P. A. CUENOT & L. G. FISCHER.

PUNCHING MACHINE.

APPLICATION FILED JULY 2, 1913.

1,155,552.

Patented Oct. 5, 1915.

3 SHEETS—SHEET 1.

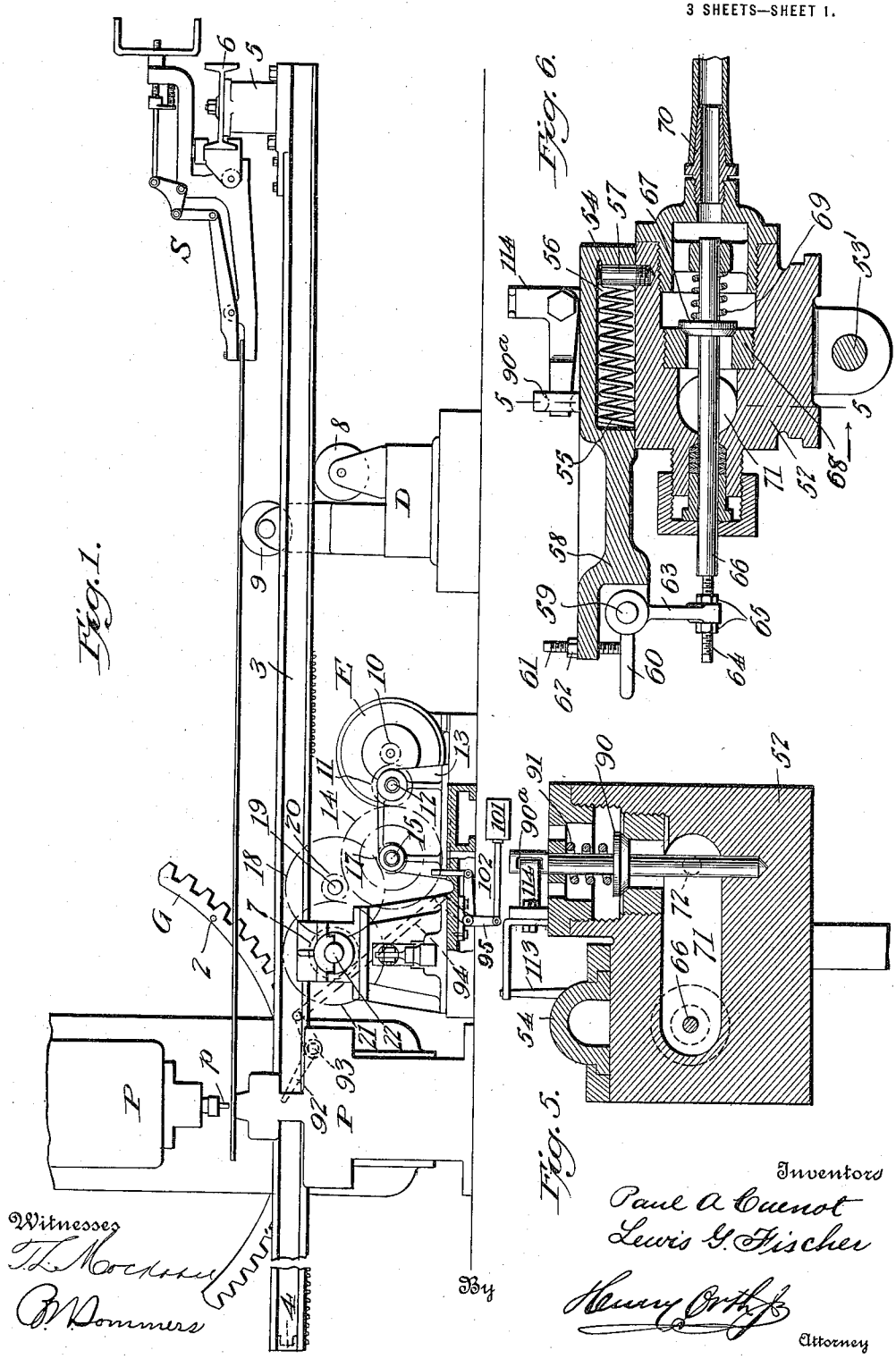


Fig. 1.

Fig. 6.

Fig. 5.

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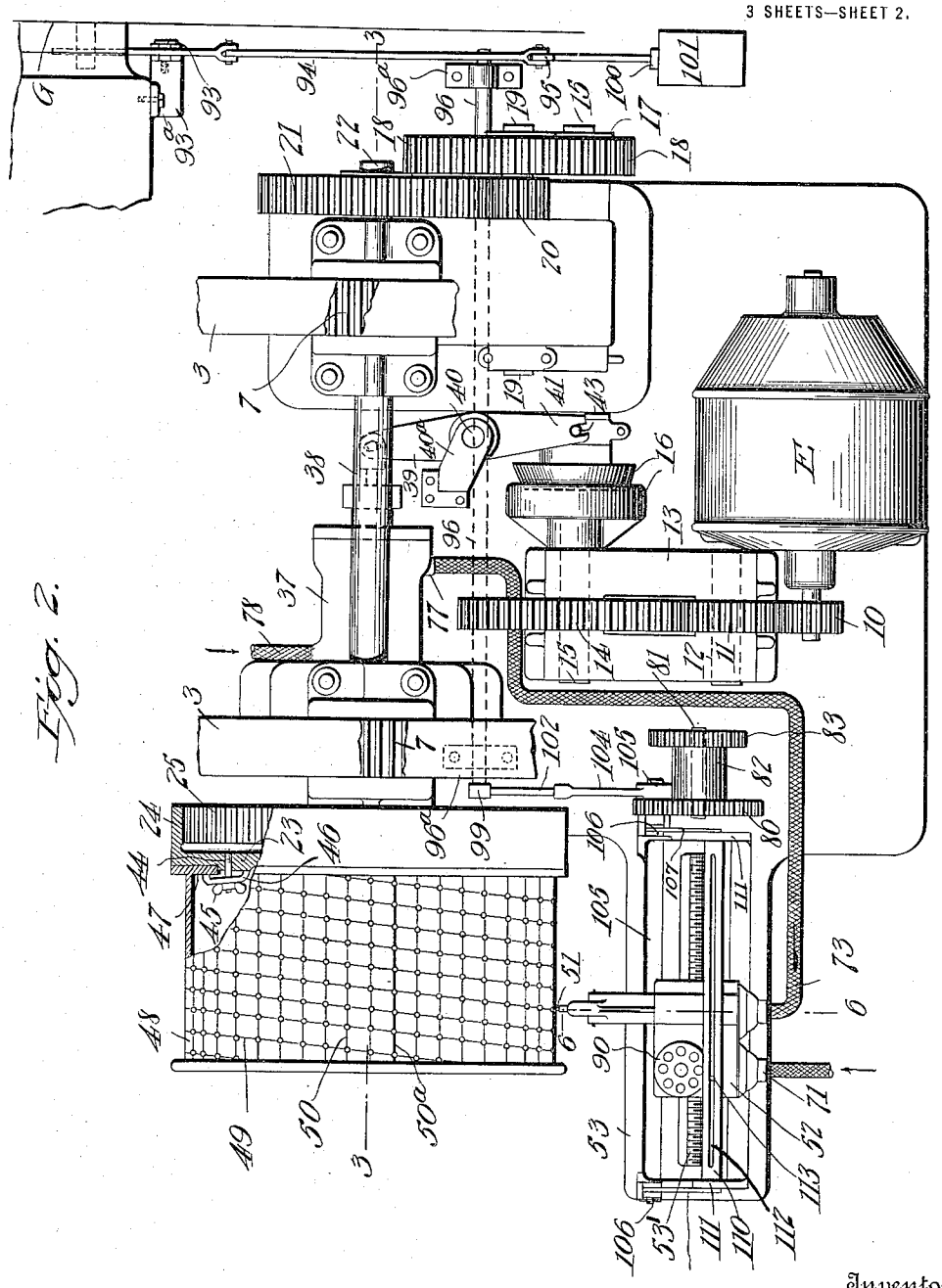


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

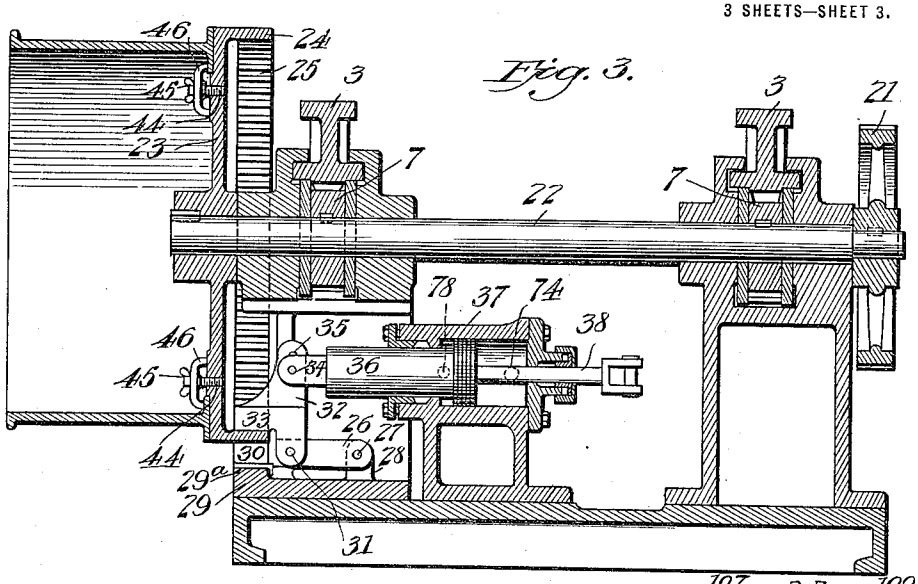
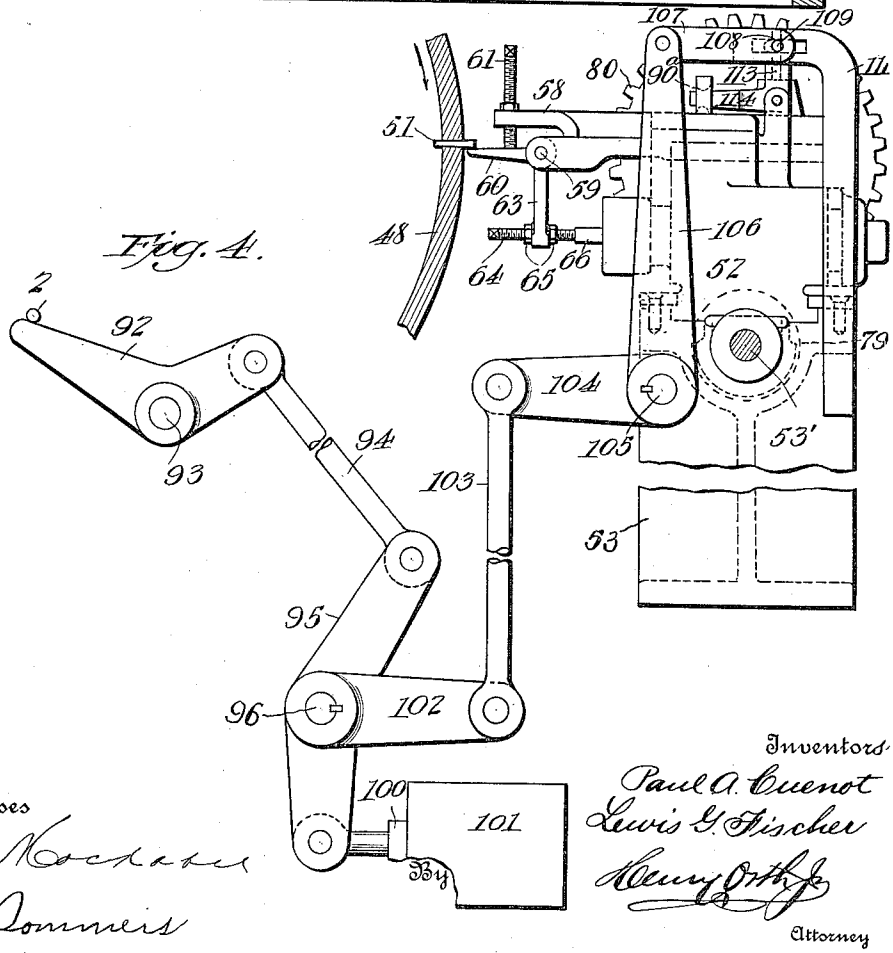


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

PAUL A. CUENOT AND LEWIS G. FISCHER, OF STEELTON, PENNSYLVANIA, ASSIGNORS TO PENNSYLVANIA STEEL COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

PUNCHING-MACHINE.

1,155,552. Specification of Letters Patent. Patented Oct. 5, 1915.

Application filed July 2, 1913. Serial No. 776,992.

To all whom it may concern:

Be it known that we, PAUL A. CUENOT and LEWIS G. FISCHER, citizens of the United States, and residents of Steelton, Dauphin county, Pennsylvania, have invented certain new and useful Improvements in Punching-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Our invention relates to spacing tables for punching machines for punching sheets and bars, and has for its object to provide a removable pin drum to control the operation of the punching table, together with mechanism coöperating with said drum to effect the proper spacing of the table, as will hereinafter be more fully described and claimed.

Referring to the drawings, in which like parts are similarly designated—Figure 1 is an elevation of one form of spacing table including our invention shown in relation to the punch. Fig. 2 is a plan view of the spacing table operating mechanism. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is an enlarged detail view of the mechanism controlled by the drum and by the punching machine. Fig. 5 is a section on the line 5—5 of Fig. 6. Fig. 6 is a sectional view on line 6—6 of Fig. 2.

In Fig. 1 we have digrammatically shown part of a punching machine, as P, having a punch *p*, and such machine is, as usual, provided with a large gear wheel, part of which is shown at G. This type of punch is well known, and forms no part of our invention. At a suitable point on the gear wheel G, of the punch, we bore a hole and insert a pin 2, for purposes hereinafter to be described. The punch *p* is located to one side of the spacing table and overhangs the same. The spacing table comprises two longitudinal rack-bars 3, the forward ends of which are connected together by means of a channel iron 4, as shown in Fig. 1, and the rear ends are connected together by pedestal 5, bolted to said rack-bars. On the pedestal 5 is secured the cross rail 6 on which is clamped the gripper S of any suitable construction, for gripping the work and holding the same during the punching operation. The detailed construction of this gripper also forms no part of our invention. The rack bars 3 are traversed by pinions 7, preferably located near the punch, and at suitable points are provided with pedestals D, Fig. 1, only one of which is illustrated. On each of these pedestals are two pairs of rollers 8, on which the flanges of a rack-bar 3 bear, the rack teeth passing between the two rollers of a pair. Extending up between the rack-bars 3 is a supporting roll 9 for supporting the work, either a sheet or a bar.

The mechanism for starting and stopping the traverse of the rack-bars 3, that is to say, the mechanism for driving and controlling the pinions 7, that directly engage the rack-bars, is best shown in Figs. 2 and 3.

An electric motor E has a pinion 10 that drives a small gear wheel 11, on a shaft 12, mounted in a pedestal 13. Gear wheel 11 drives a larger gear 14 mounted on a shaft 15. The shaft 15 is in two parts, connected by a friction clutch of any suitable type, here shown as a cone clutch 16, and at its opposite end has a pinion 17 that drives a gear wheel 18 on a shaft 19, said shaft having a pinion 20 thereon, which pinion drives a gear wheel 21 on a shaft 22 on which pinions 7 for traversing the rack-bars are mounted. On the shaft 22, which is the main actuating shaft for the table, is keyed a wheel 23, having a flange 24, whose internal face is provided with serrations, preferably saw-tooth serrations, that are very close together, for example, in the neighborhood of one-sixteenth of an inch from point to point.

The serrated flange 24, 25 is engaged by a stopping mechanism, that is, it is gripped by a gripper when it is desired to stop the wheel 23, for purposes to be hereinafter described, and this gripping is done only after clutch 16 has been released. The gripper comprises a lever 26 (Fig. 3) pivoted at 27 in ears 28 on a plate 29, and on the other end of lever 26 is formed a gripping shoe 30, conforming to the curvature of the flange 24.

Pivoted at 31 to the lever 26 is a lever 32, also having a gripping shoe 33, whose face

is serrated to correspond to the serrations 25. The lever 26 supports the lever 32, and when the jaws are disengaged from the flange or rim 24, the front end of lever 26 rests on a support 29ª on plate 29. The upper end of lever 32 has a pin and slot connection 34, 35, with one end of a differential piston 36 that operates in an air cylinder 37. To the other end of the differential piston 36 is secured a piston rod 38, which piston rod has a pin and slot connection with the lever 39. This lever 39 is pivoted on a vertical stud or shaft 40 fixed in an overhanging bracket 40ª supported by the bed of the machine. The lever 39 has a forked end 41 that engages pins 43 on the movable member of coupling 16.

The wheel 23 which is the templet carrier is provided near its periphery with a number of bolts 44, each of which bolts is provided with a thumb-nut 45 for holding clamping members 46. Each clamping member has one end engaging the wheel 23, and the other end engaging an internal flange 47 on a templet drum 48. The flange seats in the peripheral rabbet in the wheel 23, as clearly illustrated in Fig. 2. The surface of the drum 48 is provided with a spiral line 49 of any desired pitch, but preferably about one-fourth inch pitch. The circumference of the drum is equally divided by parallel lines 50, one of which 50ª is deeper or wider than the others, in order to distinguish it as a zero positioning line.

We have found it convenient to divide the periphery of the drum into 300 divisions, more or less, the drum being about twenty-four inches in diameter, thus making the divisions about one-fourth of an inch apart. At each intersection of the spiral line 49 with the parallel lines 50, 50ª we bore and ream a one-eighth inch hole for the reception of taper pins, such as 51. The drum 48 thus forms a perpetual templet.

Parallel to the drum 48 is a carriage 52 mounted on a pedestal 53, and on this carriage is the mechanism for controlling the stopping of the pin drum and table which is itself controlled or set in operation by the pins on said drum. The carriage 52 contains valves for controlling the clutch piston 36, and said carriage has a sliding member 54 (Fig. 6) held projected toward the templet drum 48 by means of a spring 55 contained within a recess 56 in said slide, said spring having one end engaging a pin 57 and the other end engaging the end wall of said recess. The slide 54 has a projecting arm 58 in which is pivoted at 59 a bell-crank lever, one arm 60 of which is limited in its upward swing by a set-screw 61 and a lock-nut 62, which arm is adapted to be engaged by the pins 51 in the templet drum. The other arm 63 of said bell-crank lever carries a screw 64 locked thereto by lock-nuts 65, said screw engaging the spindle 66 of a valve 67. The valve 67 is urged to its seat 68 by a spring 69. Compressed air is supplied to the chamber of valve 67 through the hose connection or nipple 70. As soon as pin 51, Fig. 4, strikes arm 60, the bell-crank lever is rocked on its pivot 59, causing screw 64 to urge the valve rod 66 against valve spring 69 and thereby admit compressed air through the valve seat 68 to a chamber 71. The chamber 71 has an outlet 72 to a rubber hose 73 leading to a hose connection 74 to the right hand end of cylinder 37, Fig. 3. The left hand end of this cylinder has a rubber hose 78 connected thereto, admitting live air to said end of the cylinder, and to the smaller piston area. This air is taken directly from the air line, and the air pressure is maintained constant on the smaller area of the piston under all conditions of working. As soon as compressed air is admitted through valve 69 into the chamber 71 and through the rubber hose 73 to the connection 77 of cylinder 37 and on the larger surface of the piston 36, said piston 36 will be moved to the left, Fig. 3, forcing the compressed air on the left-hand side of the piston and on the smaller area thereof, back through 78 into the line, and causing the gripper jaws 30, 33, to engage the flange or rim 24 of wheel 23 to stop the rotation thereof.

The carriage 52 is traversed by a screw 53′. On the screw 53′ is a gear wheel 79, Fig. 4, with which meshes a larger gear wheel 80, Figs. 2 and 4. This gear wheel 80 is secured on one end of a short shaft 81 mounted in a bracket 82. On the other end of the short shaft 81 is secured a gear wheel 83 that meshes with one of the racks 3, so that the movement of the rack controls the traverse of the carriage. The mechanism driving the screw causes said screw to operate, that is the screw is always running when the spacing table is in motion.

On chamber 71 is a valve 90 urged to closed position by a spring 91, Fig. 5, the object of said valve being to vent chamber 71, and consequently the right hand end of cylinder 37, to the atmosphere as soon as the punch p has completed its operation. This is done by lever mechanism actuated by the pin 2 on gear G of the punching machine. This pin 2 engages a bell-crank lever 92, Figs. 2 and 4, which bell-crank lever operates on a pivot 93 secured in a bracket 93ª on the punching machine. This bell-crank lever is connected by a link 94 to an upwardly and downwardly directed lever 95, mounted on a shaft 96 held in bearings 96ª secured to the bed plate.

The lower end of lever 95 is connected to the armature 100 of a retracting solenoid 101. A crank 102 on other end of shaft 96 is connected by a link 103 to a lever 104 that

is secured to a shaft 105, and this shaft has at each end an upstanding arm 106. To each arm 106 is connected a link 107, one end of which is provided with a hole 108 in which bears a trunnion pin 109 formed on a bar 110 which rests in a slot in fixed supports 111. The bar 110 has a slot 112 extending its whole length, receives a pin 113 (fixed on slide 54) engaging a bell-crank lever 114, which bell-crank lever 114 enters an opening 90ª in the spindle of valve 90, Figs. 4 and 5. The pin 113 is fixed to the slide 54 which will be retracted when motion is imparted to the bar 110, drawing the crank 60 out of engagement with pin 51 on the drum 48, to permit the next pin thereon to actuate the crank 60.

Briefly, the actuating shaft 22 is suitably driven to move the table and simultaneously rotate the templet or drum 48, the table traversing the slide 52 with the control valves 67 and 90. The pins on the drums, operate the valve 67 controlling the stopping mechanism, thereby disconnecting the drivage for the main shaft 22 and simultaneously operating the stopping mechanism for drum and shaft. The punching machine is then operated, and after the punching operation starts the starting mechanism, thus moving the table and drum and traversing the control mechanism until another pin on said drum comes into operation, and specifically the operation is as follows:—The removable templet drum 48 whose speed is about four times that of the rack, has a number of pins set along the spiral line 49 that is graduated to feet, inches and fractions of an inch, starting from the zero line 50ª. The pins 51 are spaced along the spiral line 49 in accordance with the distance apart that the holes are to be punched in the bar or bars.

There may be only one punch, p, or a gang of punches, so that several plates, angles, &c. may be simultaneously identically punched. If staggered holes are to be punched, then the pins 51 are alternately bronze and steel, square and round, or otherwise distinguished, so that the punch operator can throw in the proper gags for the punches.

As soon as pin 51, Fig. 4, strikes bell-crank lever arm 60, the air admission valve 67, Fig. 6, is actuated to admit air from the air line to chamber 71, hose 73, to cylinder 37. Piston 36 is then moved, first releasing clutch 16 and operating gripper 30, 33, to stop the drum and its shaft 22, thereby stopping racks 3 and the article to be punched, at the proper point. The punching operator then operates the punches, and in so doing causes gear-wheel G to rotate, so that as soon as the punches p have been retracted the pin 2 in said wheel G strikes the bell-crank lever 92, Fig. 4. The movement of 92 is carried by rod 94 to lever 95 at one end of shaft 96, and the movement of shaft 96 by crank 102 and link 103 imparts movement to crank 104 on shaft 105, which having cranks 106 on each end, attached to links 107, which are also attached on trunnion pins 109 at the ends of bar 110, causes the movement of shaft 105 to impart a lateral movement to bar 110 and the pin 113, which passes through the slotted horizontal part projecting from the end of the vertical arm of bell-crank 114 which by its lower horizontal arm operates valve 90, to vent the right hand end of the cylinder 37 to the atmosphere.

Air line pressure existing on the left hand end of piston 36 immediately causes this piston to move to the right, first releasing the gripper 30, 33, and then connecting the clutch to drive the table another step until the next templet pin 51 comes into operation.

The movement of the pin 113 also draws back slide 54, withdrawing crank 60 out of engagement with pin 51 on drum 48. The next templet pin 51 then strikes bell-crank lever arm 60, and the operation is repeated.

We claim—

1. In a spacing machine, a traversable table, mechanism for traversing the table, a pin drum stopped when the table is stopped, and pneumatic mechanism controlled by the pins in said drum to disconnect the traversing mechanism to stop the drum and table.

2. In a spacing machine, a traversable table, mechanism for traversing the table, a templet drum having templet pins arranged in a spiral line thereon, pneumatic control devices actuated successively by said pins, mechanism to cause said devices to move longitudinally into register with said spiral line, and a starting and stopping mechanism for said table and drum controlled by said devices.

3. In a spacing machine, a traversable table, mechanism for traversing the table, a pin drum stopped when the table is stopped, pneumatic mechanism controlled by pins on said drum to disconnect the traversing mechanism to stop the drum and table and means operated by the table to traverse the pneumatic mechanism.

4. The combination with a punching machine, of a traversable spacing table, mechanism for traversing the table, means on the machine for controlling the starting of said mechanism, a stopping mechanism and means driven by the traversing mechanism to control the operation of the stopping mechanism.

5. In a spacing machine, a traversable table, mechanism for traversing the table, a pin drum, movable pins in spiral spaced relation in the drum, mechanism for suddenly stopping the drum and table, con-

trolling mechanism controlling the stopping mechanism and brought into operation by the pins in said drum.

6. In a spacing table, an actuating shaft, a pin drum on said shaft, means to hold said shaft stationary, mechanism for driving said shaft, and controlling mechanism actuated from said drum for simultaneously disconnecting the driving mechanism and actuating the drum holding means.

7. In a spacing table, the combination with a pin drum, of a slide, an air valve and a vent valve carried thereby, means actuated by the pins of said drum to control the air valve, mechanism for operating the vent valve and simultaneously moving the air valve operating mechanism out of operative relation to said pins, and mechanism for traversing the slide.

8. In a spacing table, a shaft from which said table is driven, a cylindrical templet secured thereon having holes spaced around the templet, pins for insertion in said holes and mechanism actuated by the pins for controlling the movement of the table.

9. In a spacing table, a shaft from which said table is driven, a cylindrical templet thereon having holes therein in spaced spiral arrangement, pins for insertion in said holes and mechanism actuated by the pins for controlling the movement of the table.

10. In a spacing table, a shaft from which said table is driven, a cylindrical templet detachably mounted on the shaft and having holes spaced around the templet, pins for insertion in said holes, and mechanism actuated by the pins for controlling the movement of the table.

11. In a spacing table, a shaft from which said table is driven, a cylindrical templet detachably mounted on the shaft and having holes in spaced spiral arrangement, pins for insertion in the holes, and mechanism actuated by said pins for controlling the movement of the table.

12. In a spacing table, a shaft, a wheel secured to the shaft, a cylindrical templet drum having spaced templet holes therein, an internal flange at one end, means on said wheel to coöperate with said flange to accurately center the drum, and removable clamping devices on the wheel for engaging said flange.

13. In a spacing table, a shaft, a wheel secured to said shaft having a peripheral rabbet, a cylindrical templet having a flange, and removable clamping means on the wheel and engaging the flange to hold it in the rabbet and thereby secure the templet to the wheel.

14. In a spacing table, the combination with a shaft, a wheel thereon having a flange, a templet detachably secured to the wheel, a pivoted jaw acting on one side of the flange, a second jaw pivoted to the first jaw and acting on the other side of the flange, and power mechanism to swing said second jaw and cause both jaws to move to and from the wheel.

15. In a spacing table, the combination with a shaft, a wheel thereon having a flange, a templet detachably secured to said wheel, gripping jaws for engaging the flange, a pneumatic piston and cylinder for operating the jaws, and valve mechanism operated by the templet to admit pressure to one side of said piston and separate mechanism for venting the pressure from the cylinder.

16. In a spacing machine, the combination with traversable racks, a shaft, pinions on the shaft meshing with the racks, a wheel on the shaft having a flange, a templet drum detachably secured to the wheel, gripping jaws for engaging the flange, a differential pneumatic piston and cylinder for operating the jaws, the smaller end of said piston being under substantially constant pneumatic pressure, driving mechanism for the shaft, a clutch operated by said piston to connect and disconnect the driving mechanism, a vent valve and mechanism brought into operation after a punching operation to vent said valve to release the pneumatic pressure on the larger side of the piston and thereby release said jaws and clutch the driving mechanism.

17. In a spacing table, the combination with racks thereon, of an actuating shaft, pinions on said shaft engaging the racks, a templet carried by said shaft, gripping mechanism to hold the templet and shaft, a differential pneumatic piston and cylinder for operating said mechanism, driving mechanism, a clutch operated by said piston to connect and disconnect the driving mechanism, a slide, a screw for traversing the slide driven from a rack, a valve on the slide, a bell-crank one arm of which operates the valve and the other arm of which is operated by the templet, said valve controlling the admission of air to the cylinder, yielding means for holding said lever, a venting valve on the slide, a rock lever on the slide having one arm for operating the vent valve and the other arm engaging a pin on the yielding means, a slotted bar in which said pin travels and means to rock the bar to move said yielding means to simultaneously withdraw the bell-crank from the path of the templet and operate the venting valve.

18. In a spacing mechanism the combination with a spacing table, a templet having stop pins, said pins arranged in a spiral on the templet; of control mechanism traversed before said templet in accordance with said spiral and actuated by said pins, and means actuated from the table to traverse said mechanism.

19. In a spacing mechanism, the combination with a spacing table, a templet having pins thereon laterally and longitudinally spaced and means to move the templet; of control mechanism including a contacting element, a screw driven from said table to move the control mechanism and to permit the templet pins to contact with said element successively.

20. In a spacing mechanism, the combination with a table, a templet having removable stop pins therein arranged in a spiral, and mechanism for driving said templet and table, of control mechanism traversed before said templet in accordance with said spiral, and actuated by the table.

21. In a spacing table, the combination with a rotatable templet and templet carrier, and pins for the templet; of means to engage and hold the templet against rotation and mechanism for controlling the operation of said means actuated by the templet pins by the rotation of the templet.

In testimony that we claim the foregoing as our invention, we have signed our names in presence of two subscribing witnesses.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."