E. EINFELDT.

MACHINE FOR MAKING METAL WHEELS.

APPLICATION FILED MAY 21, 1906.

982,259. **Patented Jan. 24, 1911.**

4 SHEETS—SHEET 1.

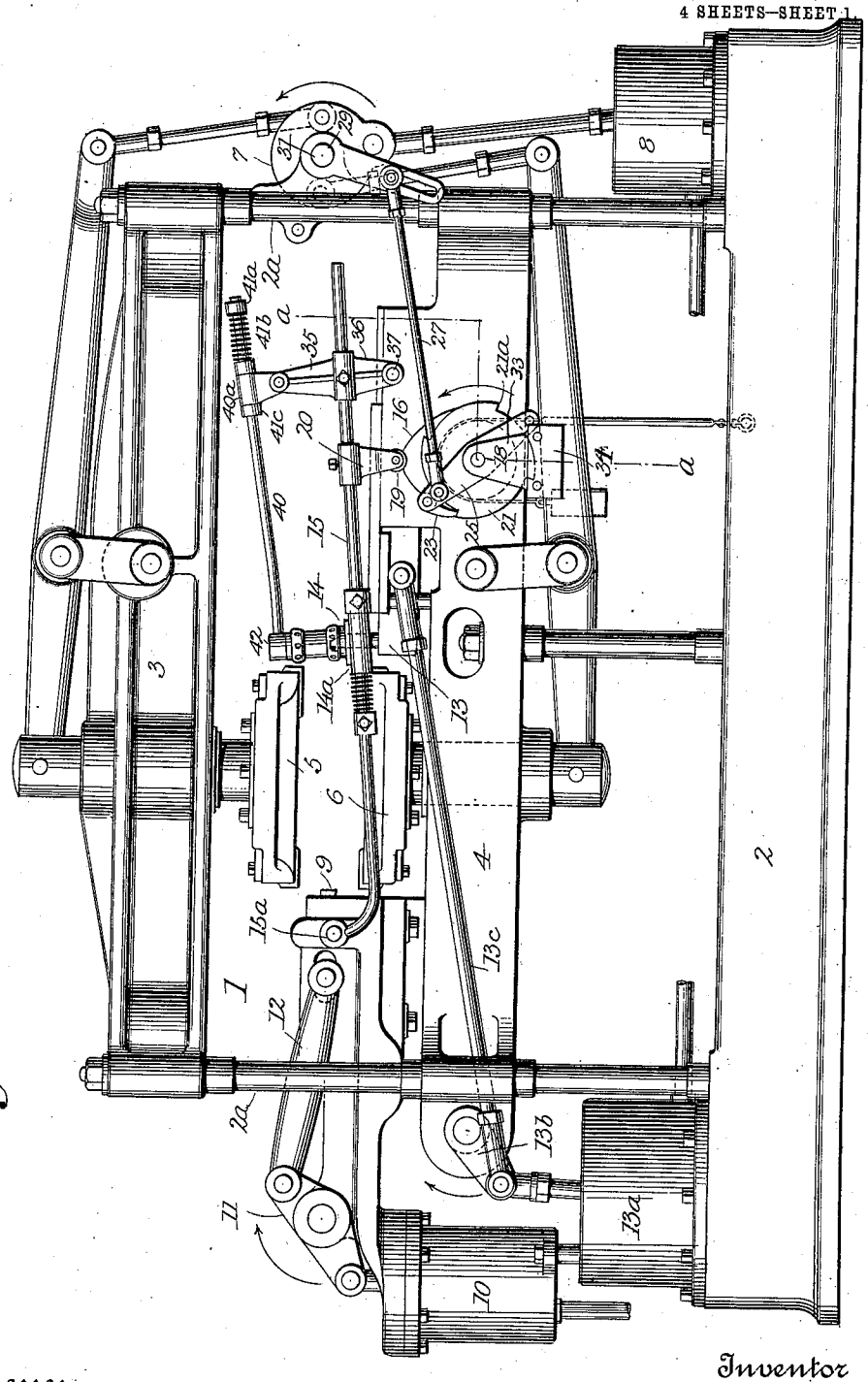

Fig. 1.

Witnesses

P. T. Barnes.

L. E. Morrison

Inventor

Emil Einfeldt

By P. T. Dodge Attorney

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4 SHEETS—SHEET 2.

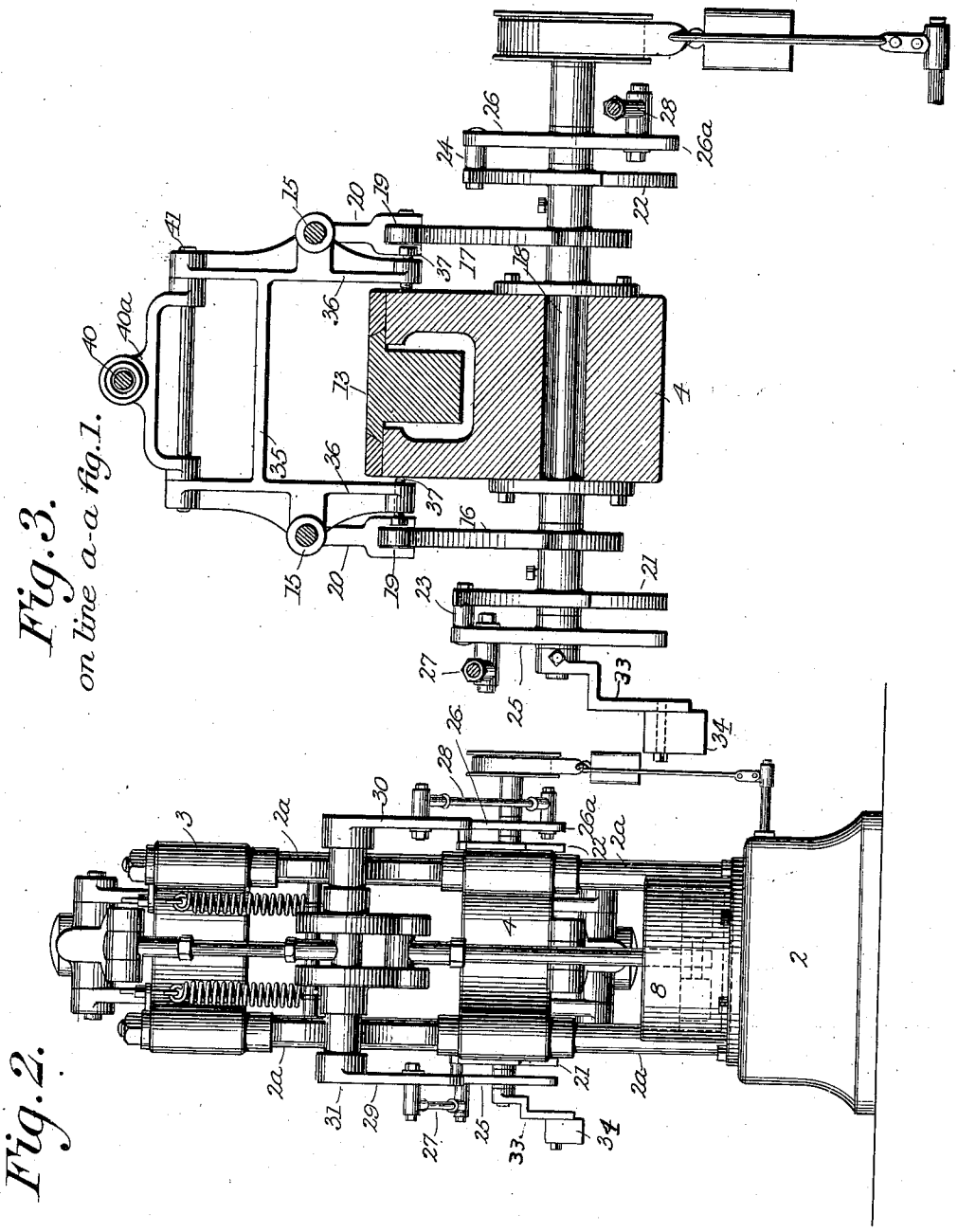

Fig. 3. on line a-a fig. 1.

Fig. 2.

Witnesses

P. F. Barnes.

L. E. Morrison

Inventor

Emil Einfeldt

By P. F. Dodge

Attorney

E. EINFELDT.

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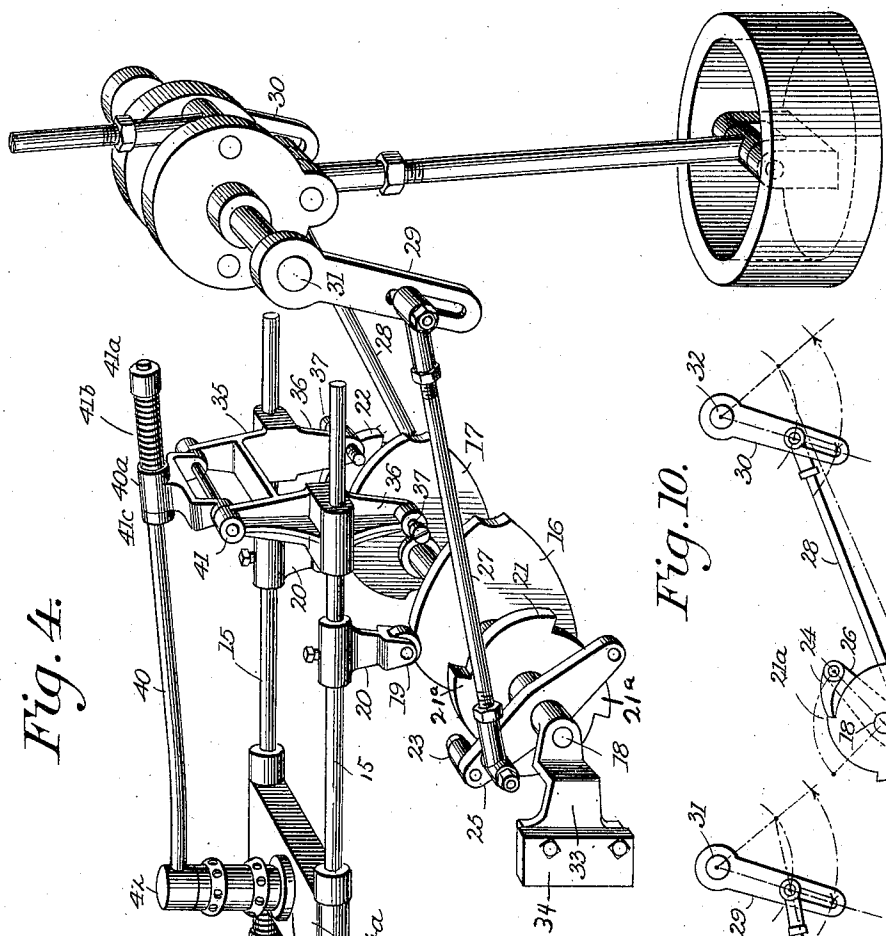

Fig. 4.

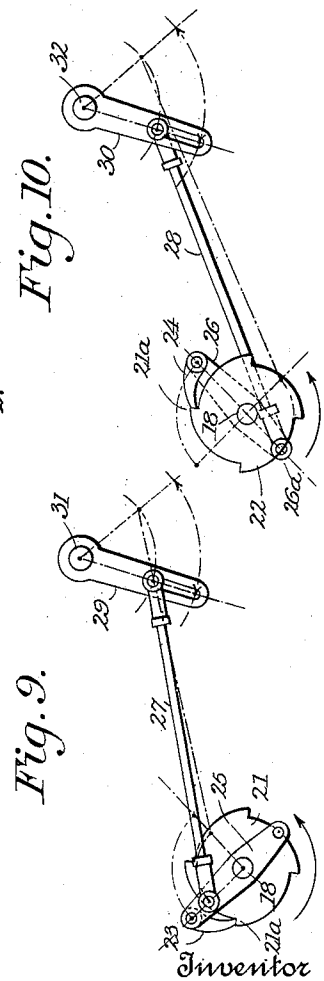

Fig. 10.

Fig. 9.

Witnesses

R. F. Barnes.

L. E. Morrison

Inventor

Emil Einfeldt

By P. T. Dodge Attorney

E. EINFELDT.

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4 SHEETS—SHEET 4.

Fig. 6.

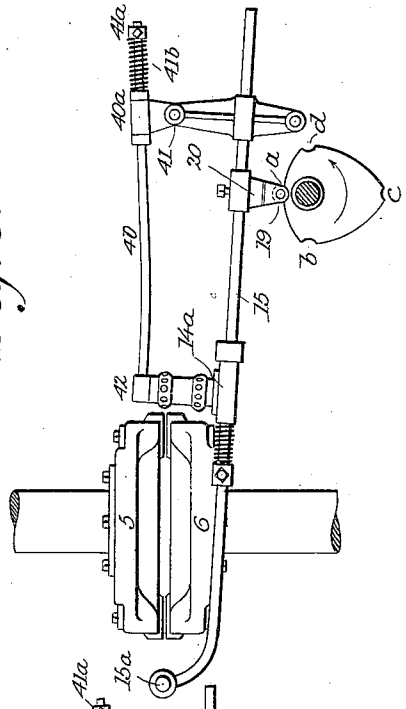


Fig. 5.

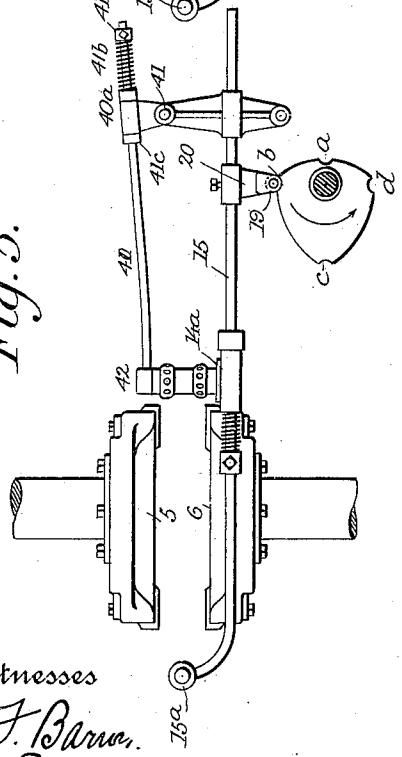


Fig. 8.

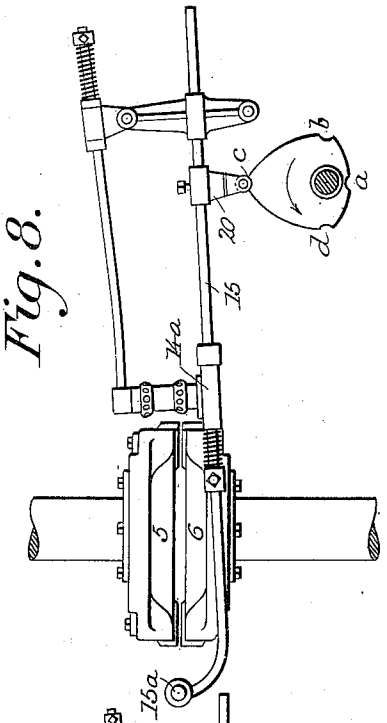
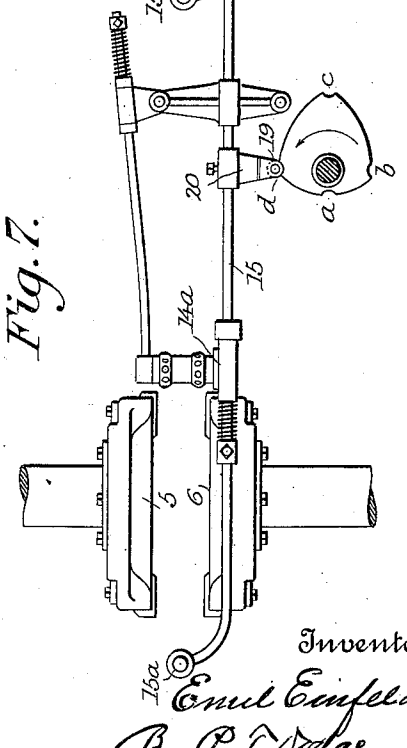


Fig. 7.



Witnesses

P. F. Barron.

L. C. Morrison

Inventor

Emil Einfeldt

By P. F. Dodge

Attorney

UNITED STATES PATENT OFFICE.

EMIL EINFELDT, OF DAVENPORT, IOWA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO G. WATSON FRENCH, NATHANIEL FRENCH, AND JOSEPH L. HECHT, OF DAVENPORT, IOWA, A FIRM.

MACHINE FOR MAKING METAL WHEELS.

982,259. Specification of Letters Patent. **Patented Jan. 24, 1911.**

Application filed May 21, 1906. Serial No. 317,967.

To all whom it may concern:

Be it known that I, EMIL EINFELDT, of Davenport, county of Scott, and State of Iowa, have invented a new and useful Improvement in Machines for Making Metal Wheels, of which the following is a specification.

This invention has reference to machines for making metal wheels, and relates more particularly to the manufacture of staggered wheels, that is, wheels in which the spokes are fastened to the hub in two rows or ranks, and are fastened to the rim either in a single line therearound or in two lines approaching each other more or less.

In securing the spokes to the hubs in wheels of this character, it is the practice under certain modes of procedure, to fasten the spokes of the two ranks alternately, that is to say a spoke of one rank is fastened in place, then a spoke of the other rank, then a spoke of the first rank again, and so on until all have been secured in position. In certain machines for accomplishing this result, the spokes after being set in the holes or bosses on the hub, are acted on by clamps and held fixedly at a predetermined point, means being provided for controlling the endwise movements of the hub to correspond to the distance between the holes or bosses of the two ranks.

The present invention is directed to improvements in machines of this type, and the invention consists of means for effecting the endwise movements of the hub in a positive and certain manner, and for giving the hub firm and rigid support when it arrives at its proper position relative to the clamped spoke.

The invention consists also in the details of construction and combination of parts hereinafter described and claimed.

In the accompanying drawings: Figure 1 is a side elevation of a machine having my invention embodied therein. Fig. 2 is an end elevation of the same, looking to the left in Fig. 1. Fig. 3 is a vertical transverse section on the line *a*—*a* of Fig. 1. Fig. 4 is a perspective view of the hub support and its operating mechanism. Figs. 5, 6, 7, and 8 are views showing the position of the actuating cams in their different periods of movement, and illustrating the different positions of the hub relative to the clamps. Figs. 9 and 10 are detail views showing the operation of the cam controlling devices of the present embodiment.

In the accompanying drawings I have represented my invention applied to a machine formed to secure the spokes to both the rim and the hub, but it will be understood that the invention is not confined in its application to a machine of this type, for obviously the fastening of the spokes to the rim may be accomplished by a separate and distinct machine, the present invention being directed to the means for controlling the endwise movements of the hub due to the alternate fastening of the spokes in the holes of the two ranks.

In the accompanying drawings, 1 represents a frame comprising a base plate 2, end uprights 2^a, an upper cross beam 3 and an intermediate bed plate 4.

5 and 6 represent upper and lower clamping jaws, movable vertically to and from each other, and adapted to clamp a spoke between them and hold it at a predetermined point. The jaws in the present instance are operated from an oscillating head 7, operatively connected with the jaws, and actuated by a pressure cylinder 8 in such manner that when the piston rises, the head will be oscillated in the direction of the arrow and the jaws will be closed, and when the piston descends, the opposite movement of the head will take place and the jaws will be opened.

9 represents a heading tool adapted to act on the outer end of the spoke to fasten it to the rim, and operated from a cylinder 10 through the medium of a rocking head 11, connected with the heading tool by links 12. 13 represents a second heading tool adapted to act on the end of the spoke within the hub to fasten the same to the hub, and operated from a cylinder 13^a through the medium of a rocking head 13^b and links 13^c

All of the parts thus far described may be of any appropriate form and construction, and except in so far as hereinafter indicated, they form no part of the present invention.

In applying my invention I provide a hub holder 14 adapted to sustain the hub on end and permit it to be turned around so as to bring the next hole in line with the clamping jaws. The holder is in the form

of a horizontal plate 14ª, having at its sides longitudinal openings through which are extended two longitudinal parallel supporting bars 15, extending along the sides of the clamping jaws and pivoted at their ends on a horizontal transverse axis 15ª to the frame of the machine adjacent the heading tool 9, the construction being such that the hub holder is sustained by the bars and is movable up and down with them, the hub by this means being moved endwise relative to the point at which the jaws clamp and hold the spoke.

The up and down movements of the bars are effected and controlled by two rotary operating cam disks 16 and 17, one on each side of the machine, which are fixed to and rotatable with a horizontal operating shaft 18 mounted in bearings in the intermediate bed plate 4. These cam disks are arranged vertically beneath, and they engage rollers 19 on the lower ends of arms 20, whose upper ends are fixed to the supporting bars 15, and as the cams are rotated, by the mechanism presently to be described, they act to raise the bars and permit them to descend, so as to alternately bring the upper and lower spoke bosses into the position where the spoke is held by the clamps.

The cam disks are of such form that the hub support will be moved from a central or normal position, first downward to bring the upper bosses into position, then back to its central position, then upward to bring the lower bosses into position, and then downward again to its central starting position, the cams coming to rest between each movement and acting when at rest to afford the hub holder a firm and fixed support. In order to effect these actions, the cam disks are of the form represented in Figs. 5, 6, 7 and 8, where it will be seen that they are of a general elliptical contour and mounted eccentrically on the operating shaft. In its edge each cam has four sockets *a*, *b*, *c* and *d*, adapted to receive the roller 19 when the cams come to rest, so as to afford a fixed support for the hub holder at these periods in the action of the cams. The socket *a* is in the end of the cam nearest the shaft, and when the roller is seated therein the hub holder is in its lowest position. The sockets *b* and *d* are arranged at the sides of the cam a greater distance from the shaft than the socket *a*, and when the roller is seated in either of the sockets *b* or *d* the hub holder is in its central or normal position. The socket *c* is in the opposite end of the cam distant from the shaft, and when the roller is in this socket, the hub holder is sustained at its highest point. Hence, in the rotation of the cams in the direction of the arrow, they will act to first lower the hub from its normal position to its lowest position, then raise it to its normal position, then raise it farther to its highest position then finally lower it again to its normal position, the cams between each action coming to rest with the rollers seated in the respective sockets and giving firm support to the hub. These actions of the cams are so timed relatively to the action of the clamping jaws and heading tools that starting with the jaws open, and a spoke set in position to be clamped with its inner end in one of the upper hub bosses, when the jaws are closed on the spoke, the cams will permit the hub to descend to its lowest position and bring the upper boss, with its inserted spoke, in line with the point where the jaws clamp and hold the spoke, whereupon the cams will come to rest with the roller 19 seated in socket *a*. The heading tools are now operated to secure the spoke in place. The jaws are then opened to release the spoke, simultaneously with which action the second movement of the cams takes place, resulting in the elevation of the hub to its former normal position. The hub is now turned in its holder to bring into position a boss of the lower rank, and the next spoke to be fastened is set in place between the clamps with its inner end in the lower boss. The jaws are now closed again as before, and simultaneously the cams act on the rollers 19 and elevate the hub to its highest point thereby bringing the lower boss, with its inserted spoke, to the point where the jaws clamp and hold the spoke, whereupon the cams come to rest again with rollers 19 seated in sockets *c*. The heading tools are now again operated and result in the fastening of the second spoke in the lower boss. The clamps are now opened to release the second spoke, the cams at the same time moving to the next position thereby permitting the hub holder to descend, and the parts come to rest in the central position again, with the roller seated in socket *d*, from which it started. The hub is now again shifted in position horizontally to bring the second boss of the upper rank into position, and a second upper spoke being set in place, the jaws are closed and the hub lowered to its lowest point, and these actions are repeated, resulting in the fastening of the spokes in place, first in the upper rank, then in the lower rank, then in the upper rank again, and so on until both ranks have been fastened in position.

In order that the movements of the hub holder may be effected in the order named, and properly timed with reference to the opening and closing actions of the jaws, I propose to provide a cam actuating mechanism, and effect the operation of the same automatically by the jaw actuating mechanism.

The cam actuating mechanism comprises two ratchet wheels 21 and 22 fixed to the shaft 18, one at the outer side of each cam

disk, which ratchet wheels are provided with teeth 21[a] engaged by pivoted driving dogs 23 and 24, carried on the ends of two vibrating arms 25 and 26 respectively, having their inner ends mounted loosely to rock on the shaft.

The arm 26 is extended beyond its supporting shaft as at 26[a], and to this extended end of the arm, and to the opposite end of arm 25, two connecting rods 27 and 28 are jointed, and extend longitudinally and have their opposite ends pivoted to the lower ends of crank arms 29 and 30 mounted fixedly at their upper ends on studs 31 and 32 extending axially from the oscillating head 7, and constituting the journals of said head.

As a result of the construction described, it will be observed that when the head 7 is oscillated either by the rise or fall of the piston, the crank arms 29 and 30 will be rocked, which action will, owing to the connection of said arms with the driving dogs, feed one or the other of the two ratchet wheels forward, and thereby advance the cams one step. By reason of the connection of the connecting rod 28 with the extension 26[a] of arm 26, one of the driving dogs will advance its wheel, while the other is retreated for a new grip, so that for every rocking action of the crank arms, the rotary cams will be fed one step, the feed of the cams being effected first on one side of the machine when the jaws are opened, and then on the other side of the machine, when the jaws are closed, one pawl feeding when the piston rises to close the jaws, and the other pawl feeding when the piston descends to open the jaws.

By reason of the elliptical form of the cam disks and their connection eccentrically with the driving shaft, the latter is subjected by reason of the unequal distribution of the weight, to considerable side strain, and to counteract this I fix to the shaft an arm 33 which is extended therefrom in a direction opposite the cam disks, and has fixed to its end a counterweight 34.

In order that in their up and down movements the bars 15 carrying the hub holder, may be guided and caused to move in a truly vertical direction, I mount on the bar, outward of the vertical supporting arms 20, a transversely arranged guiding frame 35 provided with depending fingers 36 extending at the sides of the intermediate frame bar 4, which fingers carry horizontal inwardly extending adjustable pins 37, adapted to bear at their inner ends loosely but snugly against the frame bar. By this means the lateral movements of the hub holder are prevented, and the same caused to move vertically and truly.

In order that when the hub when seated in its holder, may be prevented from tipping, and may be maintained in an upright position, I provide an arm 40 mounted loosely in a sleeve 40[a] pivoted on a transverse axis as at 41, to an upward extension of the frame 35. The end of this arm adjacent to the hub holder, is provided with a cap 42, adapted when the hub is in place in the holder, to be seated over the upper end of the hub and hold the same in position. The arm is adapted to yield longitudinally, and to effect this, its end is extended beyond the sleeve 40 and provided with a head 41[a], between which and the end of the sleeve, a spiral spring 41[b] is applied and acts at its ends respectively against the sleeve and head. On the other side of the sleeve, the arm is provided with a fixed collar 41[c] adapted by contact with the end of the sleeve to limit the endwise movement of the arm.

It will be observed from the construction of my improved mechanism, that the hub is moved positively upward to bring the lower bosses in position, and when the latter arrive at the proper point the hub is given fixed and firm support. The opposite movement of the hub holder is effected by the weight of the parts, subject to the restraining and guiding action of the cam disks, so that under all conditions the hub holder receives a firm support from beneath. By reason of this fact, the action of the parts is positive, certain, and such as to properly center the spoke bosses of the two ranks, with reference to the spoke clamping and holding mechanism.

Having thus described my invention, what I claim is:—

1. The combination with means for clamping and holding the spoke at a predetermined point, of a hub holder having a range of movement past the spoke holder to bring both sets of spoke holes in line with the clamping means, and a positively and intermittently operated feed or actuating mechanism, acting to raise and lower the hub holder to bring the various sets of spoke holes in the hub into operative relation with the spoke holding means, and support it bodily and rigidly in its position of rest.

2. The combination with means for clamping and holding the spoke at a predetermined point, of a hub holder having a range of movement past the spoke holder to bring both sets of spoke holes in line with the clamping means, and a four-step feed or actuating mechanism, acting to raise and lower the hub holder and support it bodily and rigidly in its positions of rest.

3. The combination with means for clamping and holding the spoke at a predetermined point, of a hub holder pivoted at one end to swing vertically past the clamp to present spoke-holes of each set alternately in operative relation with the spoke clamping and holding means, and an intermittently actuated operating mechanism sus-

taining the weight of the hub holder at its free end, and supporting it rigidly in its positions of rest.

4. The combination with the spoke clamping jaws and means for operating them, of a vertically movable hub holder having a range of movement to bring both sets of spoke holes in line with the spokes between the jaws, means for positively actuating and rigidly supporting the hub holder to present spoke-holes of each set in operative relation with the spoke clamping means, and connections between the jaw-operating means and hub holder operating means.

5. In a machine for securing spokes to hubs, the combination of means for holding the spoke at a predetermined point, a hub holder movable in the direction of the longitudinal axis of the hub, and a cam mechanism for moving the hub holder alternately in opposite directions to bring the spoke holes in the hub in line with the spoke holding means and there sustaining said holder rigidly while at rest.

6. The combination with the spoke clamping jaws and means for operating them, of a vertically movable hub holder, and intermittently actuated alternately operating cam mechanisms actuating and rigidly sustaining the weight of the hub holder.

7. The combination with the spoke clamping jaws and their operating mechanism, of a vertically movable hub holder to support the hub, a rocking spring-pressed arm mounted on the hub holder and having means to engage the upper end of the hub, and cam mechanism actuating and sustaining rigidly the weight of the hub holder.

8. In a machine for securing spokes to hubs, the combination of means for clamping and holding the spoke at a predetermined point, a hub holder movable in the direction of the longitudinal axis of the hub, a rotary cam acting on the hub holder and adapted to move the same, and means for rotating said cam.

9. The combination with the spoke clamping jaws, an oscillating head, and lever mechanism connecting the jaws and head, of a hub support, and intermittently operated cam mechanism, actuating and rigidly supporting the hub support, pawl and ratchet mechanism actuating the cam mechanism, and operative connections between the pawl and ratchet mechanism and said oscillating head.

10. In a machine for securing spokes to hubs, the combination of means for holding the spoke at a predetermined point, a hub holder movable in the direction of the longitudinal axis of the hub, a rotary cam disk provided at intervals with sockets, an arm on the hub holder engaged by the cam disk, and adapted to be seated in the sockets, and means for rotating the disk.

11. In a machine for securing spokes to hubs, the combination of means for holding the spoke at a predetermined point, a hub holder adapted to sustain the hub on end and movable in the direction of the longitudinal axis of the hub, arms depending from the hub holder, two cam disks engaged by said arms and adapted to control the movements of the hub holder, and means for moving said cam disks intermittently.

12. In a machine of the type described, the combination with means for holding the spokes at a predetermined point, of a hub holder movable relatively to the presented spoke in the direction of the longitudinal axis of the hub, to aline one or the other of a plurality of sets of spoke holes in the hub with the held spoke, and means for controlling said movements of the hub holder, said means acting to fixedly support the holder in its different alining positions.

13. In a machine of the type described, the combination with means for holding the spokes at a predetermined point, of a hub holder movable relatively to the held spoke in the direction of the longitudinal axis of the hub, to aline one or the other of a plurality of sets of spoke holes in the hub with the held spoke, and means for controlling said movements of the hub holder, said means acting independently of the spoke and hub, to fixedly support the hub holder in its different alining positions.

In testimony whereof I hereunto set my hand this twenty seventh day of March, 1906, in the presence of two attesting witnesses.

EMIL EINFELDT.

Witnesses:
M. LOUISE DODGE,
ANDREW NEILSON.