

(No Model.)

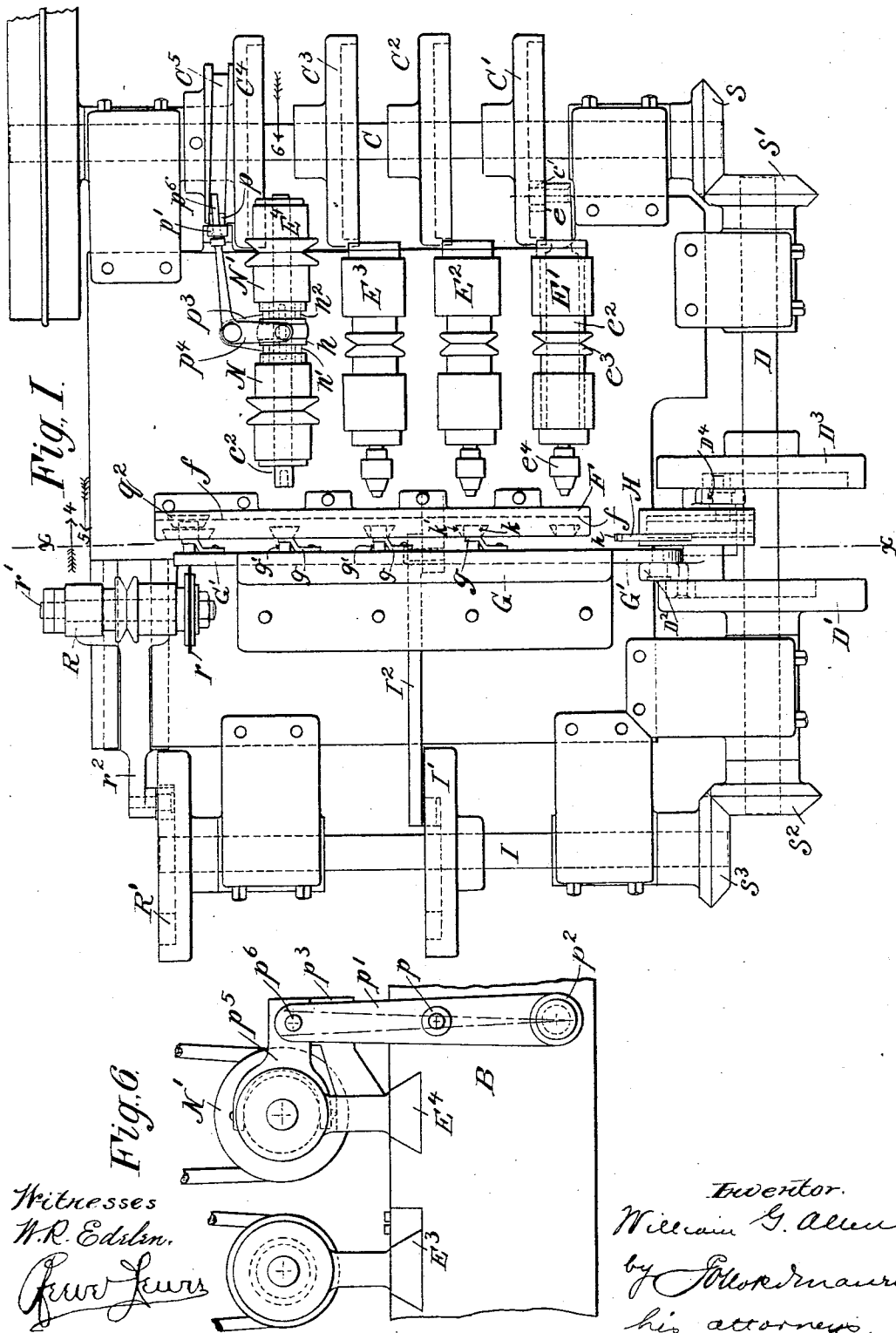
4 Sheets—Sheet 1.

W. G. ALLEN.

MACHINE FOR MAKING NIPPLES FOR WHEEL SPOKES.

No. 580,171.

Patented Apr. 6, 1897.



Witnesses
W. R. Edson.
Geo. Lewis

Inventor.
William G. Allen.
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his attorney.

(No Model.)

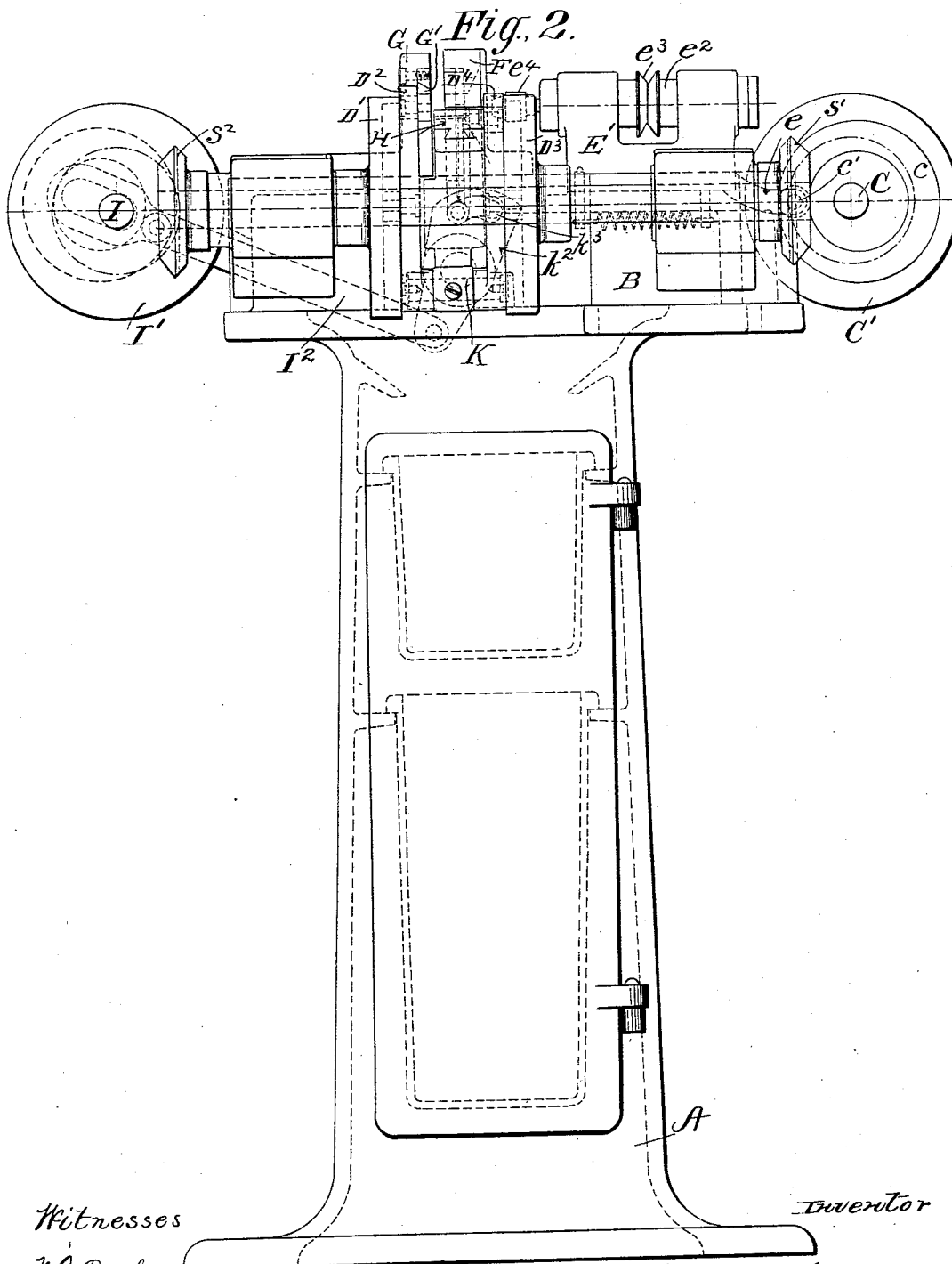
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Witnesses

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(No Model.)

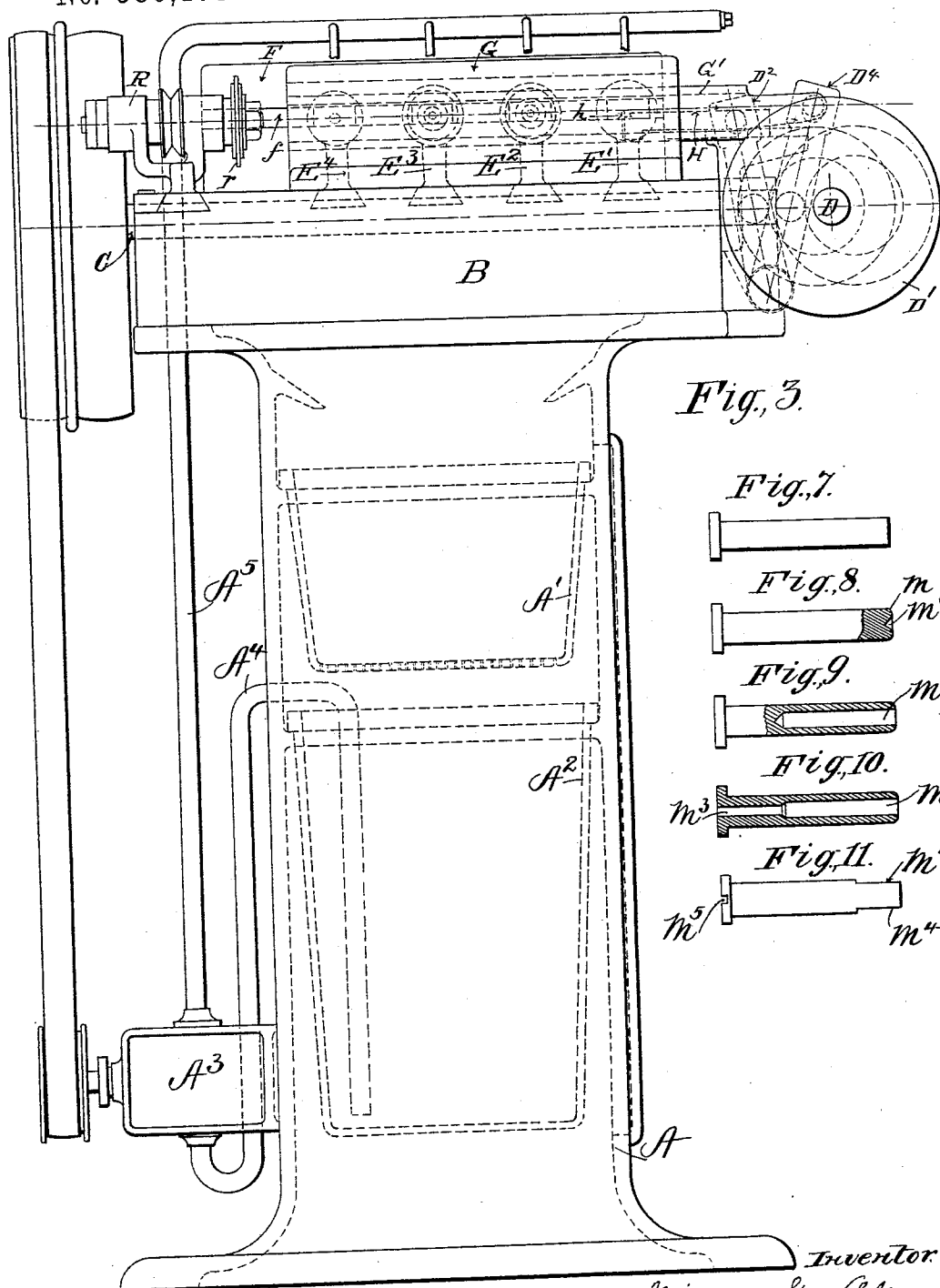
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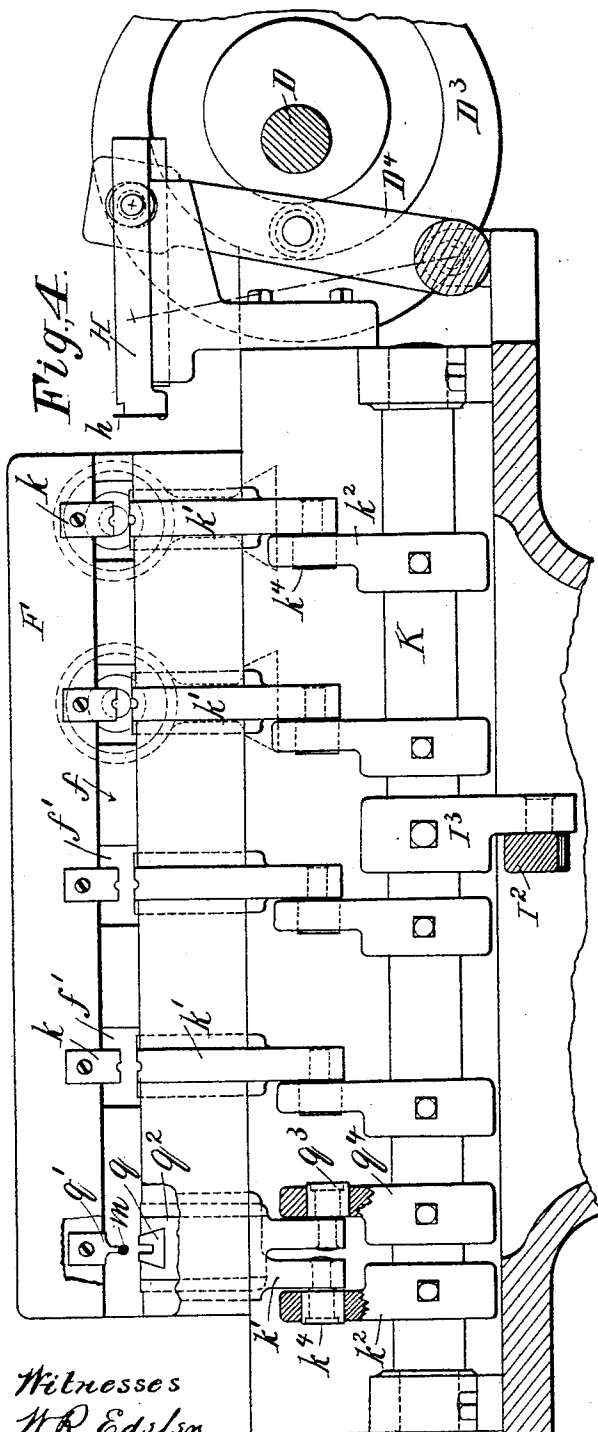
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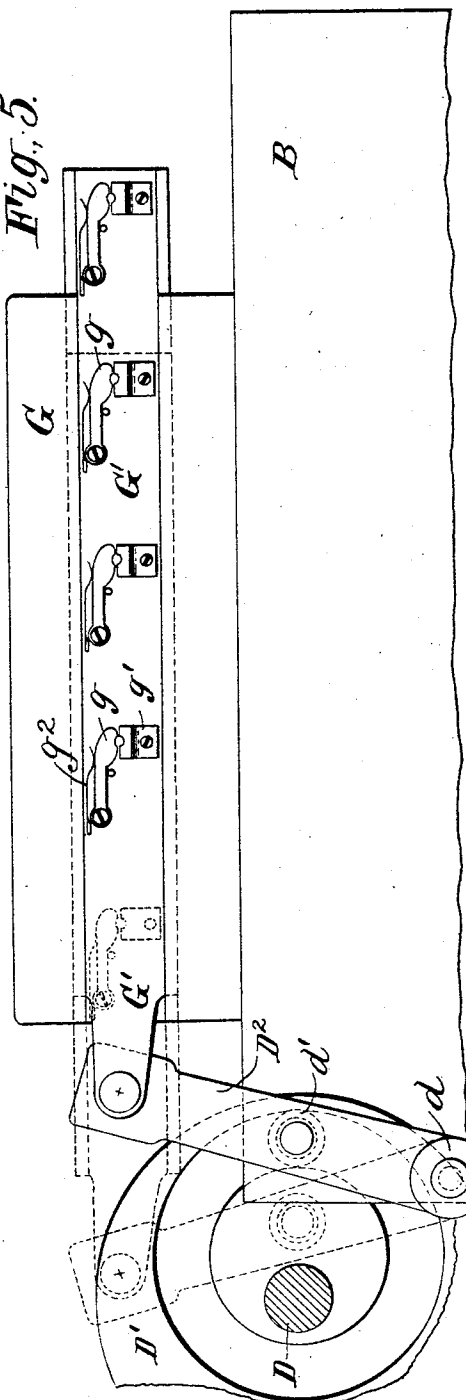
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Fig. 5.



Inventor,
William G. Allen
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UNITED STATES PATENT OFFICE.

WILLIAM G. ALLEN, OF HARTFORD, CONNECTICUT.

MACHINE FOR MAKING NIPPLES FOR WHEEL-SPOKES.

SPECIFICATION forming part of Letters Patent No. 580,171, dated April 6, 1897.

Application filed January 15, 1897. Serial No. 619,310. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. ALLEN, of Hartford, Connecticut, have invented new and useful Improvements in Machines for Making Nipples for Wheel-Spokes and Similar Articles, which improvements are fully set forth in the following specification.

In the construction of wheels for bicycles and similar vehicles where wire spokes are employed the outer ends of the spokes, which are screw-threaded, are secured to the rim by means of internally-threaded nipples. These nipples have a head whereby they are engaged with the rim, and this head is slotted, like a wood-screw. The shank, moreover, is flattened or slabbed off on opposite sides, so that it can be readily grasped and turned by means of a wrench.

The object of the present invention is to furnish a machine for cheaply and expeditiously making these nipples, though the machine, or material and essential parts thereof, can be used for making other articles similar in their general form to the described nipples. Machines for making (or rather for partially making) these nipples have been devised heretofore. The machines most generally used for this purpose have a rotating disk-shaped carrier having near its periphery holes or receptacles for receiving the blanks and means for holding the latter therein. The intermittent rotation of the carrier brings the blanks successively to the several tools whereby each blank is turned down at its end to the desired size and shape, then drilled, and then tapped. The partly-finished nipple is then discharged from the machine, and by subsequent operations slotted across the head and flattened on the shank. The principal difficulty encountered in the operation of machines of this type arises from the fact that the blank is not always accurately centered in the rotary carrier, and that when centered the drill striking its end may deflect it slightly, thus producing a defective nipple. It is difficult to hold the blank with sufficient firmness and rigidity in a rotating carrier and to center it accurately, and, moreover, a little looseness, such as results from wear, in the bearing of the carrier or in the devices which clamp it while the tools are operating destroys the accuracy necessary to a satisfactory operation.

According to my invention the nipples are carried by a feed-slide successively to a series of clamping or gripping devices mounted upon a fixed support. Thus no strain is thrown upon the movable feed device by the action of the tools. The gripping devices or jaws are operated by positive mechanism and therefore hold the blank firmly, and being on a stationary support the relation of each to the corresponding tool is fixed and unchangeable. The feed-slide has a series of gripping devices which take hold of the blanks when the latter are released by the relatively stationary grippers and advance them one step. By these devices the blank is fed forward intermittently through the entire machine and discharged therefrom a complete and finished nipple.

The invention comprises improvements in the several parts as well as the general combination of the elements constituting the complete machine, all of which can be most conveniently explained by reference to the accompanying drawings, in which—

Figure 1 is a plan view of a machine constructed in accordance with the invention. Fig. 2 is a side elevation. Fig. 3 is an elevation from the left of Fig. 1. Fig. 4 is a sectional detail on line *xx*, Fig. 1, looking in the direction of arrow 4. Fig. 5 is a similar view looking in the direction of arrow 5. Fig. 6 is an enlarged sectional detail looking in the direction of arrow 6, Fig. 1; and Figs. 7 to 11 illustrate a nipple at various stages in the operation.

In the organization shown the working parts are supported on an upright pedestal A, which also supports the receptacles A' A², which serve to catch the lubricating liquid (oil or water) used during the operation of the machine. The upper vessel A' has a perforated bottom of filtering material, which allows the liquid to pass, but detains the metal chips and other solid bodies. By means of a suitable pump A³ and pipes A⁴ A⁵ the liquid is kept circulating from vessel A², which forms a reservoir.

The arrangements for lubricating and cooling the tools form no part of the invention and may be varied at pleasure.

The bed B of the machine is mounted on pedestal A and carries the shafts, tool-supports, feed-slide, and other parts. The main

shaft C carries a series of cams C^1 C^2 C^3 C^4 , which advance at proper times the carriages for the drills, tap, &c., which act successively upon the blank, as will be hereinafter described. The carriages E^1 E^4 slide in dovetailed grooves in bed B, Figs. 3 and 6. Various means exist for giving a reciprocating motion to tool-carriages, and any suitable means for that purpose may be employed.

As shown, carriage E^1 is actuated by an arm e , carrying on its end a roller e' , which engages in the groove c in cam C^1 , Fig. 2. The other carriages are actuated in a similar manner. Each carriage supports a spindle e^2 , provided with a pulley e^3 for rotating it from an overhead counter-shaft, and with a chuck or head e^4 for holding the tool.

The nipple-blanks are fed horizontally along line x , Fig. 1, between the ledges or vertical plates F G, which are bolted to bed B. Ledge F has a horizontal slot or recess (indicated by the dotted line f , Fig. 1) extending from end to end, (see also Fig. 4,) and through this slot or recess the blanks are carried, being brought successively in line with the axes of the tool-spindles. Opposite each of these spindles the ledge has an opening, as shown at f' , Fig. 5, through which the tool passes to operate upon the blank.

Ledge G is provided with a horizontal dovetailed recess in which the dovetailed feed-slide G' reciprocates. This slide receives its motion from cam D^1 on shaft D through a lever D^2 , pivoted to the bed B at d and carrying a roller d' , which engages in the groove of the cam. Slide G' carries gripping devices by means of which the blanks are carried intermittently through the machine. These devices comprise each a pair of jaws g g' , of which the latter is fixed to the slide and the former pivoted thereto and pressed toward jaw g' by a spring g^2 . The faces of the jaws are notched or cut out so as to fit the shank of a nipple and hold it firmly. For the sake of distinction these devices will be termed the "feed-jaws."

The blanks are carried into the machine one by one by means of an arm H, having on its end, which is notched or cut out, as shown in Fig. 4, a holding-spring h . Any suitable means may be employed to supply the blanks one by one to the carrier H. The latter receives its movement from cam D^3 , also on shaft D, through lever D^4 , which is similar in construction and operation to lever D^2 . Ledge F also carries the gripping devices by which the blanks are held positively while being operated upon by the tools. These grippers comprise each a fixed jaw k and a sliding jaw k' . The latter is reciprocated vertically in a dovetailed groove of ledge F by means of an arm k^2 on rock-shaft K, and said shaft is operated from shaft I through a cam I^1 , pitman I^2 , and arm I^3 , Figs. 1 and 4. Arm K^2 has a cam-slot k^3 , (dotted lines Fig. 2,) in which engages a pin k^4 , fixed to the lower end of slide-jaw k' . Consequently as arm k^2

vibrates the jaw is moved vertically up and down. This description applies to each of the jaws k' . These jaws will be termed "work-holders."

The operation of the entire series of feed-jaws and work-holders will be understood from an explanation of the operation of one set.

In Fig. 4 the jaws k' are in their lowermost position, and so remain until arm H has advanced, bringing a blank in the spring-holder h between jaws k k' of the first set. Jaw k' now rises, lifting the blank out of holder h and clamping it firmly against stationary jaw k in line with the axis of the first tool. Slide G' now returns until its first set of feed-jaws is in the position indicated by dotted lines in Fig. 5. In this movement these jaws pass the blanks held between the jaws k k' . The blank, as already stated, has been raised by jaw k' above the plane of its feed movement, and being rigidly held it causes the pivoted jaw g to rise against the pressure of spring g^2 and to rest upon the blank. When the tool has performed its work and withdrawn, the holding-jaws open—that is to say, jaw k' descends—releasing the blank. The spring-actuated jaw g causes the blank to follow the descent of jaw k' until arrested by stationary feed-jaw g' . This descent enables the blank to clear the upper holding-jaw k in the next feed movement, which now takes place, advancing the blank to the next work-holder, where the same cycle of operations is completed. The shifting of the position of the blank from its plane of feed movement to a working position in another plane is an important feature of the operation, and it will be understood that it is effected in the machine shown by arranging the movable member of the feed-jaws on the opposite side to the movable member of the work-holders. It is not of course important that the shift should be upwardly, since it could be in any other direction according to the disposition of the working parts.

In the manufacture of nipples blanks (such as shown in Fig. 7) in the form of rivets are employed. The first step is to chamfer or round the end m . This is done by a suitable milling-tool in carriage E^1 , which tool also cuts a conical depression m' in the end of the blank, Fig. 8. At the next step the blank comes to rest opposite a drilling-tool supported by carriage E^2 . The depression m' centers the drill, which cuts out a hole m^2 of proper diameter for about two-thirds the length of the shank, leaving also a centering-depression in the bottom of the hole, Fig. 9. A smaller drill on carriage E^3 drills a hole m^3 entirely through the blank, Fig. 10. Carriage E^4 operates a tapping-tool, by which the smaller hole is threaded. The construction of this tool-carriage differs from that of the others, calling for a special description. This carriage supports in suitable bearings the tool-spindle e^3 , upon which are loosely mounted

two sleeves N N', each having a driving-pulley. These sleeves are rotated continuously in opposite directions. Between the sleeves is a clutch-ring *n*, having suitable clutch-pins *n'* *n''*, the former to engage with sleeve N and the latter with sleeve N'. Clutch-ring *n* is moved lengthwise of spindle *e*² by a cam C⁵ on shaft C through a roller *p*, Figs. 1 and 6, which engages said cam and is carried by a vertical lever *p'*, pivoted to the bed B at *p*³, and a bell-crank lever pivoted on a bracket *p*³ on the tool-carriage. One arm *p*⁴ of this lever is connected to the yoke *p*⁵, which operates the clutch-ring, and the other arm *p*⁶ extends through a hole in the upper end of lever *p'*, in which hole it works freely, so that the tool-carriage may reciprocate without disengaging the clutch-actuating mechanism. In operation, when the carriage advances, cam C⁵, through the described connections, moves the clutch-ring in the direction to clutch the spindle to the forwardly-rotating sleeve, say N. On the return movement the clutch is moved to connect the spindle to the other sleeve, thus reversing the direction of the tap or thread-cutting tool. After this operation the blank advances to the last of the series of work-holders. A blank *m* is shown in position in Fig. 4, the holding-jaws, however, being broken away. At this stage of the operation the end of the blank is squared or slabbed off on opposite sides, as shown at *m*⁴ in Fig. 11, so that it can be seized by a key or wrench. This is accomplished in the machine shown by dies *q* *q'*, of which the latter is the stationary or anvil die and the former the cutting-die. Die *q* is set in a dovetailed socket in a slide *q*², which works vertically in a dovetailed groove in ledge F. It has two cutting edges, as shown, whereby the die as it rises shears the shank, forming opposite flat surfaces thereon. Slide *q*² receives its movement by means similar to those employed for operating the jaws *k'*, that is to say, it is connected by a pin *q*³ with a cam-slot in an arm *q*⁴, fixed on rock-shaft K. The movements are so timed that jaw *k'* rises and clamps the blank just before the cutting-die *q* comes into action upon it, and the die *q* descends before the holding-jaws release the nipple.

While the operation of forming flat surfaces on the end of the shank is being performed, the head is being provided with the usual groove or notch *m*³, Fig. 11, for engagement of a screw-driver. This is effected by a rotary cutter *r* on a spindle *r'*, supported by a sliding tool-carriage R, similar to those already described. Carriage R is reciprocated by a cam R' on shaft I through a connecting-arm *r*². Shaft D is driven from main shaft C by bevel-gears S S', and shaft I is driven from shaft D by similar gears S² S³.

The foregoing description and drawings illustrate the principle of the invention applied in the best form in which I contemplate carrying the same into effect, and it will be obvious to skilled machinists that many modi-

fications in the details of construction and in the arrangement of the parts may be made without material departure from the spirit of the invention. It is also obvious that the described invention, or material and substantial parts thereof, may be used for making articles other than nipples for bicycle-spokes.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a nipple-making machine, the combination of a series of holders comprising each a fixed jaw and a positively-operated movable jaw, said holders being set a suitable distance apart on a fixed support, a feed-slide having a series of feeding-jaws corresponding to the work-holders, mechanism for reciprocating said feed-slide through a distance equal to that between adjacent work-holders, and a series of cutting-tools, for acting successively upon the blanks in said work-holders, substantially as described.

2. The combination of a ledge horizontally slotted to form a passage for the blanks, and having lateral openings at intervals, a series of tools on reciprocating carriages, one opposite each of said openings, a series of work-holders comprising each a stationary jaw and a sliding jaw working in said ledge, a feed-slide parallel to said ledge carrying feeding-jaws corresponding to the work-holders, and means for actuating said slide, tools, and work-holders, substantially as described.

3. The combination of a ledge horizontally slotted and having lateral openings from said slot at suitable intervals, a series of tools on reciprocating carriages, said tools being adapted to enter said openings to act on the work, a series of work-holders one at each opening comprising each a stationary jaw and a movable jaw, mechanism for actuating the movable jaws positively, a second ledge parallel to the first, a feed-slide working therein, a series of feeding devices thereon comprising each a stationary jaw and a spring-actuated jaw, and mechanism for operating said tools and slide, substantially as described.

4. The combination with a feed-slide having a series of feeding-jaws for feeding a blank step by step, comprising each a stationary jaw and a spring-actuated jaw, of a series of work-holders on a stationary support comprising each a fixed jaw and a movable jaw, the meeting faces of said jaws being in a different plane from the plane of feed movement of the blanks, a series of tools for operating successively upon the blanks, and mechanism for actuating said feed-slide, tools, and work-holders, substantially as described.

5. The combination of a carrier having a spring holding-finger for delivering blanks one by one to the machine, a series of positively-operated work-holders, the first of which takes the blanks from the carrier, a series of tools corresponding to the work-holders, and a feed-slide provided with a series of feeding-jaws which carry the blanks from one

work-holder to the next, substantially as described.

6. The combination of the work-holders arranged at suitable intervals apart on a stationary support and comprising each a stationary jaw and a movable jaw, the tools for operating successively upon the blanks in said work-holders, the feed-slide, a series of feeding-jaws thereon comprising each a stationary jaw and a jaw movable parallel with the movement of the work-holding jaw, the meeting faces of the work-holding jaws and feeding-jaws respectively being in different planes, and mechanism for operating said tools, feed-slide and work-holders, substantially as described.

7. The combination with a series of work-holders on a stationary support, and with a feed-slide having feeding devices for carrying the blanks successively to the several work-holders, of a chamfering and centering tool, a drill, a tapping-tool, a die for flattening the sides of the blank and a slotting-tool, said tools being arranged to act upon the blanks while in said work-holders, and mechanism for actuating said tools, feed-slide and work-holders, substantially as described.

8. The combination with suitable work-

holders, and with feeding devices for carrying a blank successively to said work-holders, of tools for drilling the blank, a tapping-tool, for threading the drilled blank, a reciprocating support for the spindle of said tool, two sleeves rotating in opposite directions on said spindle, mechanism for reciprocating said support, and clutch mechanism for connecting said spindle with one sleeve on the forward movement of said support and with the other sleeve on the return movement, substantially as described.

9. The combination with work-holders and with feeding devices for carrying a blank successively to said work-holders, of tools for drilling and threading the blanks, a cutting tool or die for shearing the sides of the blank at one end, while held in one of said work-holders, and a cutter for notching the other end of the blank while in said work-holder, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM G. ALLEN.

Witnesses:

G. J. CAPEWELL,

J. G. HAWLEY.