(No Model.) 3 Sheets—Sheet 1.

G. J. ZIMMERMAN.

MACHINE FOR MAKING METAL WHEELS.

No. 396,796. Patented Jan. 29, 1889.

Fig. 1.

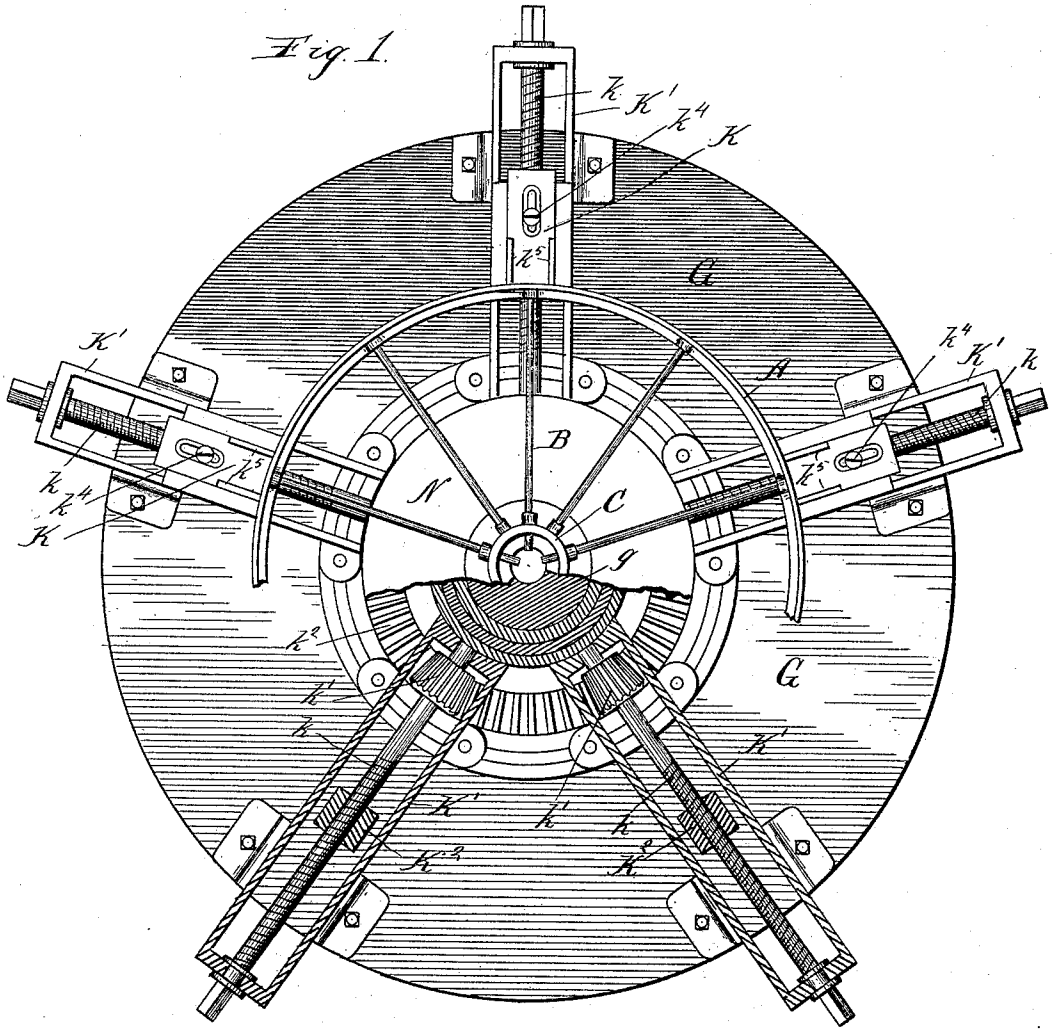
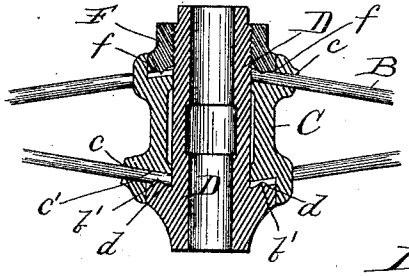


Fig 4.



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Mack A. Claflin.

Inventor:
George J. Zimmerman
By Munday, Evarts & Adcock
His Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

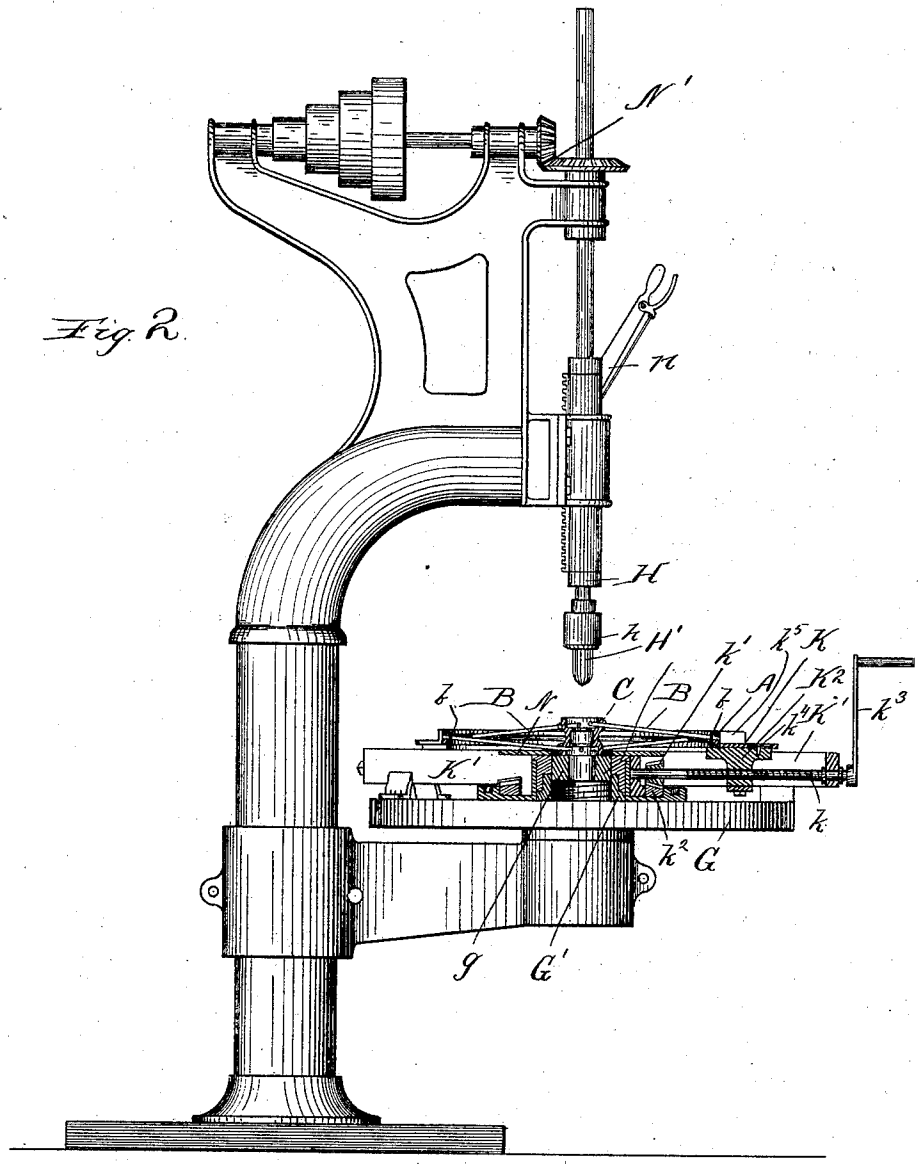
(No Model.) 3 Sheets—Sheet 2.

G. J. ZIMMERMAN.

MACHINE FOR MAKING METAL WHEELS.

No. 396,796. Patented Jan. 29, 1889.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

G. J. ZIMMERMAN.

MACHINE FOR MAKING METAL WHEELS.

No. 396,796. Patented Jan. 29, 1889.

Fig. 7

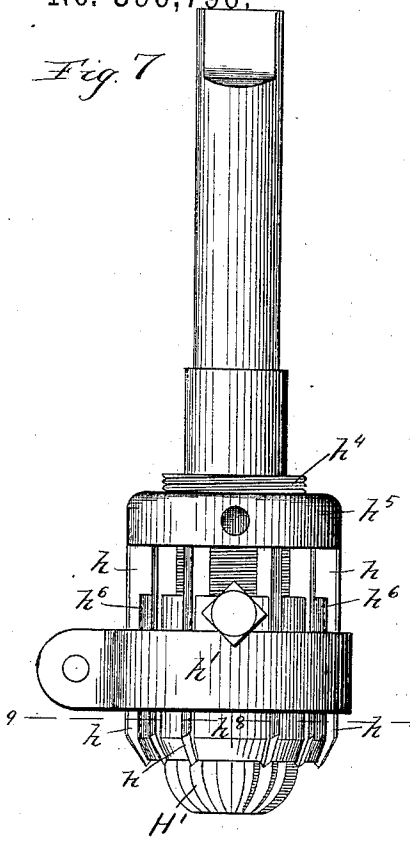


Fig. 8.

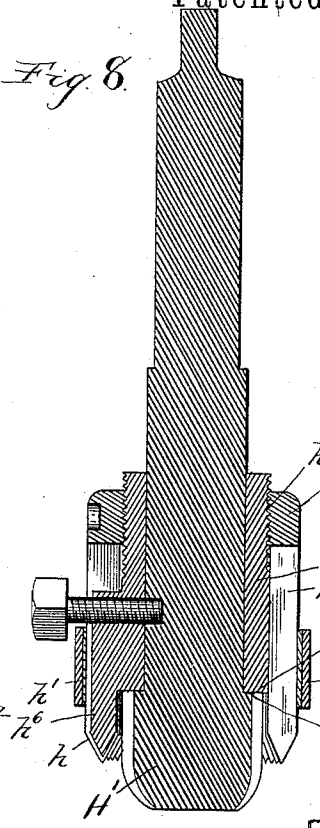


Fig. 10.

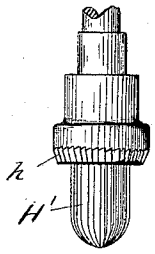


Fig. 11.

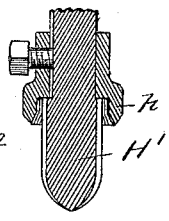


Fig. 9.

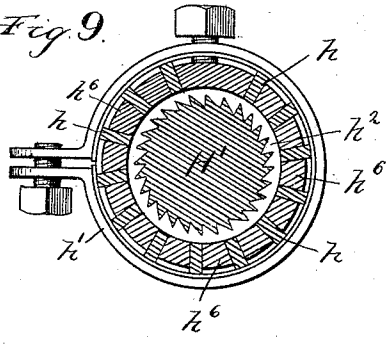


Fig. 3.

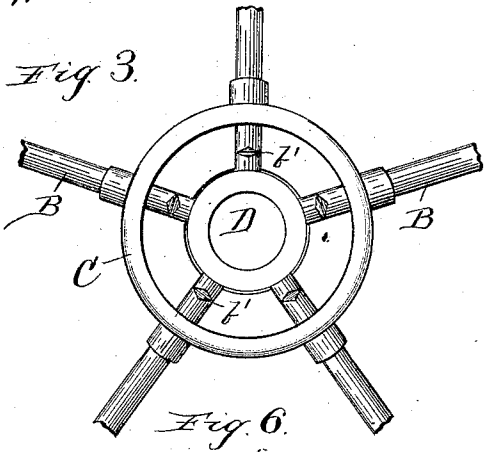


Fig. 5.

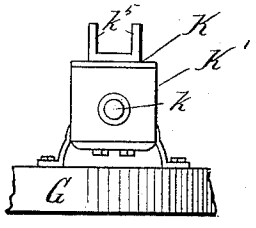
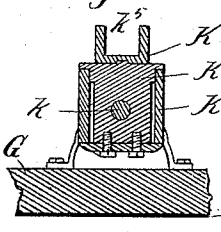


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE J. ZIMMERMAN, OF LA PORTE, INDIANA, ASSIGNOR TO THE NILES & SCOTT COMPANY, OF SAME PLACE.

MACHINE FOR MAKING METAL WHEELS.

SPECIFICATION forming part of Letters Patent No. 396,796, dated January 29, 1889.

Application filed October 27, 1888. Serial No. 289,276. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. ZIMMERMAN, a citizen of the United States, residing in La Porte, in the county of La Porte and State of Indiana, have invented a new and useful Improvement in Machines for Cutting and Shaping the Ends of Spokes in Metal Wheels, of which the following is a specification.

My invention relates to machines for use in the manufacture of metal wheels, wherein the spokes, consisting of metal rods, are clamped and held between the parts of the hub. Wheels of the class I refer to are illustrated in the accompanying drawings. In wheels of this class the inner ends of the spokes are made to abut against the peripheral surface of the inner or box portion of the hub, which thus serves to withstand the end-thrust of the spokes. In the practical construction of these wheels, where the ends of the spokes bear or abut against the inner part of the hub, it is of the greatest importance that each and all of the spokes be of precisely the same length and made to fit or abut snugly against this inner box part of the hub, as otherwise the wheel will not be properly braced and rigidly sustained by the spokes. In wheels of this kind the inner ends of the spokes are cut or notched, so that when clamped between the box and shell of the hub, or between the shell and nut of the hub, the spokes will be held against strains tending to pull them out of the hub. In order that each and every spoke of the rank or series shall be properly clamped between the two opposing parts of the hub, it is necessary that the holding-notches or tenons in each and all of the spokes be cut precisely alike, in the same corresponding plane, and to the same depth, as otherwise some of the spokes will be clamped and held rigid, while others will be more or less loose and tend to rattle, and not properly brace and strengthen the wheel.

The object of my invention is to provide a machine of a cheap and simple construction which will operate at the same time to so cut and notch the spokes as that they shall all be of the precise length required to abut snugly against the inner or box part of the hub, and to insure the equal and rigid clamping of each and every spoke between the opposing parts of the hub.

In my invention, after the spokes are all riveted in the tire or rim of the wheel and their inner ends inserted through their holes in the shell of the hub, the same are placed on a drill-press, the axis of the wheel being accurately centered with the axis of the revolving cutting-tool or drill, and then the revolving cutter is forced down and made to cut and ream off the ends of the spokes on a true circle corresponding to the periphery of the box portion of the hub. The same cutting-tool is provided with a depending cutting-flange, which serves at the same time to cut the holding-notch or tenon in the outer face of every spoke, the notches cut in all the spokes together constituting in a manner an annular groove. By this means each and every spoke is given a true fit and bearing both at its ends and sides against the parts of the hub, and a very strong and rigid wheel may be produced, and the work may be done rapidly and cheaply.

My invention consists in the combination, with a chuck for clamping and centering the wheel, of a revolving cutting-tool or drill having a depending cutting-flange, whereby the ends of the spokes may all be simultaneously cut or reamed off on a true circle corresponding to the periphery of the box portion of the hub, and at the same time the holding-notches or tenons cut in the outer faces of all the spokes.

My invention also consists in the novel devices and novel combinations of parts and devices herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a plan view of a machine embodying my invention, the cover-plate being partially broken away. Fig. 2 is a side elevation partly in section. Fig. 3 is a face view of the shell part of the wheel, showing the spokes in place after being cut and notched. Fig. 4 is a sectional view of the wheel. Fig. 5 is a detail end view of one of the radial clamps for the wheel. Fig. 6 is a section on line 6 6 of

Fig. 2. Fig. 7 is an enlarged elevation of the cutting-tool. Fig. 8 is a sectional view of the same. Fig. 9 is a cross-section on line 9 9 of Fig. 7, and Figs. 10 and 11 show a modified construction of the tool.

In said drawings, A represents the tire or rim of the metal wheel; B, its spokes, consisting of plain metal rods furnished with shoulders *b* at their outer ends and securely riveted to the tire A. The inner ends of the spokes are inserted through suitable holes, *c*, in the shell portion C of the hub. The inner ends of the spokes B abut against the peripheral surface of the rim or box part D of the hub. The inner ends of the spokes B are furnished with notches *b'*, so that the same may be clamped and held against pulling-out strains between the interior shoulders, *c*, of the shell C and the exterior shoulders, *d f*, of the box D and nut F, as is clearly shown in Fig. 4. As shown in the drawings, the spokes are arranged in two ranks in the ordinary manner. The wheel may, however, of course be of a single-rank instead of a double-rank construction.

G represents the table or bed of an ordinary drill-press, and H its revolving spindle, carrying the spoke cutting and notching tool H' *h*.

As shown in the drawings, the wheel is provided with ten spokes—five in each rank. All the five spokes of each rank are simultaneously cut and notched by the revolving tools H' and *h*.

The table G is furnished with radially-sliding wheel clamps or chucks K, preferably one in number for each of the spokes operated upon. These clamps K are mounted to slide on suitable guides, K', and are operated or adjusted by screws *k*, journaled on the guides K'. Each of the screws *k* is furnished with a bevel-gear, *k'*, which meshes with a horizontally-revolving bevel-gear, k^2, thus gearing all the screws together, so that the turning of one of them by the crank k^3 will simultaneously operate them all. The bed-plate G, Fig. 2, is further furnished with a bottom block or anvil, G', having interior screw-threads, into which the adjustable support *g* for the hub of the wheel to rest upon screws. The wheel or hub-support *g* may thus be raised or lowered to fit the different lengths of hub. Above the adjustable hub-supports *g* is a circular cap-plate, N, having a central hole for the hub to project through. This cap-plate serves to cover the gears by which the radially-sliding clamps or dogs K are operated. Each of the radially-sliding clamps or dogs K is adjustably secured upon the threaded block K^2, in which the screws are threaded, so that each clamp or dog may be independently adjusted to the true circle of the wheel. The dog or clamp K is secured to the block K^2 by threaded bolts k^4, which pass through slots in the clamp K. Each clamp has a vertical shoulder, k^5, which bears against the periphery of the tire as well as the horizontal ledge upon which the tire rests. After the spokes have been riveted in the tire and inserted in place through the shell C the same is placed on the clamps or dogs K, and then by turning the crank k^3 all the dogs or clamps K are brought simultaneously up against the tire, so as to clamp the wheel in a true circle about the axis of the spindle H as a center.

As indicated in Fig. 1 of the drawings, the radial guides K' are arranged equidistant apart, and the wheel is so placed on the dogs or clamps K that each one of the five spokes operated upon coincides with the radial guides K', so that each of the five clamps K will bear directly against the ends of the spokes operated upon by the tool H' *h*. The next step in the operation is to bring the revolving reamer or tool H' *h* down against the spokes, when the portion H' of the tool will ream or cut off the ends of the spokes all on a true circle, as indicated in Fig. 3, so that their ends will all bear snugly against the outer periphery of the inner or box portion, D, of the hub. At the same time the outer depending cutting-flange, *h*, of the revolving tool will form the notches *b'* in the side of each and all the spokes in a true circle and of precisely the same depth, so that the shoulders *d* and *f* will fit snugly against each and all the spokes.

As shown in Figs. 7, 8, and 9, the cutting-flange *h* of the tool which forms the notches *b'* in the spokes consists of independent and separately removable or adjustable knives *h*, each held in suitable sockets on the tool-head by a clamp-ring, *h'*.

As shown in Figs. 7, 8, and 9, the shank of the reamer-tool H' is furnished with a shoulder, h^2, and the peripherally-slotted or segmental knife-socket ring h^8 is furnished with a shoulder, h^3, which fits against the shoulder h^2. The upper ends of the knife-socket ring h^8 are provided with screw-threads h^4 to fit the screw-threads of the holder-ring h^5. The sockets in which the knives *h* fit are formed by segments h^6 on the ring h^8, and the knives are held in place by the clamp-ring *h'* and the screw-threaded holder-ring h^5.

The set-screw shown in Figs. 7, 8, and 9 at right angles to the axis of the tool passes through the knife-socket ring h^8, and serves to hold said knife-socket ring in place on the tool-shaft H. The knives *h* all abut at their upper ends against the holder-ring h^5; but they may be individually adjusted by simply putting thin slips of paper or metal between the ends of the knife and the ring h^5, against which they abut, or by grinding off the upper end of the knife, and thus making it slightly shorter, as may be required.

As shown in Figs. 10 and 11, the cutting-flange *h* consists simply of a serrated sleeve or annular reamer secured to the shank portion of the reamer H'. The preferable construction of the tool is that before described and indicated in Figs. 7, 8, and 9.

The cutting-edge of the tool *h*, whether the same consists of separate knives or of one

notched rim or sleeve, may of course be given any desired shape corresponding to the form of notch *b* which it is desired to make in the side of the spokes B.

As the spokes are all securely riveted to the tire before the cutting and notching operation takes place, and as the wheel is also forced to a true circle by the radial clamps K prior to the cutting operation, it is obvious that when the spokes are thus cut and notched by my machine each and all will accurately and truly fit the parts of the hub C, D, and F.

The shaft H of the tool is revolved by the usual gearing, N, and it is fed up and down by any suitable or customary mechanism, *n*. While my machine is specially designed for cutting and notching the spokes of metal wheels, it may be used for other purposes.

I claim—

1. The combination, with a chuck for clamping and centering the wheel, of a revolving tool having a central cutting portion, H′, and provided with a depending cutter-flange, *h*, for simultaneously cutting or reaming off the ends of the spokes and cutting holding-notches or tenons therein, substantially as specified.

2. The combination, with a chuck for clamping and centering the rim or tire of the wheel, of a support for the hub and a revolving tool or reamer for cutting off the ends of the spokes on a true circle about the axis of the wheel, substantially as specified.

3. The combination, with a chuck for clamping and centering the rim or tire of the wheel, of a support for the hub and a revolving tool or reamer having a central cutting portion, H′, for cutting off the ends of the spokes on a true circle about the axis of the wheel, said revolving tool having a cutter flange or shoulder, *h*, for simultaneously cutting holding-notches or tenons in the outer face of the spokes, substantially as specified.

4. The combination, with a chuck for clamping and centering the rim or tire of the wheel, of a support, *g*, for the hub to rest upon, a plate, N, above said support, having an opening for the lower end of the hub to fit in, and a revolving tool for cutting off the ends of the spokes, substantially as specified.

5. The combination, with a chuck for clamping and centering the rim or tire of the wheel, of a support, *g*, for the hub to rest upon, a plate, N, above said support, having an opening for the lower end of the hub to fit in, and a revolving tool for cutting off the ends of the spokes, said tool having a cutter flange or shoulder for simultaneously cutting holding-notches or tenons in the outer face of the spokes, substantially as specified.

6. The combination, with the chuck, of a revolving tool, H′, having a cutter flange or shoulder consisting of independently-adjustable knives *h*, substantially as specified.

7. The combination, with a revolving tool, H′, of independently-adjustable cutters *h* and a clamp-ring, *h′*, for securing said cutters to said revolving tool, substantially as specified.

8. The combination, with a revolving tool, H′, furnished with shoulder H^2, of the individual cutters *h*, socket-ring h^8, having shoulders h^3 and screw-threads h^4, and screw-threaded holder-ring h^5, substantially as specified.

9. The combination, with revolving tool H′, furnished with shoulders h^2, of the individual cutters *h*, socket-ring h^8, having shoulders h^3 and screw-threads h^4, and screw-threaded holder-ring h^5 and clamp-ring *h′*, substantially as specified.

10. The combination, with a revolving reamer or tool, H′, of table or bed G, radially-sliding chuck-clamps K, their guides K′, adjusting-screws *k*, gears *k′*, and gear k^2, meshing with all said gears *k′*, substantially as specified.

11. The combination, with a revolving tool, of table or bed G, radially-sliding chuck-clamps K, screw-threaded blocks K^2, to which clamps K are adjustably secured, guides K′, adjusting-screws *k*, gears *k′*, and gear k^2, substantially as specified.

12. The combination, with radially-sliding clamps K, their guides K′, and operating-screws *k*, of an adjustable support, *g*, for the hub of the wheel and a revolving tool, substantially as specified.

13. The combination, with radially-sliding clamps K, their guides K′, and operating-screws *k*, of an adjustable support, *g*, for the hub of the wheel and a revolving tool, said tool having a flange or shoulder to cut notches or tenons in the faces of the spokes, substantially as specified.

14. The combination, with radially-sliding clamps K, their guides K′, and operating-screws, of an adjustable support, *g*, for the hub and a plate, N, having a recess to receive the lower end of the hub, as specified.

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EMMET SCOTT.