F. V. WHYLAND.

SWAGING MACHINE.

APPLICATION FILED MAY 15, 1911

1,074,398.

Patented Sept. 30, 1913.

6 SHEETS—SHEET 1.

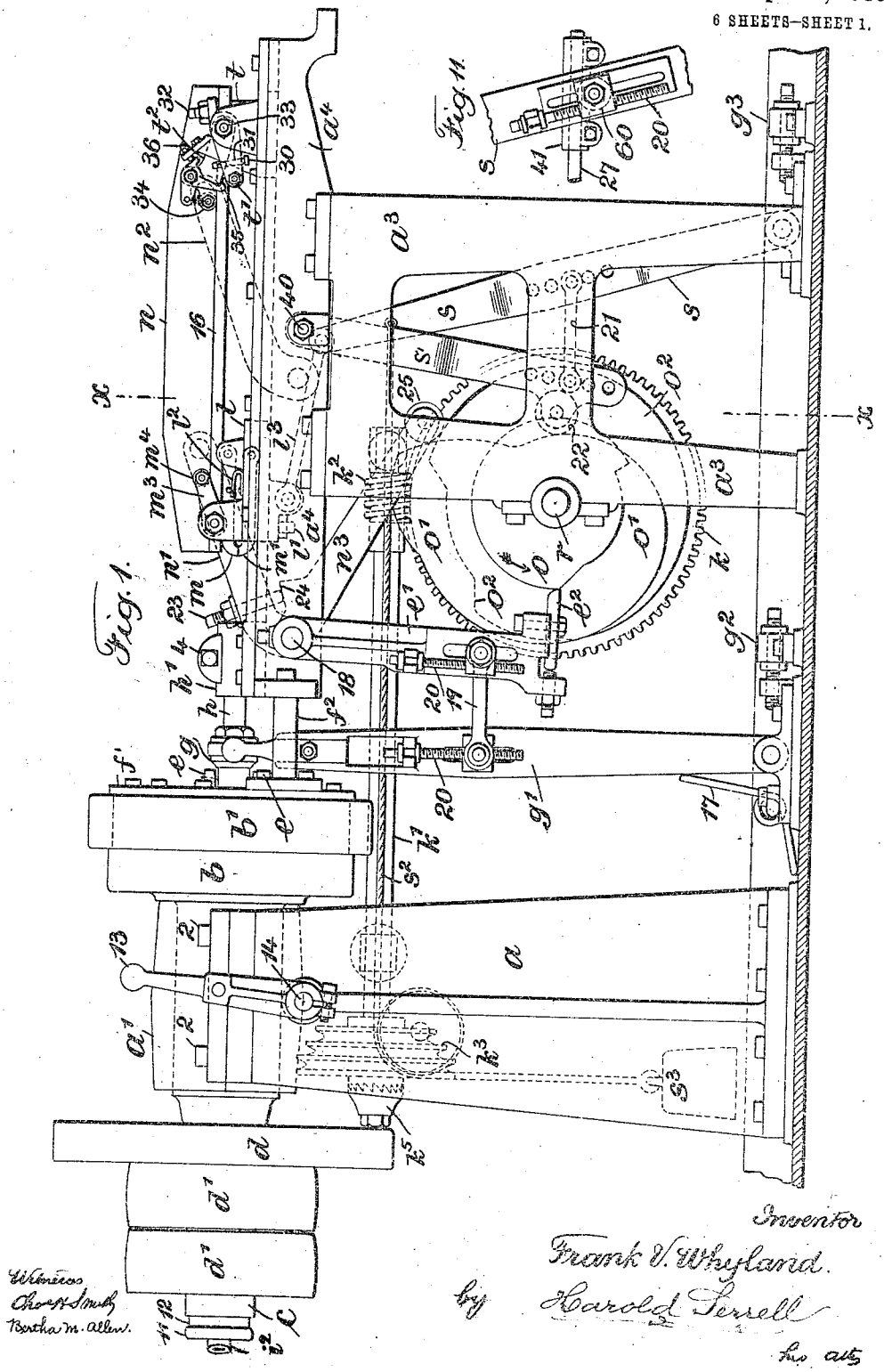


Fig. 1.

Fig. 11.

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SWAGING MACHINE.

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6 SHEETS—SHEET 2.

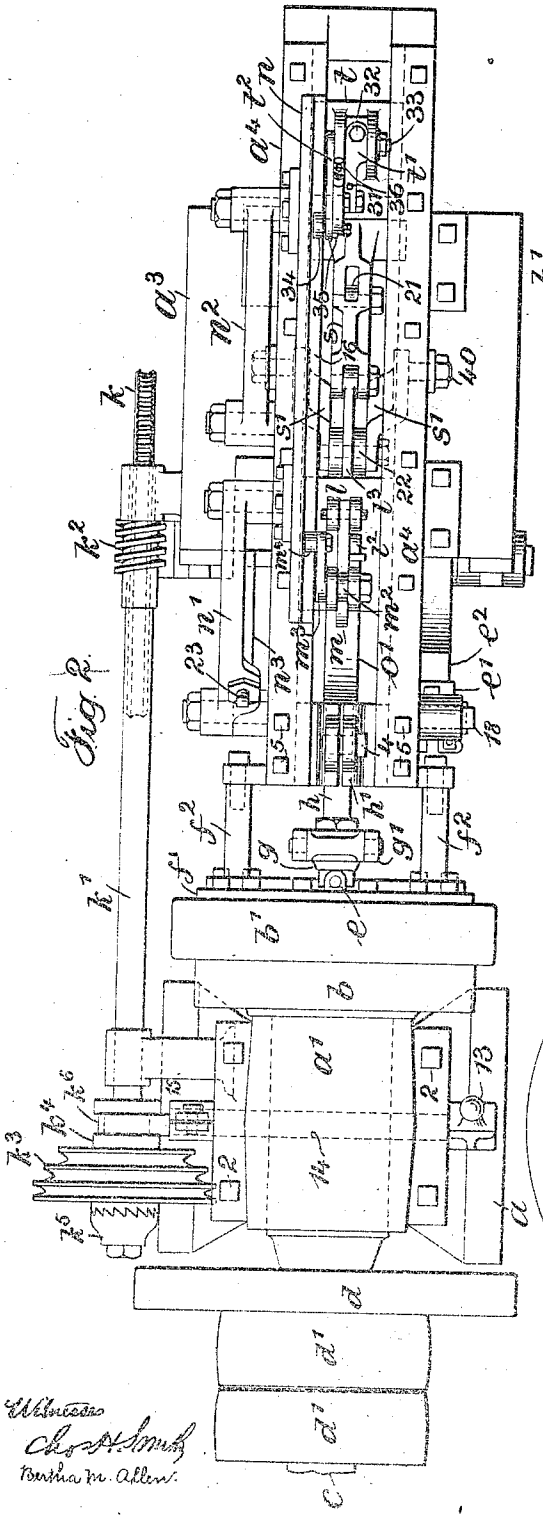


Fig. 2.

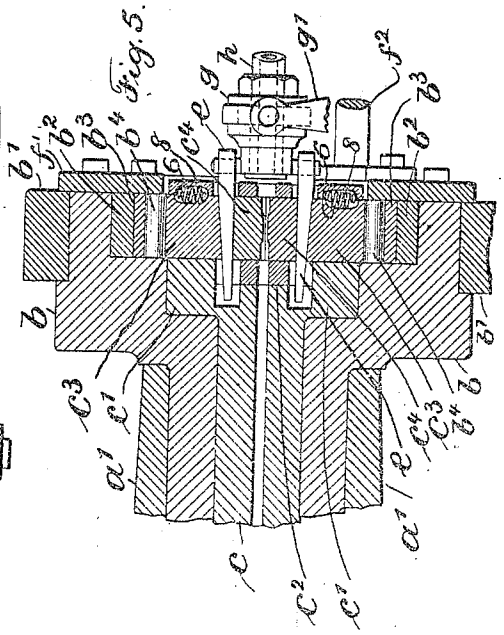


Fig. 5.

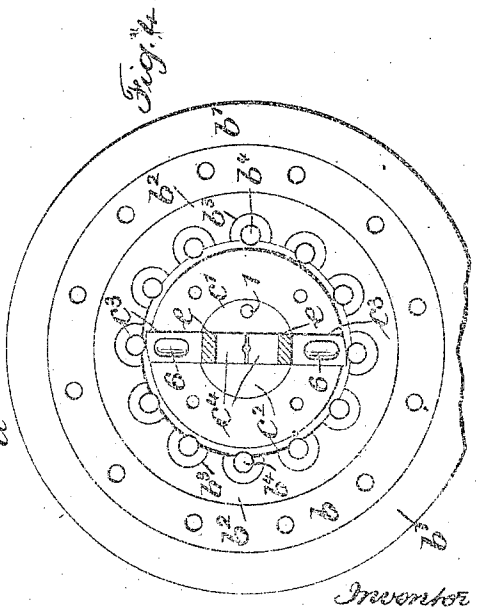


Fig. 4.

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6 SHEETS—SHEET 3.

Fig. 10

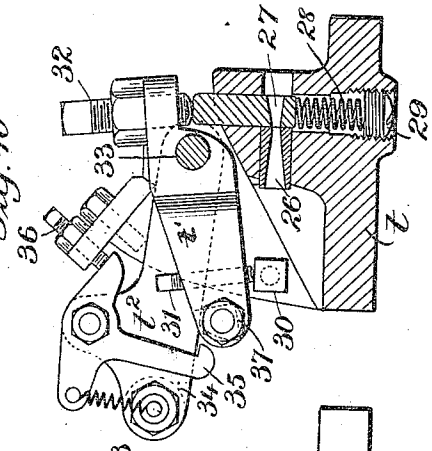


Fig. 8.

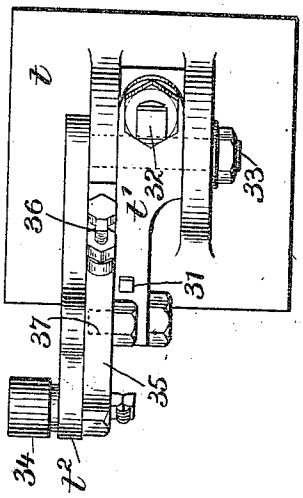


Fig. 9.

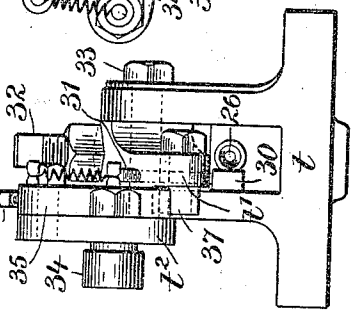
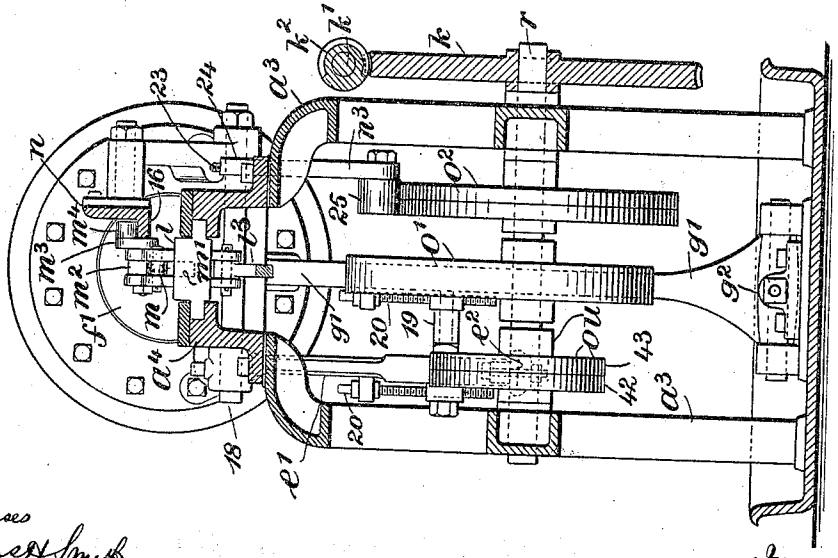


Fig. 3.



Witnesses

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6 SHEETS—SHEET 4.

Fig. 7.

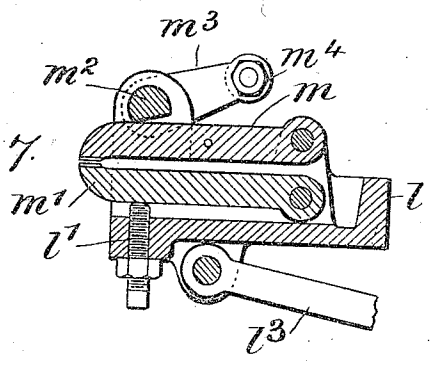
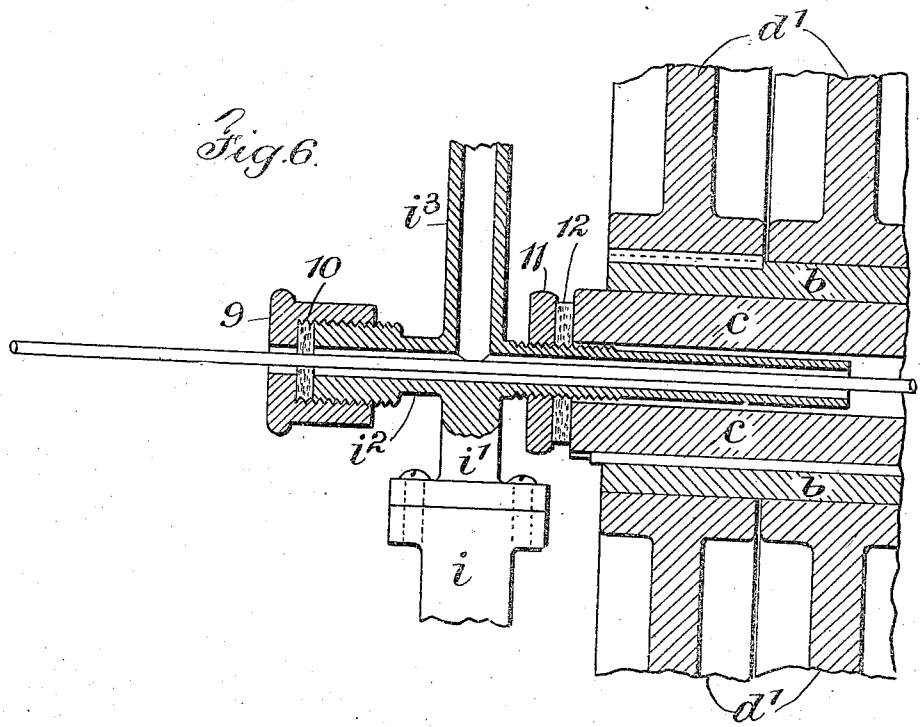


Fig. 6.



Witnesses

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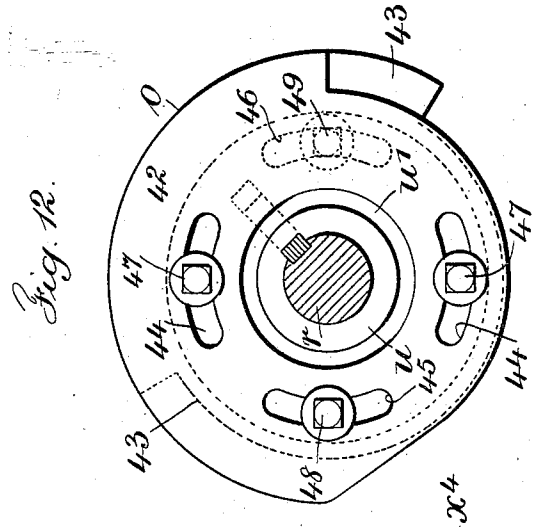
SWAGING MACHINE.

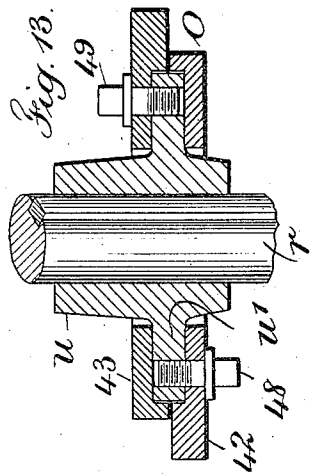
APPLICATION FILED MAY 15, 1911.

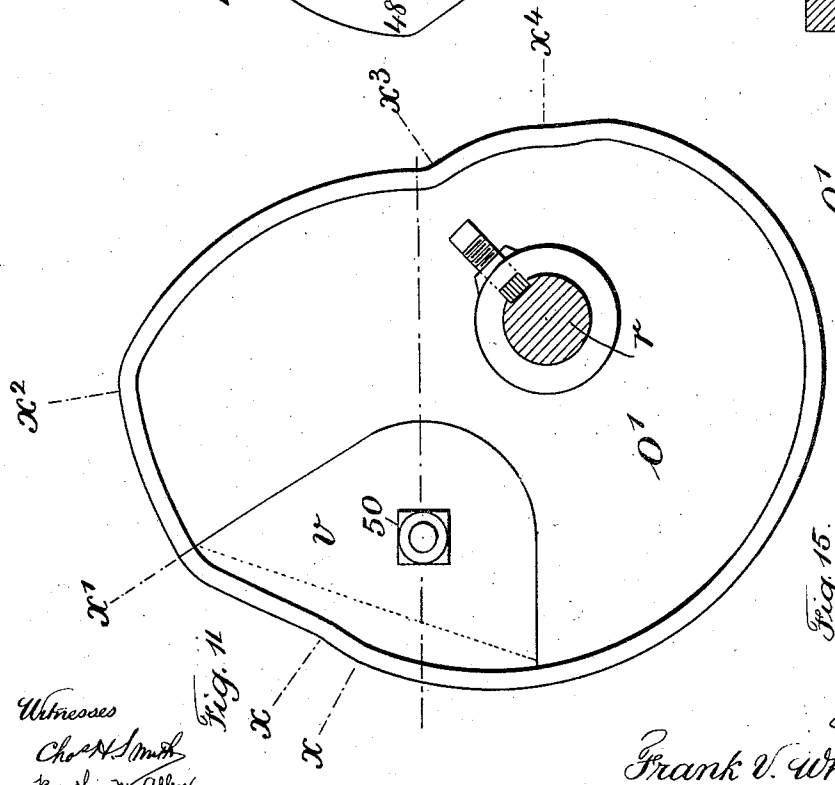
1,074,398.

Patented Sept. 30, 1913.

6 SHEETS—SHEET 6.







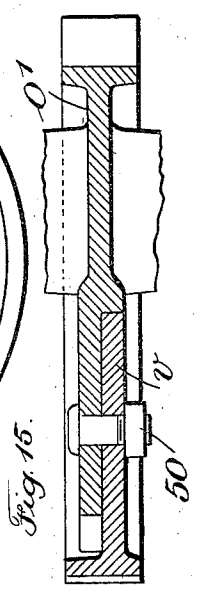


Fig. 11.

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SWAGING MACHINE.

APPLICATION FILED MAY 15, 1911.

1,074,398.

Patented Sept. 30, 1913

6 SHEETS—SHEET 6.

Fig. 17

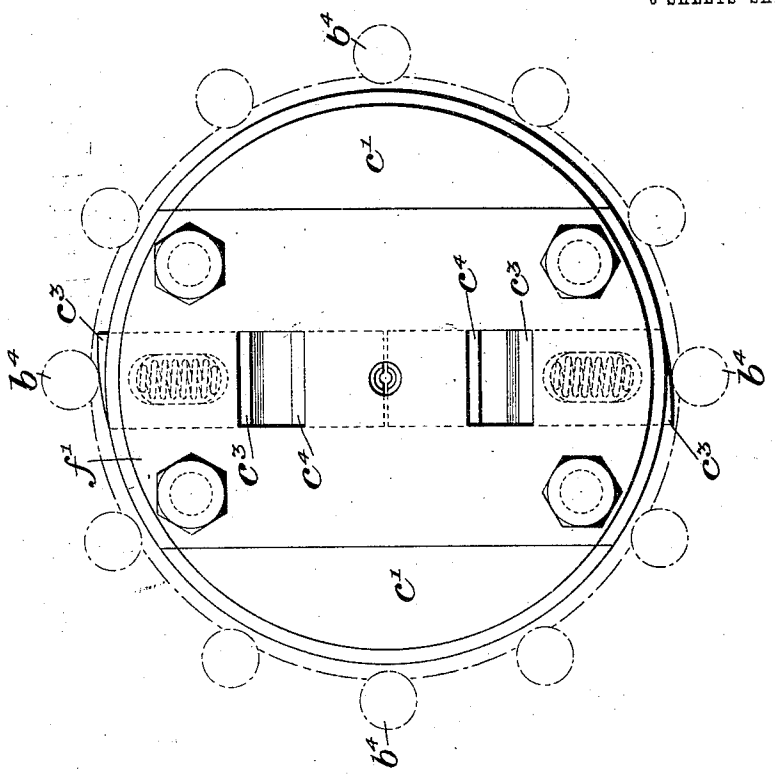
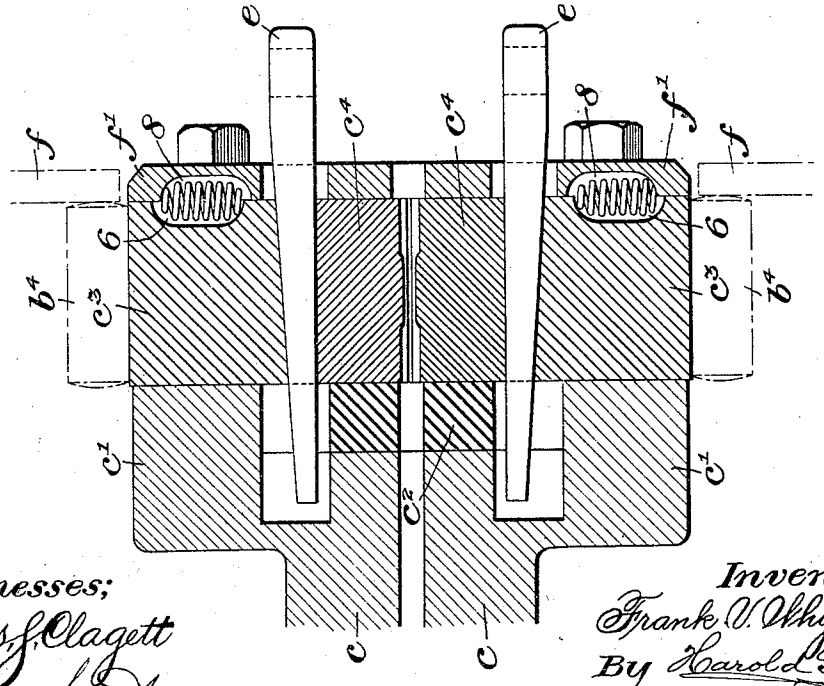


Fig. 16



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UNITED STATES PATENT OFFICE.

FRANK V. WHYLAND, OF BUFFALO, NEW YORK.

SWAGING-MACHINE.

1,074,398. Specification of Letters Patent. Patented Sept. 30, 1913.

Application filed May 15, 1911. Serial No. 627,123.

To all whom it may concern:

Be it known that I, FRANK V. WHYLAND, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Swaging-Machines, of which the following is a specification.

My invention relates to improvements in machines for swaging metal spokes for bicycle and motor vehicles and the same is designed as an improvement upon the device shown and described in Letters Patent No. 629,838, granted August 1, 1899, to George B. Burrall, as my assignee, and re-issued May 22, 1900, No. 11,826 by mesne assignments to Asbury Lester.

My present invention embraces novel features of improvement with reference to the devices for swaging, the devices for actuating the wedges, the devices for grasping the spoke wire and drawing the same along, the devices for shearing the said wire to separate the spokes, and also has reference to means for feeding a liberal supply of oil to the swaging devices, all of which features are hereinafter more particularly described.

In the drawing, Figure 1 is a side elevation representing my improved swaging machine. Fig. 2 is a plan view of the same. Fig. 3 is a section at about the line x, x, of Fig. 1, looking toward the swaging devices. Fig. 4 is an elevation of the swaging devices with the face-plates removed. Fig. 5 is a longitudinal section of the swaging devices shown in Fig. 4, with the face-plates in position. Fig. 6 is a vertical section of my improved oiling device. Fig. 7 is an elevation of the jaws and their carriage. Fig. 8 is a plan, Fig. 9 an elevation and Fig. 10 an elevation and partial section of the spoke shearing devices. Fig. 11 is a detached elevation of part of one of the rocker levers and links showing the adjustable connection. Fig. 12 is an elevation and Fig. 13 a horizontal section of the details of construction of the double cam o. Fig. 14 is an elevation and Fig. 15 a cross section of the double cam o^1. Fig. 16 is a vertical section, and Fig. 17 an elevation of the swaging devices shown in small size and less clearly in Figs. 4 and 5. Figs. 5 to 10 inclusive and 12 to 17 inclusive are shown of larger size for clearness.

The metal standard a is connected to and supported by a flanged base and the same is provided with a cap a^1 secured thereto by bolts 2. The stationary head b is supported by the standard a. The enlarged end of the stationary head b is provided with a steel band b^1 shrunk thereon. Within the stationary head b is the tubular shaft c through which passes the wire to be swaged. Upon the rear end of the tubular shaft c is the flywheel d and the pulleys d^1, one of which pulleys is loose on the said shaft and the other keyed fast. The face of the stationary head b adjacent to the swaging devices is recessed to receive the large ring b^2 which is driven into place in the said head and is stationary with the said head. This ring b^2 is recessed at spaced apart intervals in its inner periphery and in the said recesses are secured the cylindrical bushings b^3 within which are placed the hardened rollers b^4, part of the surface of which rollers projects within the said ring.

The tubular shaft c is made with a head or boss c^1 and this head or boss is centrally and axially recessed at 3 and transversely and centrally grooved across its face. In the axial recess of the said head or boss is placed the bushing c^2 and a dowel-pin 1 is preferably employed passing through the bushing into the head or boss c^1 to prevent the bushing turning. The bushing is also transversely and centrally grooved in line with the grooves of the head or boss, and the rear portion of the bushing is provided with an opening to agree with the opening in the tubular shaft c. In the grooves of the head or boss c^1 are placed the hammers c^3, and in the grooves of the bushing are placed the dies c^4 and the tapering wedges e come between the said hammers and the said dies. The hammers c^3 are provided with recesses or pockets 6 in their outer faces and in the back of the auxiliary face-plate f^1 there are recesses or pockets that come closely adjacent to the recesses or pockets 6 in the face of the hammers, the said recesses being slightly offset, as will be seen particularly by reference to Fig. 5, and in these recesses, between the hammers and the auxiliary face-plate, are double spiral springs 8, the ends of the springs nearest the axial center of the tubular shaft c resting upon the edge of the hammer recesses and the distant ends of the said springs resting upon the edges of the auxiliary face-plate recesses, and the office of the springs is to keep the hammers from flying out by centrifugal force when the devices are not swaging and to keep the ham-

mers against the wedges and overcome their tendency to rebound against the rollers and head or ring during the swaging operations and prevent the noise or chattering attendant upon the swaging operations. Also by this improvement the wire can be drawn through the dies when the wedges are released without in any manner marring the blanks because of controlling the centrifugal action of the parts. The wear and tear of these parts of the machine is thus reduced to a minimum.

A ring face-plate f is secured at the bolt holes shown in the stationary head b, see Fig. 4, by bolts shown in Fig. 5, and this face-plate extends down and covers the bushings b^3 and rollers b^4, and the auxiliary face-plate f^1 extends across the face of the head or boss c^1 covering the dies and wedges, and the same is secured to the head or boss c^1 at the bolt holes shown in Fig. 4 by bolts, and the said auxiliary face-plate f^1 is provided with openings f' through which pass the wedges e.

Studs f^2 are connected at one end to brackets of the frame a^4 which is mounted upon the frame a^3, the said frame a^3 being secured to the flanged base or support and these studs f^2 at their other ends are bolted to the ring face-plate f so that the stationary head of the swaging devices through the ring face-plate is rigidly connected to the other and adjacent frames of the machine. The wedges e are pivotally mounted upon studs secured to the grooved revoluble collar g. This collar is mounted upon the stationary tubular support h, and I provide a split head h^1 secured to the frame a^4 by bolts 5, see Fig. 2, and this tubular support h passes through this split head and is clamped thereto by the bolt 4, the said stationary tubular support h being thus adjustable and longitudinally movable in the said split head.

The grooved revoluble collar g is connected by a yoke to a rocker-lever g^1 pivoted to a sliding base supported upon the flanged oil holding base of the machine, and I provide an adjusting device g^2 secured to the said flanged base and having a screw passing into a lug upon the sliding base of the rocker-lever g^1, and a spring 17 connected to the said sliding base acts against the edge of the rocker-lever g^1 to move the same in one direction, or in other words, to hold the said rocker-lever g^1 toward its operating cam.

On the shaft 18, mounted in the frame a^4, I connect a crank-arm e^1 which depends from the shaft and this crank-arm is slotted as is also the rocker-lever g^1 and a link 19 extends across between the rocker-lever g^1 and the crank-arm e^1 and said link is connected thereto by bolts and slidable boxes which parts are held in position by adjusting screw rods 20. This adjustment provides for moving the link 19 to vary the extent of movement or throw of the rocker-lever g^1 the same actuating the wedges e and controlling the extent of their movement between the hammers and dies.

On the lower end of the crank-arm e^1 is an adjustable bar e^2 movable in a slideway on the lower end of said crank-arm and connected thereto by a bolt and having a stop bolt adjacent to its back end, the forward end being hardened and curved and coming against the edge of the cam o upon the shaft r, which shaft r is mounted in suitable bearings upon the frame a^3 of the machine. Upon this shaft r I also provide a cam o^1 and another cam o^2 hereinafter more particularly described.

In connection with the swaging mechanism hereinbefore described, I employ an oiling device shown especially in Fig. 6, and this comprises a support i extending to any convenient locality. A base i^1 is connected to and rises from this support, and made with this base i^1 is a horizontal tube i^2 and a vertical tube i^3, the said tube i^3 intersecting the horizontal tube i^2. The horizontal tube i^2 passes for an appreciable distance into the end of the tubular shaft c and it is threaded adjacent to the entrance to the said shaft at which point there is a nut 11 upon the threaded portion and a washer 12 coming between the nut and the end of the tubular shaft c. And on the extreme end of the horizontal tube i^2 is another threaded portion receiving the cap 9 and between the cap 9 and the end of the tube a washer 10, these washers being preferably of felt to prevent the escape of oil, and the cap 9 is centrally perforated for the passage of the wire to be swaged, which wire is also shown in Fig. 6. The oil comes down the vertical tube i^3 into the horizontal tube i^2 surrounding the wire to be swaged and it passes out of the open end of the tube i^2 into the opening through the tubular shaft c and with the wire passes on through the tubular shaft to the swaging devices, which swaging devices are liberally bathed in oil.

The devices for driving the cams o o^1 and o^2 and actuating the shaft r, comprise the following: On the said shaft r is a worm-gear k, and in suitable bearings connected to the frames a and a^3 of the machine is a shaft k^1 having a worm k^2 meshing with the worm-gear k. Upon the shaft k^1 and loose thereon is a hub k^4 having driving pulleys k^3 of different diameters to provide different speeds for the cam shaft. A clutch k^5 having one face upon the driving pulleys k^3 and the other face secured to the shaft k^1 is provided for coupling the driving pulleys and the shaft, and I provide an actuating lever 13, a shaft 14 extending across through the frame a, an arm 15 and a yoke coupler k^6 by the movement of which the driving pulleys

and one clutch face may be moved longitudinally of the shaft for connecting or disconnecting the driving pulleys and the shaft. A band not shown passes around the said pulleys for communicating power thereto. These devices are shown, especially in Fig. 2.

The devices for gripping the spoke and drawing the same along comprise the following: A carriage l is longitudinally movable upon ways provided upon the upper part of the frame a^4. This carriage is provided with upright arms at opposite sides to which the jaws m m^1 are pivoted, the said jaws pointing toward the swaging devices. The carriage is also provided with an adjustable stop l^1 in the form of a screw passing vertically through the forward part of the carriage with the ends thereof coming up against the under edge of one jaw m^1, and on the said stop there is a nut for clamping the same as adjusted, and I provide a spring l^2, see Figs. 1 and 2, the office of which is to keep the jaws normally apart. The said carriage is also made with a projection to which the crank-arm m^3 is pivoted and this crank-arm carries a cam m^2 coming above the upper edge of the jaw m, and on the outer end of the crank-arm is a roller m^4 moving over a rib 16 upon the frame n forming a raceway. This frame n is vertically movable and in its movement is maintained in a position parallel with the upper edge of the frame a^4. To the lower portion of the carriage l is pivoted a connecting rod l^3. This connecting rod at its other end is pivoted to the upper end of a rocker-lever s and the lower end of the rocker-lever is pivoted to a sliding base resting upon the flanged base or support of the machine, and I provide an adjusting device g^2 in connection with this rocker-lever s similar to the adjusting device g^2 employed in connection with the rocker-lever g^1 and which performs for the said rocker-lever the same office. I provide a double crank-arm s^1 pivoted at 40 to the frame a^4 of the machine, the parts of which arm come at opposite sides of the rocker-lever s and the said crank-arm s^1 and rock-lever s are connected by a link 21. This connection is adjustable because the said rocker-lever and crank-arm are provided with adjacent perforations to any two of which the respective ends of the link may be connected in order to provide for the desired extent of movement to be imparted to the carriage l and gripper jaws in proportion to the length of the spoke being swaged. I, however, prefer to employ the adjustment shown in Fig. 11. This is similar to that shown in connection with the crank-arm e^1 and rocker-lever g^1 and comprises an adjusting screw rod 20 and slidable box 60 and a split sleeve 41 receiving and clamping the link 21 and in turn pivotally connected to the bolt of the slidable box. The double crank-arm s^1 is provided with a roller 22 running upon the periphery of the cam o^1 and operated by said cam to cause the operation of the rocker-lever s and the sliding movement of the jaw carriage l longitudinally of the frame a^4, and I provide a cord s^2 at one end connected to the rocker-lever s and passing over the roller in the frame a, and at the other end connected to a weight s^3 or its equivalent, the office of which is to hold the rocker-lever and the cam arm and the roller 22 against the cam o^1 and insure the return movement of the said parts. The crank-arms n^1 and n^2 are pivoted at one end to the movable frame n, the arm n^2 at its other end being pivoted to the frame a^4 and the arm n^1 at its other end being connected to the shaft 18 passing through the frame a^4, and another crank-arm n^3 is also pivoted to the shaft 18 closely adjacent to the crank-arm n^1, and this latter crank-arm n^3 is provided with a shoulder 24 and the crank-arm n^1 is provided with an adjusting pin 23 forming a stop, the end of which comes against the shoulder 24, and on the free end of the crank arm n^3 is a roller 25 running upon the periphery of the cam o^2 upon the shaft r. This cam imparts to the crank-arm n^3 a swinging movement, and when the shoulder 24 thereof comes against the end of the pin 23 of the crank-arm n^1, a movement is imparted to the said crank-arm n^1 and from the same to the frame n causing the frame to be raised and the crank-arm n^2 to swing correspondingly. This rising movement of the frame n causes a swinging movement to the crank-arm m^3 causing the cam m^2 to operate against the upper jaw m and bring the jaws together to grip and hold the wire so as to move the same longitudinally of the machine at the proper time. The rising movement of the frame n also actuates the crank-arm t^2 of the spoke shearing devices, the roller 34 of the said crank arm t^2 also bearing upon the upper surface of the rib 16. These spoke shearing devices further comprise a base t secured to the frame a^4. This base t is perforated horizontally and vertically in a portion extending across between two uprights which form bearers. The horizontal perforation receives the tubular spoke guide 26 in which one end of the wire at all times rests and in the vertical perforation the shearing blade 27 plays and under the lower edge of the said shearing blade is a helical spring 28 and an adjusting nut 29 screws into the vertical opening in the base below the spring and is movable to apply a tension to the spring 28. This shearing-blade is provided with an opening normally in line with the opening in the spoke-guide 26. As will be seen by reference to Fig. 10, this base also carries a stud 30 and between the uprights

of the base the rocker-arm t^1 is pivotally connected by the pin 33, the said rocker-arm being provided with a stop-pin 31 screwing through the same with the lower end coming against the stud 30. This rocker-arm is provided at its other end with an extension through which passes the screw pressure pin 32 having a nut for clamping the same in the desired position. The lower end of this pin 32 rests upon the upper end of the shearing blade 27. The crank arm t^2 is also pivotally connected to the base by the pin 33, and as before expressed, carries the roller 34 at its outer end and the said crank-arm t^2 is further provided with a spring actuated latch 35 pivoted thereto above the rocker-arm t^1 and there is an adjustable stop 36 upon one of the upright bearers of the base t against which the latch 35 is adapted to come to cause the same to swing. One end of the rocker-arm t^1 carries a nut, shown in Figs. 8, 9 and 10, which nut secures to the rocker-arm a nosing 37 upon its opposite face and adjacent to the lower edge of the latch 35. In the operation of the spoke shearing device, when the frame n is at its lowest position, the crank-arm t^2 is depressed and the lower hooked end of the latch 35 comes underneath the nosing 37. When the frame n is raised by the operation of the cam o^2 and the crank-arms n^3 and n^1 the said crank-arm t^2 is also raised because of its roller 34 bearing upon the rib 16 of the frame n and as the said crank-arm t^2 is raised, the latch 35 engages the nosing 37 swinging the rocker-arm t^1 and forcing downward the shearing-blade 27 cutting off the projecting swaged wire into a spoke at the vertical meeting faces of the shearing-blade 27 and spoke-guide 26, so that the said spoke falls away from the machine, the end of the wire remaining in the tubular spoke-guide 26 adjacent to the shearing-blade. This shearing action is accomplished before the crank-arm t^2 is fully raised and as the parts are elevated the latch 35 comes against the stop 36 and the latch is swung on its pivot and its lower hooked end is moved away from beneath the nosing 37, allowing the rocker-arm t^1 to fall and the spring 28 to raise the shearing blade 27 and restore the said parts to their normal position ready for the operations to be repeated with the up and down movement of the frame n

The various parts hereinbefore described are timed in their several operations for the proper performance of the swaging operation and with reference to the position of the parts shown in Fig. 1, the arrow shows the direction of the cam o and indicates that the wedges v have been pushed in between the hammers and dies to the full extent of their movement and will be held in that position until the bar e^2 drops off the end of the cam o, shown in dotted lines, while the wire is being swaged. These parts also indicate that the carriage l and the grippers have been moved to their forward position nearest to the swaging devices and also that the frame n has been raised to bring the jaws together to take a new bite on the wire and also that the shearing devices have been operated to cut a spoke from the length of wire projecting beyond the tubular guide 26. In the further movement of the parts, as the swaging progresses, the cam o^1 moves the roller 22, the crank-arm s^1, rocker-lever s and the carriage l toward the right hand end of the machine gradually drawing the wire through the swaging devices as the swaging operation is performed, and after the carriage makes its full movement in this direction the frame n is lowered because of the roller 25 running upon the reduced portion of the cam o^2, and as the roller 22 travels on the reduced portion of the cam o^1 the weight s^3 acts upon the cord s^2 with the open grippers to move the carriage l forward to obtain a fresh bite upon the wire, and in this way the various operations are progressively repeated with each length of wire and spoke swaged therefrom.

The two-part cams o and o^2 are preferably made alike and the description of one will suffice for both. The two-part cam o preferably comprises similar companion disks 42 and 43 upon opposite sides of the flange u^1 of the hub u keyed upon the shaft r, see Figs. 12 and 13. The cam disks are correspondingly slotted at 44 and bolts 47 pass through both slots to clamp the parts together. The cam-disk 42 is slotted at 45 and a bolt 48 passes through the slot into the flange u^1 to hold the disk independently thereto. The cam-disk 43 is slotted at 46 and a bolt 49 passes through the slot into the flange u^1 to hold this disk independently thereto. Either cam-disk may be adjusted and set in relation to the other to properly regulate the extent of movement of the parts effected by the cam o. If the cam-disk 43 is to be adjusted the bolt 49 and bolts 47 are loosened and the disk 43 turned on the hub u to lengthen or shorten the cam surface and control the stroke of the parts operated thereby, and in this movement the bolt 48 holds the cam-disk 42 in a fixed relation to the flange and hub. If the cam-disk 42 is to be adjusted the bolts 47 and the bolt 48 are loosened and the bolt 49 left untouched when the cam-disk 42 can be turned upon the hub independent of the cam-disk 43. As the cam o effects the operation of the wedges and the cam o^2 the movement of the frame n and consequently the action of the pincers and the cutting mechanism, it is obvious that the adjustment of these parts and the timing of their movements can be effected to a nicety, according to the length

and size of the spoke being acted upon. The cam o^1 for effecting the movement of the carriage and grippers, and which cam is shown particularly in Figs. 14 and 15, is preferably made with removable interchangeable sections v. In this connection the web of the cam is offset to form a recess to exactly receive the plate or web of the section v, and a bolt 50 passing through the parts holds them together. The ends of the cam face of the section v coincide with the ends of the cam face of the cam proper, and upon this section I provide a surface of equal radius, that is, one struck from the axial center of the cam and where no movement is given to the roller 22 running upon the cam surface. The section v is thus made for the purpose of producing a pause at the end of the swaging action so as to form a shoulder between the part swaged and the butt end of the spoke, so that the shoulders at the respective ends of the swaged portion may be as nearly alike as possible and may further be true and even. This portion of the section v, Fig. 14, is intermediate between the lines x, x. The surface of this cam o^1 after this point of rest, is increased so as to draw the blank between the parts x and x^1, and from x^1 to x^2 is a portion also of even radius to form an outer rest, and the return movement of the pincers is effected between the point x^2 and the point x^3, and here there is another point also of equal radius between x^3 and x^4, forming an inner point of rest and the swaging operation is effected with the rotation of the cam between the point x^4 and the point x. If a spoke of shorter length is to be swaged, the section v is removed and another interchangeable section inserted where the shoulder rest between x and x occupies a slightly different position, the same being nearer to the point of swaging for a short spoke, and farther from the point of swaging and nearer the point x^1 for a longer spoke.

I claim as my invention:—

1. In a swaging machine, the combination with the swaging devices and the tubular shaft through which the wire to be swaged passes, of an oiling device adjacent to the outer free end of the said tubular shaft and comprising a horizontal tube passing into the open end of the said tubular shaft and through which the wire to be swaged also passes, means for closing the outer end of the said tube and for closing the annular opening between the end of the tubular shaft and the tube passing therein, a support for the oiling device and a tube for supplying the oil, substantially as set forth.

2. In a swaging machine, the combination with the swaging devices and the tubular shaft through which the wire to be swaged passes, of an oiling device adjacent to the outer free end of the said tubular shaft and comprising a horizontal tube at one end passing into the open end of the tubular shaft and having a threaded portion and a nut and washer surrounding the same at the annular opening of the tubular shaft to close the same, a threaded portion on the free end of the said oil tube and a cap and washer for closing the same except for the passage therethrough of the wire, a support for the horizontal oil-tube and a vertical tube intersecting the same for supplying the oil thereto, which oil passes through the horizontal shaft and into the tubular shaft with the wire to be swaged to the swaging devices, substantially as set forth.

3. In a swaging machine, the tubular shaft, its head or boss and the ring face-plate, the hammers and the inner face-plate and means acting in connection with the said hammers and face-plate to normally hold the said hammers toward the wire being swaged, substantially as set forth.

4. In a swaging machine, the tubular shaft and its head or boss, the hammers recessed in their outer face, the auxiliary face-plate recessed in its inner or under face adjacent to the recesses in the hammers, but offset therefrom and the springs in the recesses between the hammers and the face-plate, substantially as and for the purposes set forth.

5. In a swaging machine, a grooved revoluble collar carrying the wedges, and a stationary tubular support on which the said revoluble collar is longitudinally movable, and a split head through which the said tubular support passes, and means for clamping the said head to adjustably secure the said tubular support to the frame of the machine to which the said head is connected, substantially as set forth.

6. In a swaging machine, the combination with the swaging devices, and the wedges acting in connection therewith, of the grooved revoluble collar to which the wedges are pivotally connected, a support for the said collar and on which the same is longitudinally movable, a rocker-lever and a yoke connecting the same with the revoluble collar, an adjustable support for the rocker-lever and a spring for acting against the same, a crank arm and support therefor and a link connecting the crank arm and the rocker lever and a cam for actuating the parts, substantially as set forth.

7. In a swaging machine, the combination with the swaging devices, the wedges acting in connection therewith, the revoluble collar to which the wedges are pivotally connected and a support on which the collar is longitudinally movable, of a rocker-lever and a yoke connecting the same to the revoluble collar, a shaft in the frame of the machine and a crank-arm connected thereto,

a link connecting the crank arm and the rocker-lever, and means for adjusting the link in its relation to the crank arm and rocker-lever, a bar connected to the crank-arm and a cam for actuating the parts means for adjusting the said bar, substantially as set forth.

8. In a swaging machine, the combination with the swaging devices, the wedges acting in connection therewith, the revoluble collar to which the wedges are pivotally connected and a support on which the collar is longitudinally movable, of a slotted rocker-lever and a yoke connecting the same with the revoluble collar, the shaft in the frame and a slotted crank-arm pivoted thereto and depending therefrom, a link and sliding boxes connecting the respective ends of the same to the slotted rocker-lever and crank-arm, adjusting rods connected to the boxes of the link for holding the same in position, an adjustable bar in a slideway in the lower face of the crank-arm, a stop for limiting the movement of the same and a bolt for securing the same in place, substantially as set forth.

9. In a swaging machine, the combination with the swaging devices, the wedges acting in connection therewith, the revoluble collar to which the wedges are pivotally connected and a support on which the collar is longitudinally movable, of a rocker-lever and a yoke connecting the same with the revoluble collar, a slidable base to which the said rocker-lever is pivoted, an adjusting device connected to the flanged base of the machine and engaging the slidable base of the rocker-lever, and a spring connected to the slidable base of the rocker-lever and bearing against the edge of the same to move the rocker-lever in one direction, substantially as set forth.

10. In a swaging machine, the combination with the swaging devices, a power shaft and a cam thereon, of a shaft in the frame of the machine, adjacent crank-arms pivoted thereto, the one carrying a roller against which the said cam acts, and a frame having a rib and to which the end of the other crank-arm is pivoted, a crank-arm also pivoted to the frame of the machine and to the said movable frame, and adjustable means connected to the aforesaid adjacent crank arms for moving the one with the movement of the other to raise the said frame, substantially as set forth.

11. In a swaging machine, the combination with the swaging devices, a power shaft and a cam thereon, of a shaft in the frame of the machine, adjacent crank-arms pivoted thereto, the one carrying a roller against which the said cam acts, and a frame having a rib and to which the end of the other crank-arm is pivoted, a crank-arm also pivoted to the frame of the machine and to the said movable frame, and adjustable means connected to the aforesaid adjacent crank-arms for moving the one with the movement of the other to raise the said frame, a shoulder on one of the adjacent crank-arms and an adjusting pin forming a stop against the shoulder and passing through the other adjacent crank arm, substantially as set forth.

12. In a swaging machine, the combination with the swaging devices and a vertically movable frame having a rib and means for periodically operating the same, of a spoke shearing device comprising a base supported by the frame of the machine, a tubular spoke guide therein, and an adjacent perforated shearing blade, a rocker-arm for actuating the shearing blade in one direction and a spring for returning the same to its normal position, a crank-arm operated by the movable frame and spring actuated devices connected to the crank-arm for engaging and actuating the rocker-arm and the shearing blade, substantially as set forth.

13. In a swaging machine, the combination with the swaging devices and a vertically movable frame having a rib and means for periodically operating the same, of a spoke shearing device comprising a base supported by the frame of the machine, a tubular spoke guide therein and an adjacent perforated shearing blade movable vertically through the said base, a rocker arm pivoted to uprights of the base and at one end having an adjustable pressure pin bearing upon the top of the shearing blade and at the other end a stop pin and a nosing, and means actuated by the vertically movable bar for engaging the nosing, swinging the rocker-arm and actuating the shearing blade, substantially as set forth.

14. In a swaging machine, the combination with the swaging devices and a vertically movable frame having a rib and means for periodically operating the same, of a spoke shearing device comprising a base supported by the frame of the machine, a tubular spoke guide therein, and an adjacent perforated shearing blade movable vertically through the said base, a rocker-arm pivoted to uprights of the base and at one end having an adjustable pressure pin bearing upon the top of the shearing blade and at the other end a stop pin and a nosing, a crank arm carrying at its free end a roller running on the ribs of the said vertically movable frame, a spring actuated latch pivoted to the said crank-arm, a stop for swinging the latch and disengaging the same from the nosing, and an adjustable spring for raising the shearing blade to its normal position, substantially as set forth.

15. In a swaging machine, the combination with the hammers, the dies and the wedges, of means substantially as specified

and acting continuously and automatically against the hammers to press the same toward the dies, substantially as set forth.

16. In a swaging machine, the combination with the swaging devices, the pincers and the carriage on which the same are mounted, and means for operating the same, of a shaft transversely of the machine, a cam upon said shaft for effecting the longitudinal movement of the pincers and carriage, a removable section in said cam having a surface struck from the axial center of the cam for the purpose of effecting a pause in the movement of the carriage, and pincers so that the swaging devices may form a shoulder at the end of the swaged portion of the spoke, substantially as set forth.

17. In a swaging machine, the combination with the swaging devices, the pincers and the longitudinally movable carriage upon which the same is mounted and means for moving the same, of a shaft transversely of the machine, a cam upon the said shaft for effecting the movement of the devices operating the pincers and their carriage, the said cam being divided into an outer rest and an inner rest and a shoulder rest, an intermediate return portion, a swaging portion and a portion for drawing the blank, the said cam being provided with a cut away and offset portion forming a recess, and a section received therein, the shoulder rest being upon the said section and at points according to the desired length of the spoke, substantially as set forth.

18. In a swaging machine, the combination with the swaging devices and the frame a^4 of the machine, of a carriage longitudinally and independently movable in ways in the said frame, jaws pivoted to the said carriage, a crank-arm pivoted to the said carriage and means for periodically raising the same to hold the jaws together and grip the wire, a rocker-lever and a rod connecting the upper end of the same to the said carriage, a double crank-arm coming at opposite sides of the rocker-lever and having a series of perforations and pivots for the crank arm in the frame of the machine, a link adjustably connecting with the crank arm at the perforations, a split sleeve receiving and clamping the link, a box slidable on the rocker-lever and to which the split sleeve is connected, an adjusting screw-rod, a roller carried by the crank-arm and a cam acting thereon, substantially as set forth.

Signed by me this 8th day of April, 1911.

FRANK V. WHYLAND.

Witnesses:

J. H. O. BUNGE,

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C. A. BARRETT.