(No Model.)

2 Sheets—Sheet 1.

A. K. STONE.

WHEEL.

No. 437,260. Patented Sept. 30, 1890.

Fig. 1.

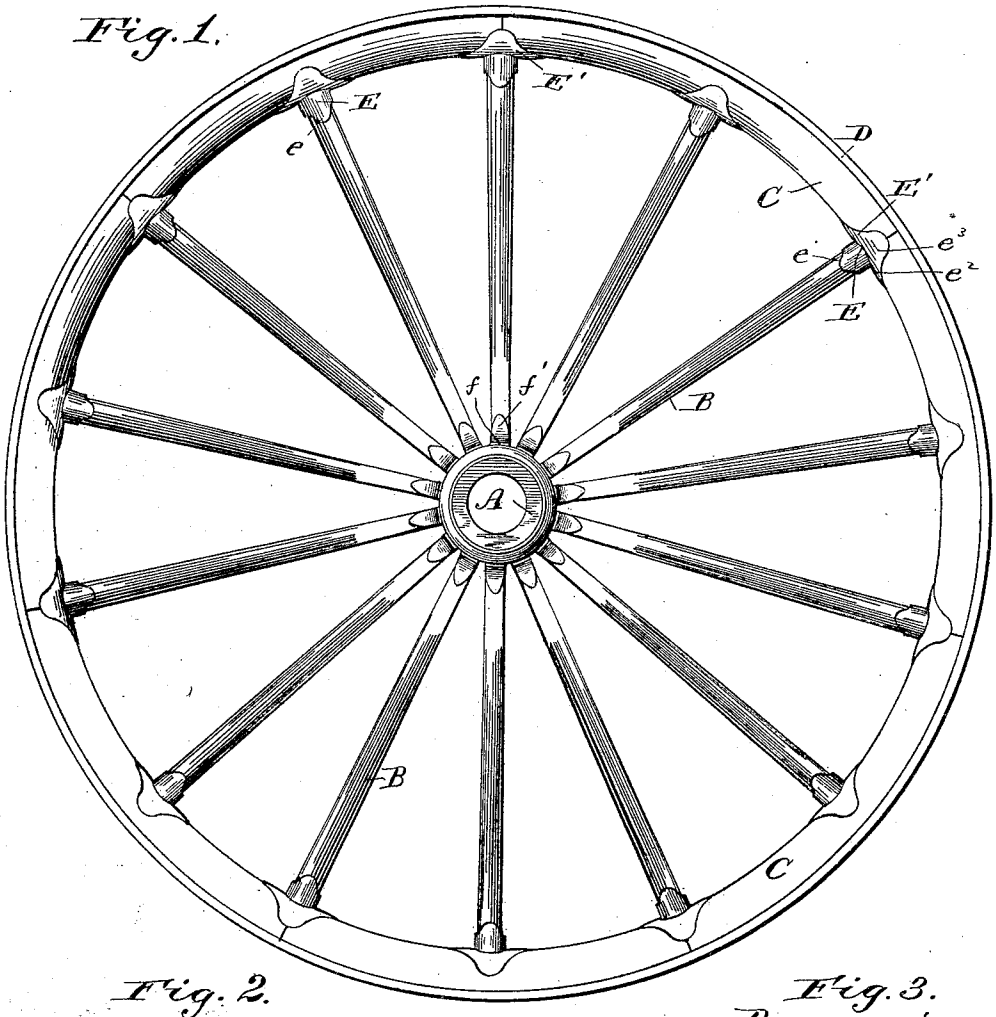


Fig. 2.

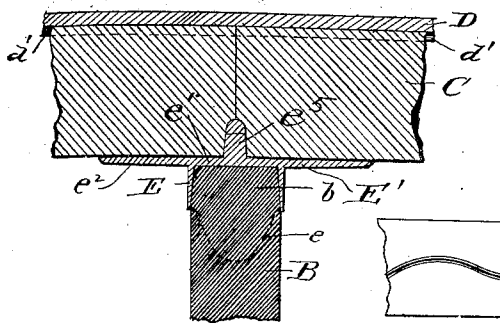


Fig. 8.

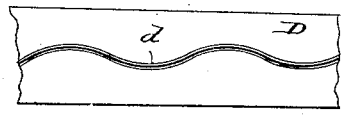


Fig. 3.

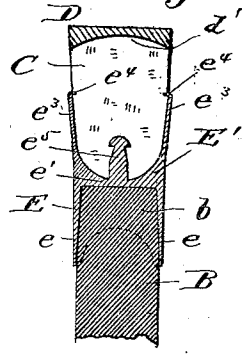
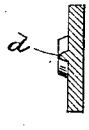


Fig. 9.



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(No Model.) 2 Sheets—Sheet 2.

A. K. STONE.

WHEEL.

No. 437,260. Patented Sept. 30, 1890.

Fig. 4.

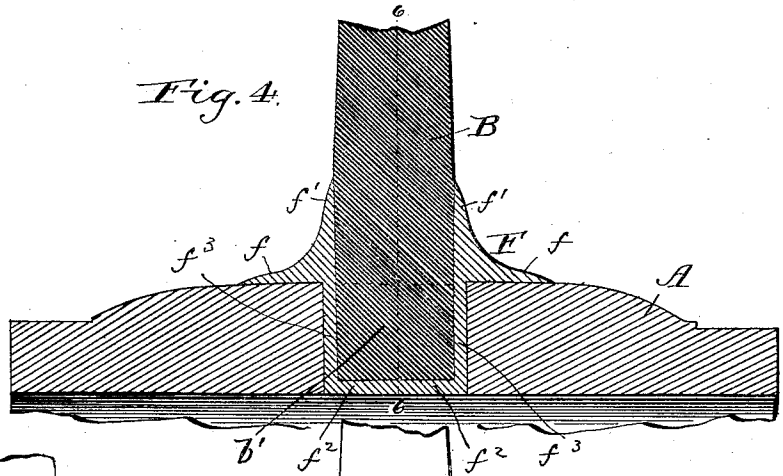
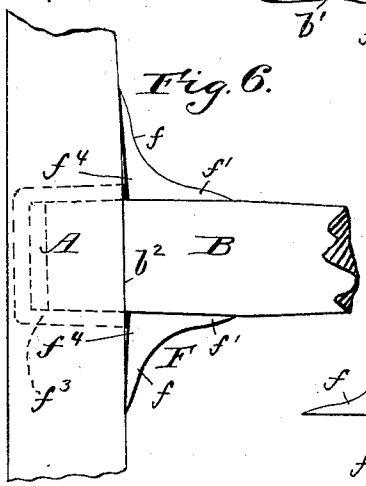


Fig. 6.



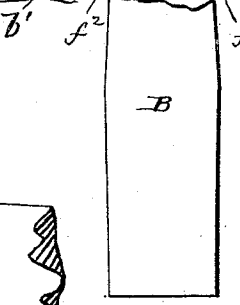
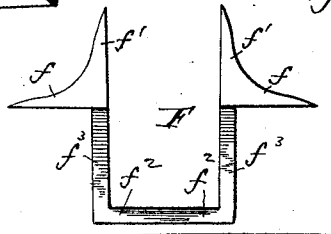


Fig. 5.



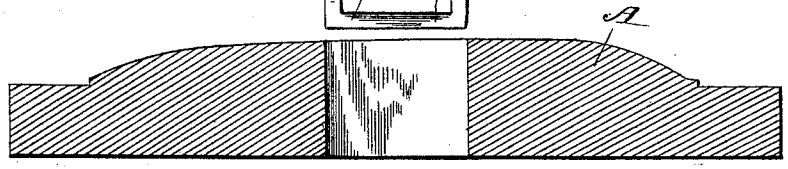
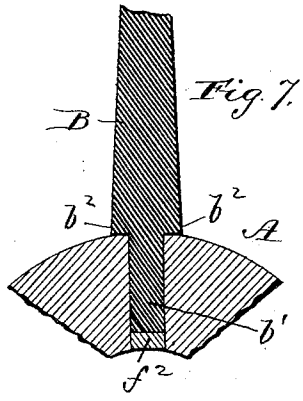


Fig. 7.



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UNITED STATES PATENT OFFICE.

ANSON K. STONE, OF PINE ISLAND, MINNESOTA.

WHEEL.

SPECIFICATION forming part of Letters Patent No. 437,260, dated September 30, 1890.

Application filed February 18, 1890. Serial No. 340,860. (No model.)

To all whom it may concern:

Be it known that I, ANSON K. STONE, a citizen of the United States, residing at Pine Island, in the county of Goodhue and State of Minnesota, have invented certain new and useful Improvements in Wheels; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My improvement is directed to obviating difficulties which have been experienced in the use of vehicle-wheels arising from the weakness of the joints or connections by which the spoke is united with the felly and with the hub.

According to my invention the spoke is connected with the felly by means or through the medium of a spoke-socket and felly-supporter, while its joint with the hub is strengthened and made rigid by a spoke-brace and hub holder or supporter, said socket and brace pieces being of peculiar construction, hereinafter particularly set forth and claimed.

My invention enables the felly, spoke, and hub to be made comparatively thin and light, thus diminishing the amount and cost of material required for these parts, while the finish and general appearance of the vehicle are much enhanced and its strength and durability greatly increased.

In order to make the invention clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect without, however, limiting my invention to the particular construction which, for the sake of illustration, I have set forth.

In said drawings, Figure 1 is a side view of a wheel embodying my improvement. Fig. 2 is a longitudinal vertical section, on a larger scale, of the joint between the spoke and felly. Fig. 3 is a transverse section of the same. Fig. 4 is a transverse vertical section of a portion of the hub, showing the joint between the same and the spoke. Fig. 5 is a similar view with the parts separated. Fig. 6 is an elevation showing the parts not yet forced together into their final position. Fig. 7 is a section on line 6 6 of Fig. 4. Fig. 8 is an inner view of one form of tire having a curved or zigzag rib. Fig. 9 is a transverse section of the same.

Referring to the drawings, A indicates the hub; B, the spokes; C, the felly, and D the tire.

The outer end of the spoke, instead of being shouldered and provided with a tenon adapted to fit a mortise in the felly in the usual manner, is tapered slightly, as at *b*, and fitted tightly into a metallic socket-piece E of corresponding tapered or slightly conical form internally. The full strength of the spoke is thus preserved, while additional lateral stiffness is derived from the sides of the metallic socket-piece. The said sides may be extended along the inner and outer faces of the spoke, as shown at *e*, to still further resist the severe breaking strain to which wheels are sometimes subjected in transverse directions. Practically the full size or cross-section of the spoke is thus preserved, very little material being removed in the above-described tapering of the spoke, and it is well adapted to sustain, without crushing or shortening, the heaviest loads or shocks. Moreover, the greater the endwise pressure upon the spoke the more tightly it is wedged into and united with the socket-piece E. In its normal position the end of the spoke abuts against the cap or plate e', which closes the end of the socket-piece. I thus dispense with boring holes in the felly for the ends of the spokes, with the consequent weakening of that part and liability of the tire to get loose.

E′ is the felly-supporter, rigidly attached to or formed with the socket-piece E and suitably concaved to receive and fit the under or inner side of the felly. It is provided with extensions e^2 along said inner side and with radial extensions e^3, which clasp the sides of the felly and are bent or curved inward toward each other at their extremities, as shown at e^4, and slightly buried in the felly to prevent the intrusion of any sharp stone or other substance between the felly and the extension e^3. The supporter E′ is further provided or formed with a central radial pin e^5, of arrow-head shape by preference, adapted to be forced into the under side of the felly or be-

tween the abutting ends of two felly-sections, thereby preventing any movement of the spoke and socket along the felly. The means of connection between the spoke and felly above described enables the joints between the sections of the felly to be placed in line with the spoke and on the supporter E′, thus preventing the wheel from becoming flattened by the bending inward of the ends of the felly-sections.

F is the spoke-brace and hub holder or supporter, comprising two lateral arms *f*, situated upon each side of the spoke and adapted to fit the hub and carry the weight of the same; two arms or braces *f′*, parallel with the spoke upon the inner and outer sides thereof and having two legs f^3, adapted to enter the mortise in the hub, and a horizontal portion or portions f^2 f^2, formed with or attached rigidly to the braces *f′* and passing across or partly across the end of the spoke-tenon *b′* and adapted to be supported thereby. The spoke also has by preference the usual shoulders b^2 engaging the surface of the hub, and the weight of the hub and vehicle is therefore carried partly by such shoulders, but mainly by the end of the spoke, parts f^2, braces or legs f^3, and arms *f*. The parts f^2 of each brace *f′* may be separate and the device F made in two parts, or said parts f^2 may be connected across the end of the spoke-tenon, as shown. The arms *f* are so arranged relatively to the legs f^3—for instance, at a slightly acute angle thereto—that the extremities of said arms will touch the surface of the hub before the inner portions f^4 of the arms, Fig. 6. Further inward pressure upon the spoke, as by setting the tire, will therefore cause the legs f^3 and braces *f′* to act as jaws, between which the spoke is grasped with great force and constant pressure.

It will be seen from an examination of the structure above described that in the completed wheel the hub is, by the circumferential series of arms *f*, compressed as by a band, strengthening the hub and distributing the weight of the vehicle upon it. If the hub shrinks or the tire becomes loose, the setting of the tire makes the wheel firmer and stronger than ever. It will also be seen that the spokes are each held in a pair of braces or jaws, the pressure of which laterally upon the spoke increases with the weight applied. The spoke is thus greatly strengthened at its weakest point, making it impossible for it to break at the shoulder of the tenon.

By severing the connection between the horizontal portions f^2 the device may be used for different-sized spokes. The same device may be used for either the inner or outer row of mortises of an ordinary hub by turning it to correspond with the slope or curve of the hub's surface and slant of the mortise into which it is to be inserted. When the spokes are driven home into the braces, the latter will, by their own shape and direction, bring the outer or felly ends of the spokes into line.

While I prefer the construction shown, it will be understood that the arms *f* may be secured to bands or an iron casing surrounding the hub. The action of the arms or jaws *f′* is improved, and a continuous engagement between the spoke and the parts *f′* f^3 for the full length of the latter is insured by slightly tapering the inner end of the spoke and the space between the jaws.

It will be understood that the socket E may be provided with an internal thread, into which the spoke may be screwed and by which it will be held.

The tire D is formed in a manner to engage the felly to prevent lateral displacement, as by a V-shaped rib *d*, Figs. 8 and 9, or by making the tire with a peripheral hollow, as at *d′*, Figs. 2 and 3.

Having thus described my invention, what I claim is—

1. The combination, with the felly and spoke, of a socket for the latter carrying a felly-supporter E′, situated at the joint between the felly-sections, fitting the inner side of the felly, and having the rigid pin e^5, provided with shoulders or projections adapted to engage said sections, substantially as set forth.

2. In a vehicle-wheel, the combination, with the felly-sections, of the felly-supporters E′, situated at the felly-joints and provided with pins e^5, and a tire fitted around said sections and having means, such as the rib *d*, by which the latter are engaged to prevent lateral displacement, whereby the felly-sections act intermediately between said supporters and the tire in a positive manner to keep the tire in line with said supporters and with the spokes, substantially as set forth.

3. The combination, with the spoke and the hub having a mortise, of a spoke-brace and hub-supporter having portions parallel with and engaging the sides of the spoke, arms at an angle thereto adapted to fit the hub, legs extending into the mortise, and portions f^2, upon which the end of the spoke is adapted to rest, substantially as set forth.

4. The combination, with the spoke and mortised hub, of a spoke-brace and hub-supporter having portions *f′*, acting as jaws to hold the spoke, arms *f*, adapted to engage the hub first at their outer ends, and legs f^3, connected by portions f^2, which engage the end of the spoke, substantially as set forth.

5. The herein-described spoke-brace and hub-supporter, comprising the jaws *f′* f^3 *f′* f^3, arms *f* *f*, and horizontal portions f^2 f^2, substantially as set forth.

6. The herein-described vehicle-wheel, consisting of the combination of the mortised hub, the spoke-braces fitting the mortises thereof, the spokes inserted between and held by the jaws of said braces, the sockets E, fitting the ends of said spokes and carrying the

felly-supporter E′, the felly, and a compressing-tire securing all of said parts, substantially as set forth.

7. The herein-described vehicle-wheel, having the supporter and socket E E′, engaging the felly on the inner side, and the tire D, having the V-shaped rib *d*, made sinuous, as shown, for engaging the outer side of the felly in such manner as to prevent splitting or lateral displacement of the latter, as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

ANSON K. STONE.

Witnesses:
LOOMIS F. IRISH,
ALBERT WALDRON.