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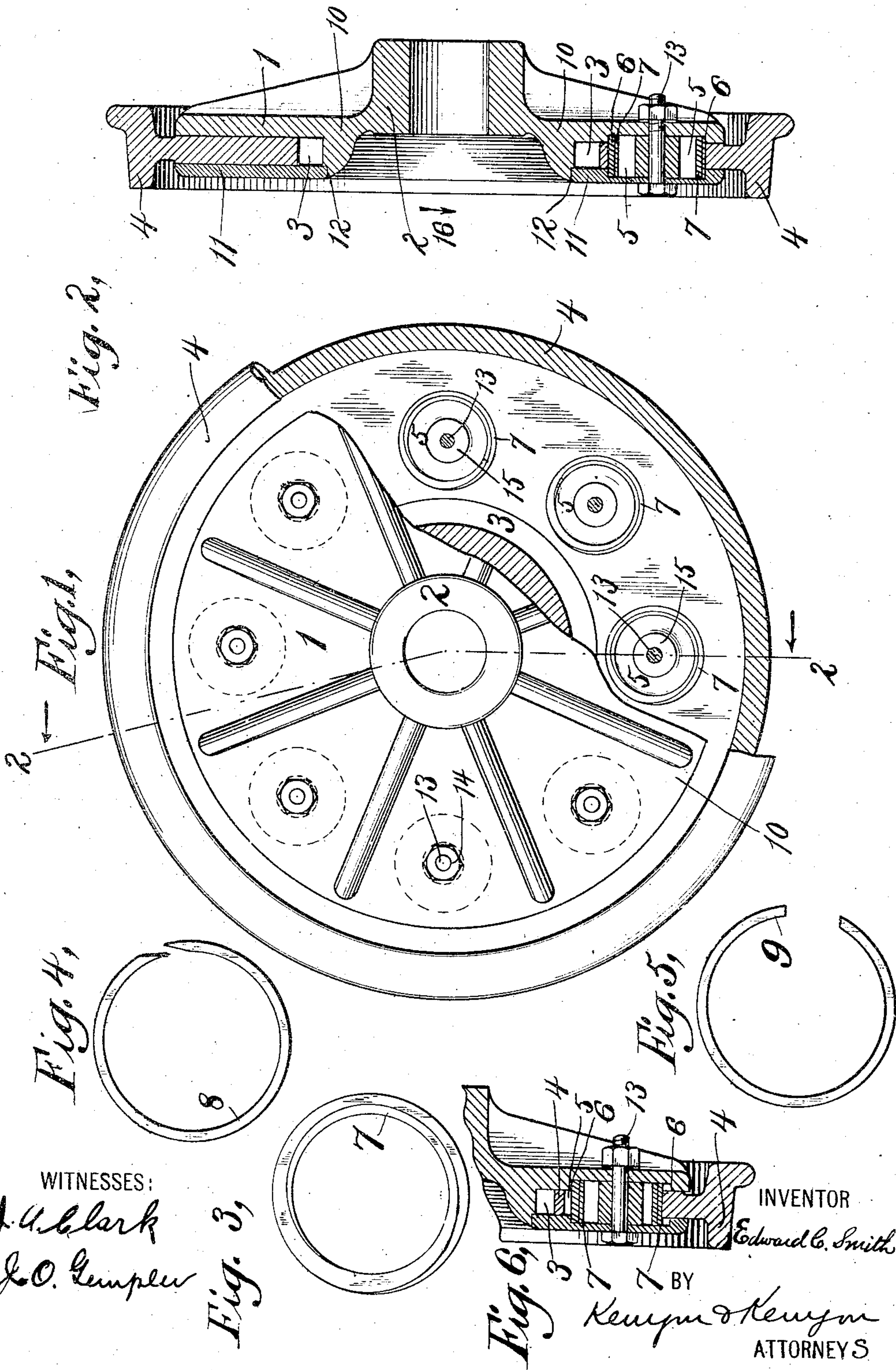
Patented Oct. 22, 1901.

E. C. SMITH.
SPRING RIMMED WHEEL.

(Application filed June 6, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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Fig. 3,

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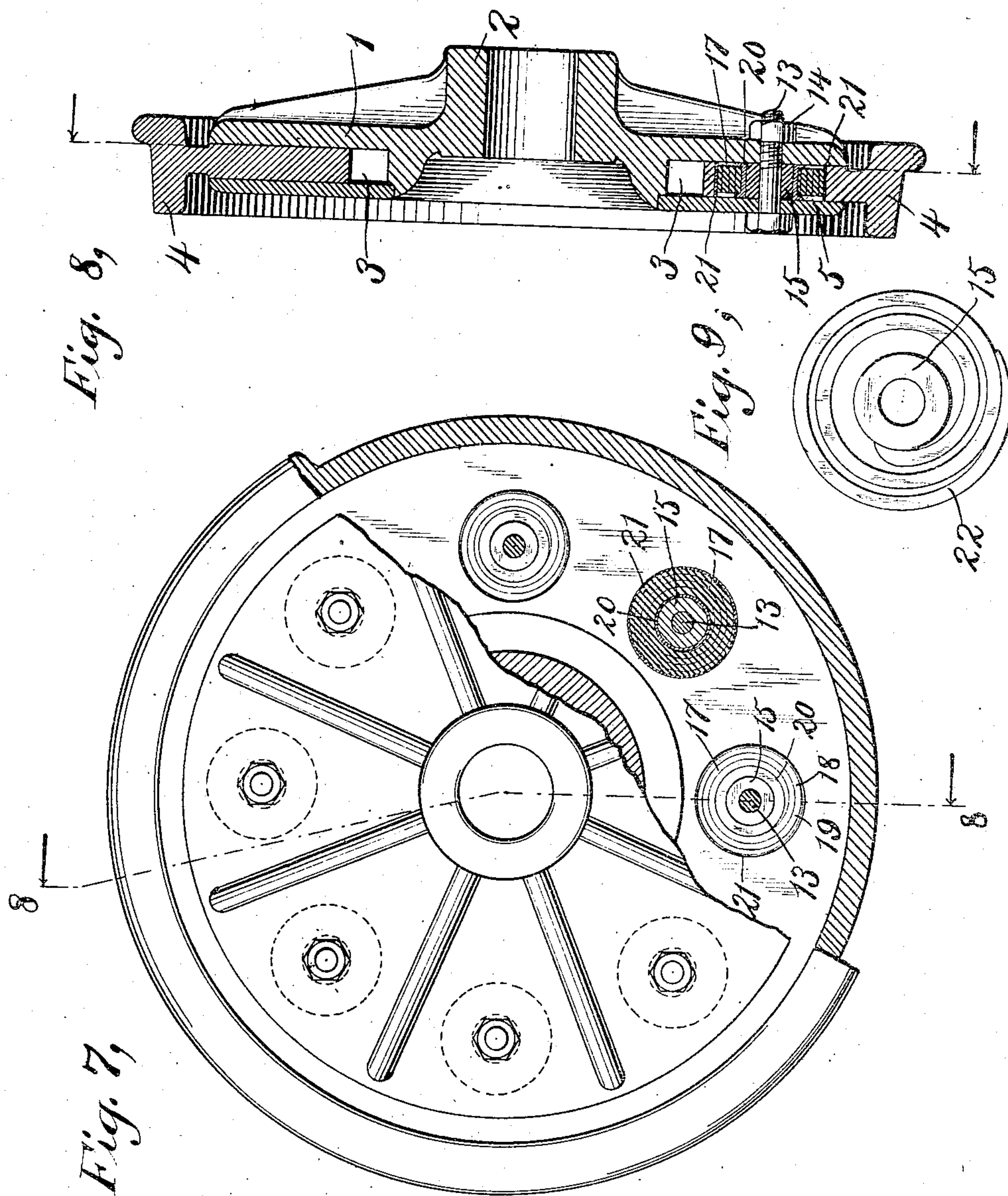
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No Model.)

3 Sheets—Sheet 2.



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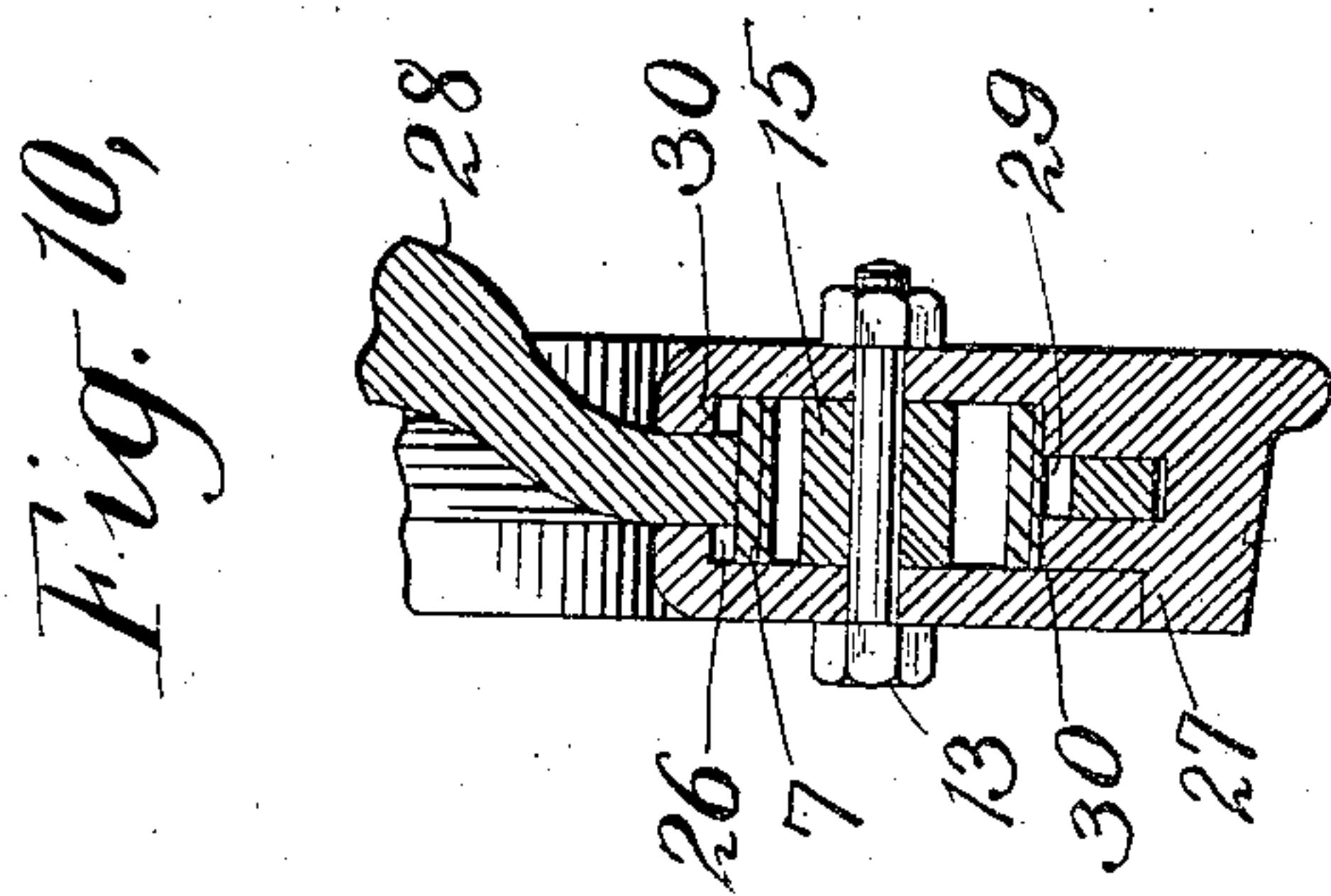
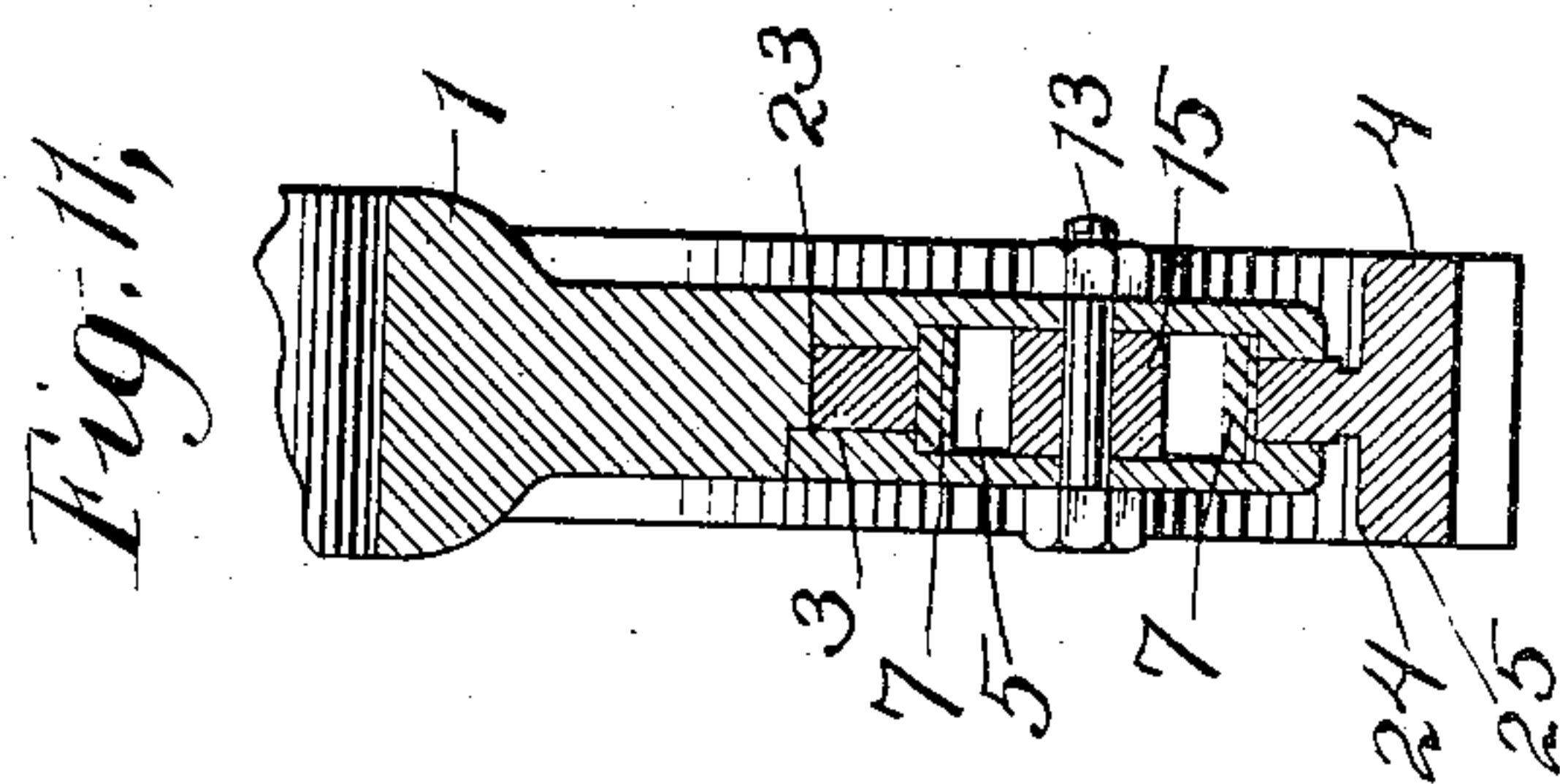
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

EDWARD C. SMITH, OF SCHENECTADY, NEW YORK, ASSIGNOR OF ONE-HALF
TO CHARLES WILKIN JEFFERSON, OF SCHENECTADY, NEW YORK.

SPRING-RIMMED WHEEL.

SPECIFICATION forming part of Letters Patent No. 685,229, dated October 22, 1901.

Application filed June 6, 1901. Serial No. 63,424. (No model.)

To all whom it may concern:

Be it known that I, EDWARD C. SMITH, a citizen of the United States, and a resident of the city and county of Schenectady, State of New York, have invented certain new and useful Improvements in Spring-Rimmed Wheels, of which the following is a specification.

My invention relates to that class of wheels in which the supporting part is made yielding to reduce vibrations or jarring.

The principal objects of my invention are to provide means whereby the central and peripheral portions of a wheel have elastic play relatively to each other either radially or circumferentially, or both, and also have such play well distributed and constantly changing.

My improvements consist in certain features and details and combinations of parts hereinafter described.

In the drawings, Figure 1 is a plan of a car-wheel embodying one form of my invention, but with a portion of one side of the outer casing or supporting member partly broken away to show the spring connections. Fig. 2 is a section of the same, taken on the line 2 2 of Fig. 1 and looking in the direction of the arrows in said figure. Figs. 3, 4, and 5 are details of different forms of spring connections. Fig. 6 is a fragmentary section showing the positions of the parts in the construction shown in Figs. 1 and 2 during the application of pressure downward on the hub. Fig. 7 is a similar view to Fig. 1 of a slightly-different embodiment of my invention. Fig. 8 is a section of the wheel shown in Fig. 7, taken on the line 8 8 of Fig. 7 and looking in the direction of the arrows in said figure. Fig. 9 is an edge view, enlarged, of a spiral spring which may be used in place of those shown in the other figures and the protecting-sleeve of one of the bolts. Fig. 10 is a similar view to Fig. 6, but showing a slight modification of my invention. Fig. 11 is a similar view to Fig. 6, but showing the application of my invention to a gear-wheel.

Similar numbers represent like parts in all the figures.

1 is the central member of the wheel, provided with the central hub 2 and an annular groove 3.

4 is the peripheral member, formed of a ring extending in the groove 3 and, as shown in the drawings, its outer edge or rim constituting the tread of a car-wheel. In the ring 4 is an annular series of circular transverse receptacles or holes 5.

Referring now to Figs. 1 and 2, the opposite walls of the groove 3 of the casing are provided with circular recesses corresponding in circumference with the holes 5 in the ring 4 and said recesses constituting circular shoulders 6, which are adapted to register with the walls of said holes.

7 represents buffers in the form of circular springs inserted, respectively, in the holes 5 and their opposite edges resting in the recesses and against the shoulders 6. The springs shown in Figs. 1, 2, and 3 are in the form of helices. In Fig. 4 the spring 8 is in the form of a broken ring, one end slightly overlapping the other, and in Fig. 5 the ring 9 is in the form of a broken ring with the two ends some distance apart.

The central member 1 is divided into two parts 10 and 11, as shown in Fig. 2, to enable the ring 4 to be inserted in the groove 3. The part 11 is in the form of a flat ring, its inner periphery fitting snugly over and resting in an annular recess 12 in the member 1 at the bottom of the groove 3. Bolts 13, passing through both parts 10 and 11 and through the middle of the springs 7 and secured by nuts 14, hold said parts 10 and 11 together. The ring 4 should fit just loosely enough in the groove 3 to permit free action of said ring in the groove, but not so as to permit lateral movement. Sleeves 15, surrounding, respectively, the bolts 13 and with their ends bearing upon the inner surfaces of the parts 10 and 11, serve as braces to prevent said parts from being drawn too much toward each other within the holes 5, and thus prevent free action of the springs. The bolts 13 and sleeves 15 are firmly attached to the member 1 and are practically rigid with and move with said member. They also serve as axes, around which the respective springs are contracted.

When my improved wheel is in use, the members 1 and 4 will have play relatively to each other. Pressure or weight upon the hub 2 toward the tread or the ground (by the axle

or otherwise) will tend to move the member 1 in such direction, the two sides of the groove 3 sliding in such direction over the inclosed portion of the member 4, and thus cause the same to advance in the opposite direction or toward the hub. This action will cause all the buffers or springs to contract radially or diametrically in planes parallel to the movement of the two members 1 and 4, that portion of the walls of the holes 5 exerting pressure against the outside of the springs forcing such portion of the springs away from their bearing-shoulders in the member 1, the remainder of the shoulders retaining and holding such springs, and the portion of said holes 5 and of the member 4 opposite to such bearing portions receding from the springs in the groove 3. For example, if the pressure on the hub 2 and member 1 be exerted vertically downward in the direction of the arrow 16, Fig. 2, the usual direction of such pressure, (or gravity,) the lower portion of the wall of each hole 5 below the spring 7 will force the adjacent portion of said spring upward and away from its bearing on the shoulders 6, the rest of the spring being retained by the opposite portions of the shoulders, thus contracting the spring, while the upper part of the holes 5 and adjacent parts of the ring or member 4 will recede from the springs. (See Fig. 6.) The usual pressure of a car or other vehicle on its axle and on the hubs of the wheels being that of gravity or vertically downward, the pressure on every spring of the wheel above described will be vertically upward, and as the wheel revolves such pressure on each and every spring will be constantly changing around its circumference on each successive point of the same, thereby causing a constantly-changing elastic play on that portion of the wheel near its perimeter or tread. When the pressure is relieved, the elasticity of the springs will return the parts to their normal positions.

In Figs. 7, 8, and 9 the springs 17 are in the form of elastic cushions and are preferably of alternate layers of rubber or similar elastic material 18 and cloth or other binding material 19. I also prefer to make the cushion 17 in the form of a spiral, the rubber and cloth being cemented or otherwise held together and wound around a central spool 20. A bushing or ferrule 21 surrounds the cushion 17, and said spool and bushing serve to take up the wear from the ring 4 and to guide the cushion in the groove 3. In the construction shown in Figs. 7, 8, and 9 the shoulders 6 are dispensed with, as the pressure-bearings of the cushions 17 are at their centers (instead of at their peripheries) and the pressure is upon the sleeves 15 and bolts 13, such bolts being practically an integral part of the casing 1. In Fig. 10 I have shown a spiral spring 22 with its inner end bearing upon the sleeve 15. This form of spring may be used with a casing, just above described, in which the contractile pressure of the spring comes

upon the sleeve 15 and bolt 13, or said spring 22 may be used with the casing having the shoulders 6, (shown in Figs. 1, 2, and 6,) in which case the contractile pressure of the spring comes upon said shoulders.

If the construction shown in Figs. 7, 8, and 9 be used, the bolts 13 and sleeves 15, moving with the casing 1, will in the lines of said movement cause the bolts and sleeves to come nearer the lower portions of the holes 5 in the ring 4, and thus depress the portion of the cushioned springs 17 between the walls of said holes and the sleeves 15. (See Fig. 9.) If springs of the form shown in Fig. 10 be used in the construction of wheel shown in Figs. 7 and 8, the action will be as just above described; but if such springs be used with the construction of wheel shown in Figs. 1 and 2 the action will be the same as that described with relation to such figures.

From the above it will be seen that the casing bearing the hub will always have an elastic yielding bearing and that jarring, jolting, and vibrations on the axle and through it to a vehicle will be reduced to a minimum.

When the construction shown in Figs. 1 to 7 is used on a gear-wheel, pulley, or similar wheels, or a flexible coupling, as shown in Fig. 11, the pressure of the spring 7 will not be radial or diametrical, but such pressure would be circumferential, the spring being compressed in a somewhat tangential line around its perimeter or circumference. In this case the two members 1 and 4 should have no radial play relatively to each other, but should be rigid radially and their relative play should be only circumferential, as otherwise the wheel would get out of gear or proper engagement. Such construction should therefore have either the inner perimeter 23 of the part 4 bearing upon the bottom of the groove 3, as shown in Fig. 11, or the shoulder 24 of the flange 25 of the member 4 bearing upon the outer edge of the member 1.

Fig. 10 is a similar view to Fig. 6, but showing the application of my invention in which the annular groove 26 is made in the peripheral member 27 of the wheel and with the perimeter of the central member 28 inclosed within said groove in said central member. In this case the action would be reversed to that shown and described in relation to Figs. 1 to 6. The movement of the two members in relation to each other would cause all the buffers or springs to contract radially or diametrically in planes parallel to the movement of the two members 27 and 28, that portion of the walls of the shoulders 30 exerting pressure against the outside of the springs forcing such portion of the springs away from their bearing on the holes 29 in the member 28, the opposite portion of the wall of said holes retaining and holding such springs and the adjacent portions of the shoulders 30 receding from the springs and the hole 29.

My invention in its broader aspects is not

limited to the precise construction shown and described nor to the precise construction by which it may be carried into effect, as many changes other than those suggested may be made therein without departing from the main principles of my invention or sacrificing its chief advantages.

What I claim as new, and desire to secure by Letters Patent, is—

1. A wheel constructed of a central member and an outer or peripheral member, and said members being movable relatively to each other, one of said members being provided with transverse receptacles, a series of buffing devices retained in said receptacles, and the walls of the receptacles preventing radial displacement of said buffing devices, and the buffing devices also bearing upon the other member, whereby said members may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery of the wheel.
2. A wheel composed of a central member and a peripheral member having a series of transverse receptacles, and buffing devices retained in said receptacles, and the walls of the receptacles preventing radial displacement of said buffing devices, and the buffing devices also bearing upon said central member, whereby the said central member and peripheral member may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery of the tread of the wheel, and constantly changing as the wheel revolves.
3. A wheel constructed of a central member and an outer or peripheral member, and said members being movable relatively to each other, one of said members being provided with transverse holes having continuous walls, a series of springs retained in said transverse holes and entirely surrounded by the walls of the same, and said springs also bearing upon a part of the other member, whereby said members may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery of the wheel.
4. A wheel constructed of a central member and an outer or peripheral member, and said members being movable relatively to each other, one of said members being provided with transverse holes having continuous walls, a series of circular springs retained in said transverse holes and entirely surrounded by the walls of the same, and said springs also bearing upon a part of the other member, whereby said members may have elastic play relatively to each other, and also whereby said elastic play or pressure will be near the periphery of the wheel.
5. A wheel constructed of a central member and an outer or peripheral member, and said members being movable relatively to each other, one of said members being provided with transverse holes having continuous walls, an annular series of springs re-

tained in said transverse holes and entirely surrounded by the walls of the same, and said springs also bearing upon a part of the other member, whereby said members may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery of the wheel.

6. A wheel composed of a central member and a peripheral member having a series of circular transverse holes, and springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, whereby the said supporting member and peripheral member may have elastic play relatively with each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing, as the wheel revolves.

7. In a wheel, the combination of a supporting member for an axle, a movable ring bearing the tread and provided with a series of circular transverse holes, and springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, whereby the said supporting member and ring may have elastic play relatively with each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing, as the wheel revolves.

8. In a wheel, the combination of a supporting member for an axle, a movable ring bearing the tread and provided with an annular series of circular transverse holes, and springs inclosed within said holes and bearing upon the walls of the same, and their peripheries also bearing upon shoulders in said support, whereby the said supporting member and ring may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing, as the wheel revolves.

9. In a wheel, the combination of a supporting member having a central hub and a peripheral annular groove, a movable ring resting in said groove, and provided with an annular series of circular transverse holes, springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, whereby the said supporting member and ring may have elastic play relatively with each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing.

10. In a wheel, the combination of a supporting member having a central hub and a peripheral annular groove, a movable ring resting in said groove and provided with an annular series of circular transverse holes, circular springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, whereby the said supporting member and ring may have elastic play relatively

with each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing.

5 11. In a wheel, the combination of a supporting member having a central hub and a peripheral annular groove, a movable ring resting in said groove and provided with an annular series of circular transverse holes, 10 ring-shaped springs inclosed within said holes and bearing upon the walls of the same, and also bearing upon a part of said supporting member, whereby the said supporting member and ring may have elastic play relatively 15 to each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing.

12. In a wheel, the combination of a supporting member having a central hub and a 20 peripheral annular groove, a movable ring resting in said groove and provided with an annular series of circular holes, springs inclosed within said holes and bearing upon the walls of the same, and their peripheries 25 also bearing upon shoulders in said support, whereby the said supporting member and ring may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery or tread 30 of the wheel and constantly changing.

13. In a wheel, the combination of a supporting member having a central hub and a peripheral annular groove, a movable ring resting in said groove and provided with an 35 annular series of circular transverse holes, springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, and said member divided into two parts in- 40 closing said annular groove between them, and means for removably connecting said parts, whereby said ring may be inserted in said groove, and whereby said supporting member and ring may have elastic play rela- 45 tively to each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing.

14. In a wheel, the combination of a sup- 50 porting member having a central hub and a peripheral annular groove, a movable ring resting in said groove and provided with an annular series of circular transverse holes, springs inclosed within said holes and bear- 55 ing upon the walls of the same and also bearing upon a part of said supporting member, and said member divided into two parts inclosing said annular groove between them, and screw-bolts for removably connecting 60 said parts, whereby said ring may be inserted in said groove, and whereby said supporting member and ring may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the pe- 65 riphery or tread of the wheel and constantly changing.

15. In a wheel, the combination of a sup-

porting member having a central hub and a peripheral annular groove, a movable ring resting in said groove and provided with an 70 annular series of circular transverse holes, springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, and said member divided into two parts in- 75 closing said annular groove between them, and screw-bolts for removably connecting said parts and said bolts surrounded by a sleeve in said groove, whereby said ring may be inserted in said groove, and whereby said 80 supporting member and ring may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and constantly changing. 85

16. In a wheel, the combination of a supporting member having a central hub and a peripheral annular groove, a movable ring resting in said groove and provided with an annular series of circular transverse holes, 90 springs inclosed within said holes and bearing upon the walls of the same and also bearing upon a part of said supporting member, and said member divided into two parts in- 95 closing said annular groove between them, and screw-bolts for removably connecting said parts and said bolts surrounded by a sleeve in said groove, and said sleeve having a length slightly greater than the width of the groove, whereby said ring may be in- 100 serted in said groove, and whereby said supporting member and ring may have elastic play relatively to each other, and also whereby such elastic play or pressure will be near the periphery or tread of the wheel and con- 105 stantly changing.

17. A wheel constructed of a central member and an outer or peripheral member, one of said members being provided with trans- 110 verse receptacles, a series of buffing devices retained in said receptacles, and the buffing devices also bearing upon the other member and arranged to cushion the circumferential movement only of the members relatively to 115 each other, whereby said members have a rigid connection radially but have elastic play relatively to each other circumferentially.

18. A wheel constructed of a central member and an outer or peripheral member, one of said members being provided with trans- 120 verse receptacles, a series of buffing devices retained in said receptacles, and the walls of the receptacles preventing radial displacement of said buffing devices, and the buffing devices also bearing upon the other member, 125 and arranged to cushion the circumferential movement only of the members relatively to each other, whereby said members have a rigid connection radially but have elastic play 130 relatively to each other circumferentially.

19. A wheel composed of a central member and a peripheral member movable relatively to each other, portions projecting from said members and said portions almost entirely

overlapping the other member to render the connection between the members firm and strong without interfering with their relative movability, buffing devices interposed between said members, whereby said members may have elastic play relatively to each other, and also whereby such play may be completely and accurately guided, and great strength of the wheel be attained.

10 20. A wheel composed of a central member and a peripheral member movable relatively to each other, portions projecting from said members and said portions almost entirely overlapping the other member to render the

15 connection between the members firm and

strong without interfering with relative movability and springs interposed between said members, whereby said members may have elastic play relatively to each other, and also whereby such play may be completely and accurately guided, and great strength of the wheel be attained.

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

EDWARD C. SMITH.

Witnesses:

ALLAN H. JACKSON,
ROBERT J. LANDON.