle, the combination of a cutter head supported upon an incline in said spindle, a feed shaft located therein and connected to the cutter head, means for raising and lowering the said feed shaft for intermittently controlling the feed, and means for reciprocating said hollow spindle intermittingly with the feed control, substantially as specified.

2. In a splining machine employing a reciprocating hollow spindle, the combination of a cutter head supported upon an incline in said spindle, a feed shaft located therein and connected to the cutter head, a train of revolving gears and a screw for raising and lowering the said feed shaft operated intermittently, a rack bar connected to said spindle and driven by a train of gears for reciprocating said spindle, and automatic tripping feed controlling mechanism operated by the driving and reversing mechanism, whereby the feeding mechanism is automatically operated at each end of the stroke of the hollow spindle, substantially as specified.

3. In a splining machine, the combination of the reciprocating hollow spindle having an inclined slotted way formed therein, a tool-stock supported upon said inclined way, the feed rod M located in the spindle and connected to the tool-stock, the sleeve N swiveled to said rod, the shaft O connected to said sleeve, the feed P, and a train of gears connecting said shafts, substantially as described.

4. In a splining machine, the combination of the hollow spindle, the tool stock supported therein, the shaft O connected to the spindle and tool stock, a feed shaft, a train of gears connecting the feed shaft to the shaft O, and a tripping mechanism through which the feed shaft is automatically operated at each end of the stroke of the tool, substantially as described.

5. In a splining machine the combination of the tripping cylinder and piston with a belt shifter and with the feeding shaft 8, which operates a train of gears to feed the tool stock, substantially as specified.

6. In a splining machine, the combination with the tool stock and feeding mechanism, of the tripping device composed of the pivoted cylinder and its piston, a compression spring engaged with said piston, and the driving gears and belt shifting mechanism, substantially as described.

7. In combination with a reciprocating hollow spindle a main driving shaft operating a train of gears which reciprocate the said spindle and tripping mechanism connected to the belt shifting devices and to the devices for feeding the tool stock through the spindle all arranged to be automatically operated in time movements with each other, substantially as specified.

8. In a splining machine, the combination with a hollow spindle and a tool stock supported in the said spindle, of a sliding feed shaft, a screw for operating said feed shaft, a rotating and reciprocating shaft O for driving the feed shaft, through said screw, a train of gears intermittently actuating the rotating and reciprocating shaft, and driving and reversing mechanism for reciprocating the hollow spindle, substantially as specified.

In testimony whereof we have hereunto set our hands.

ARTHUR GIESLER.
ANDREW BRITT.

Witnesses:
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