

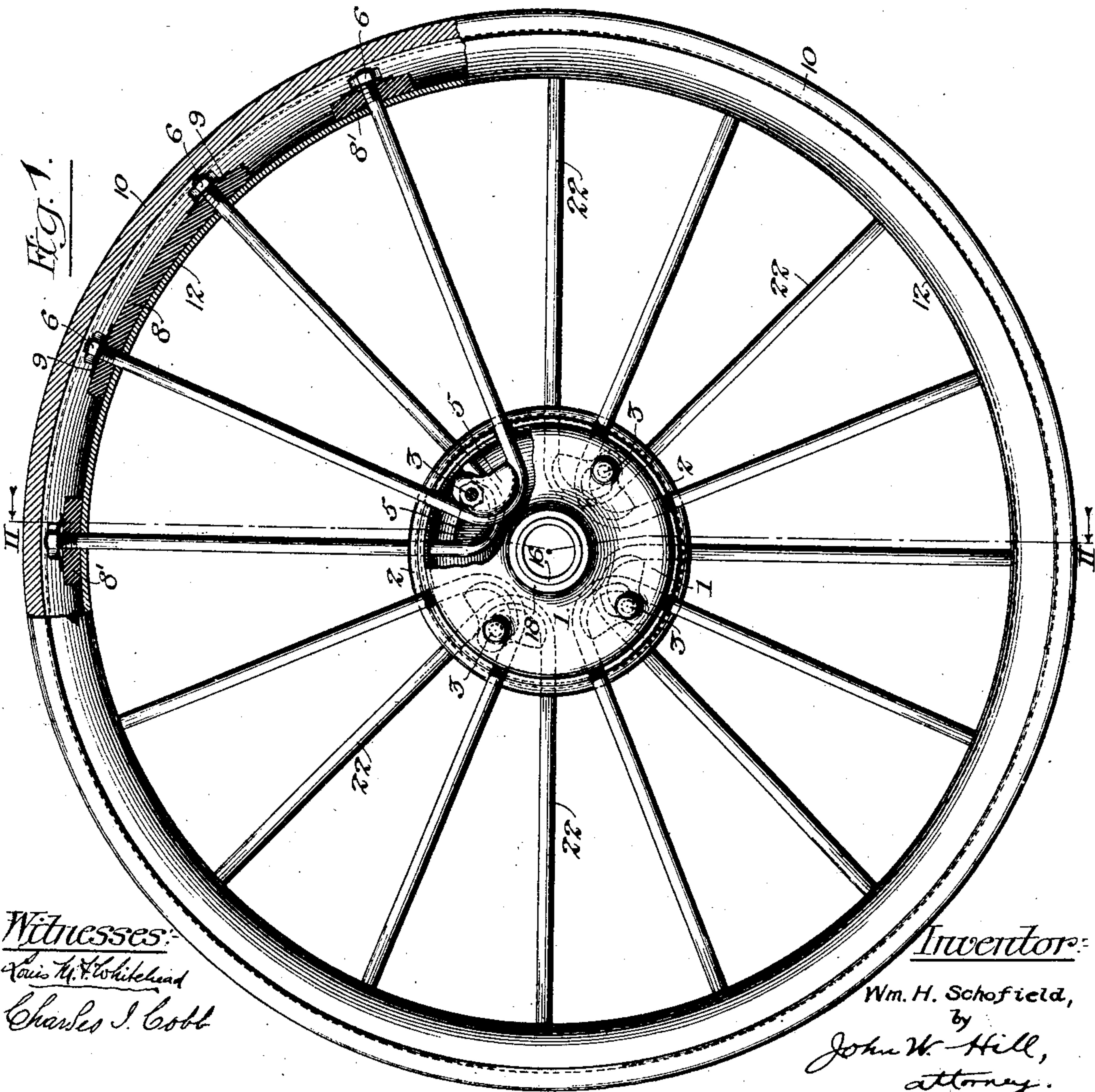
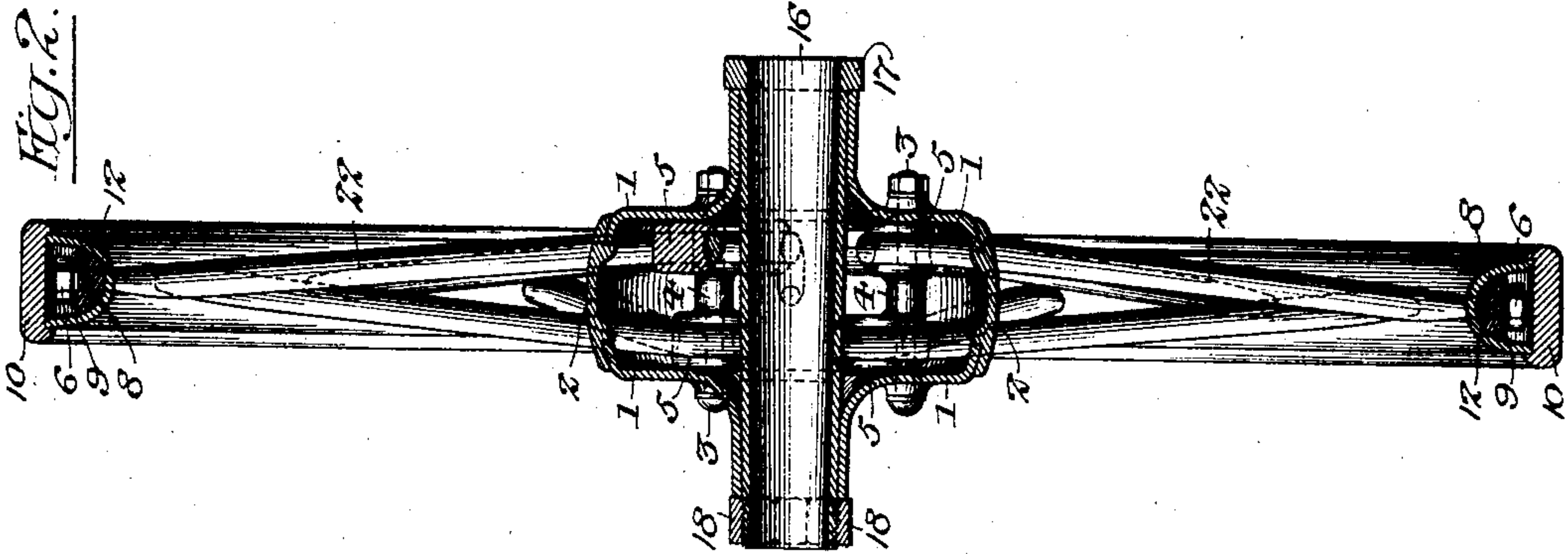
No. 779,877.

PATENTED JAN. 10, 1905.

W. H. SCHOFIELD.
VEHICLE WHEEL.

APPLICATION FILED NOV. 2, 1903.

5 SHEETS—SHEET 1.



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Charles J. Cobb

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5 SHEETS—SHEET 2.

Fig. 3.

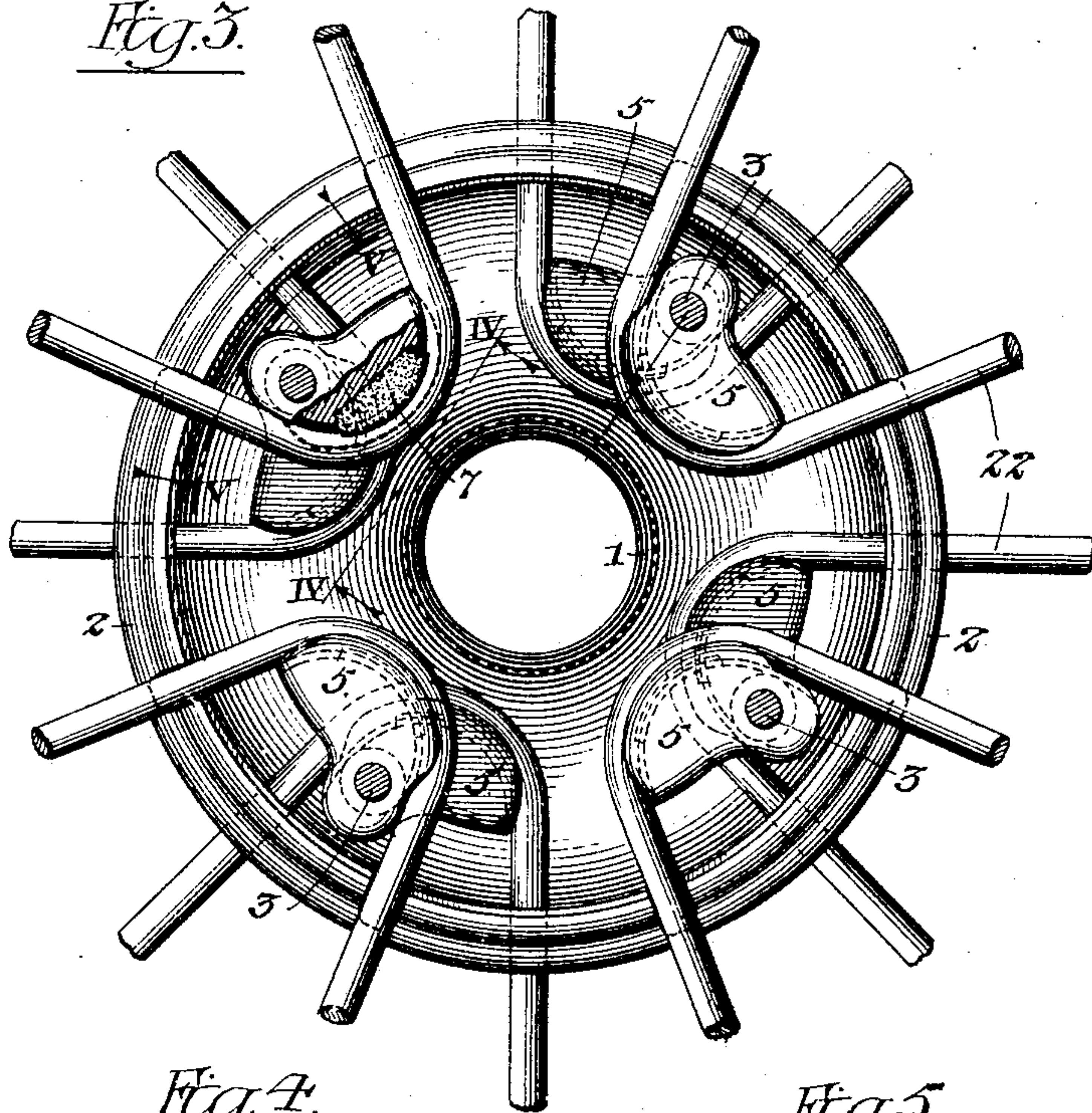


Fig. 4.

Fig. 5.

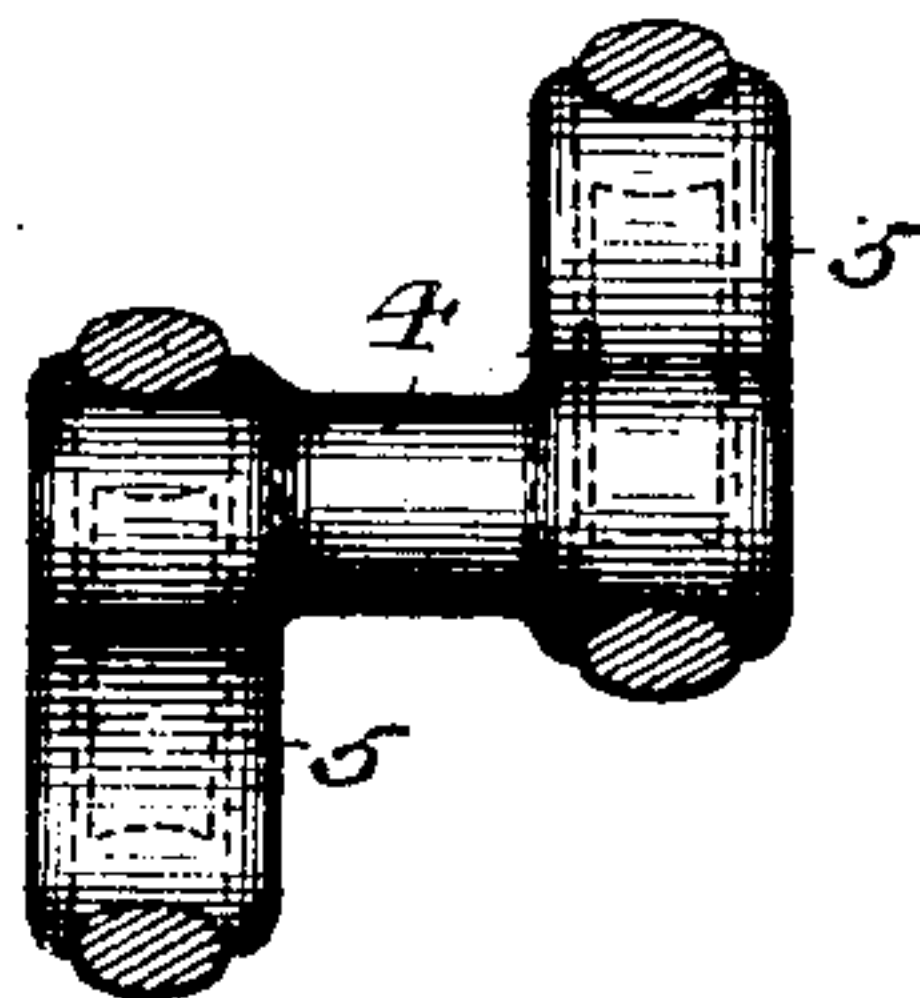
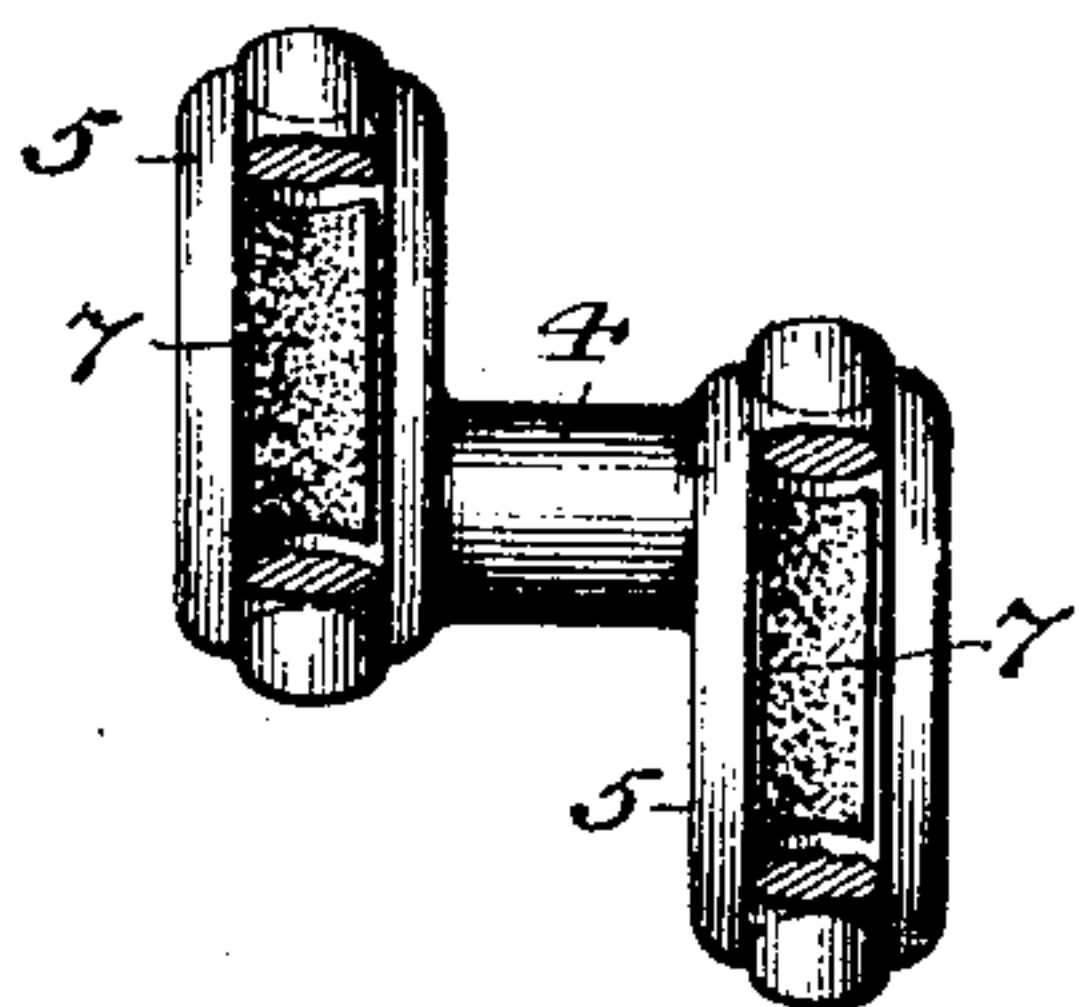
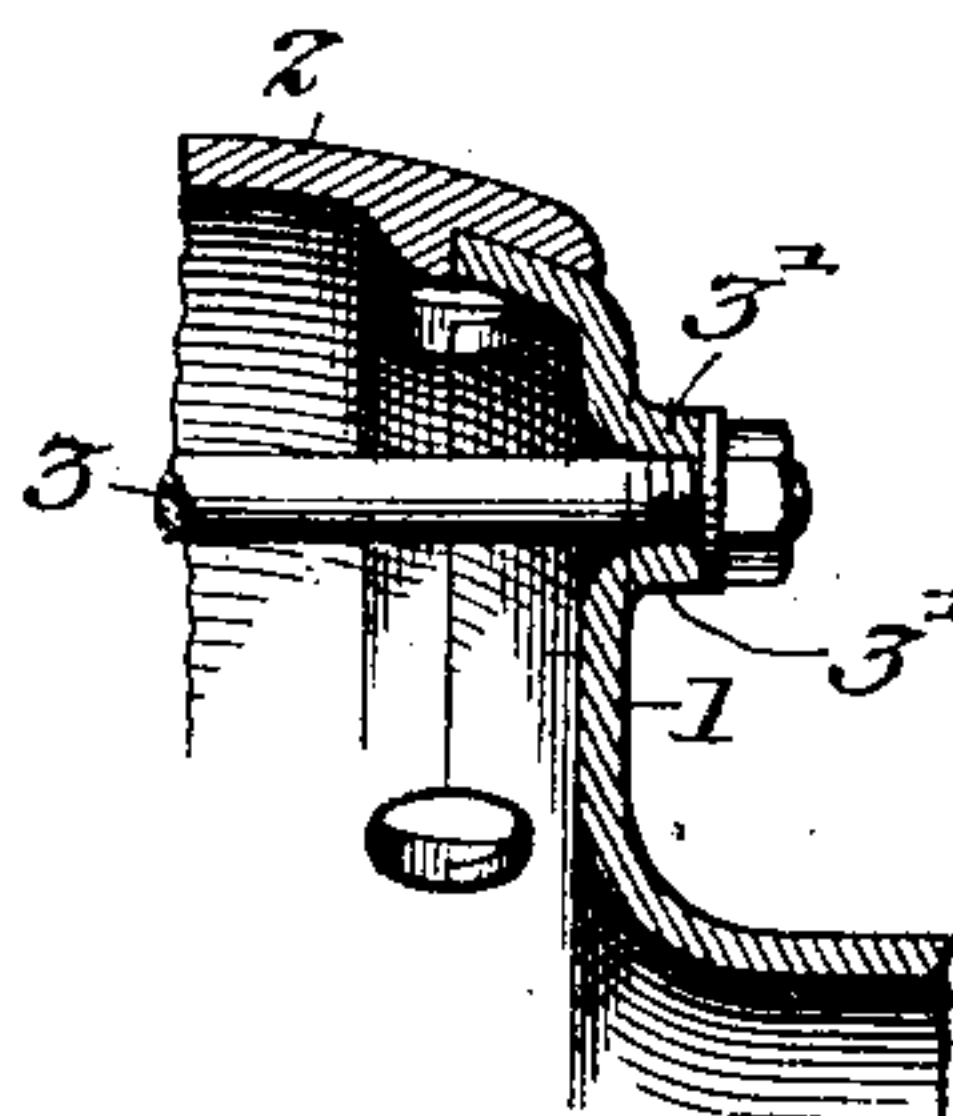
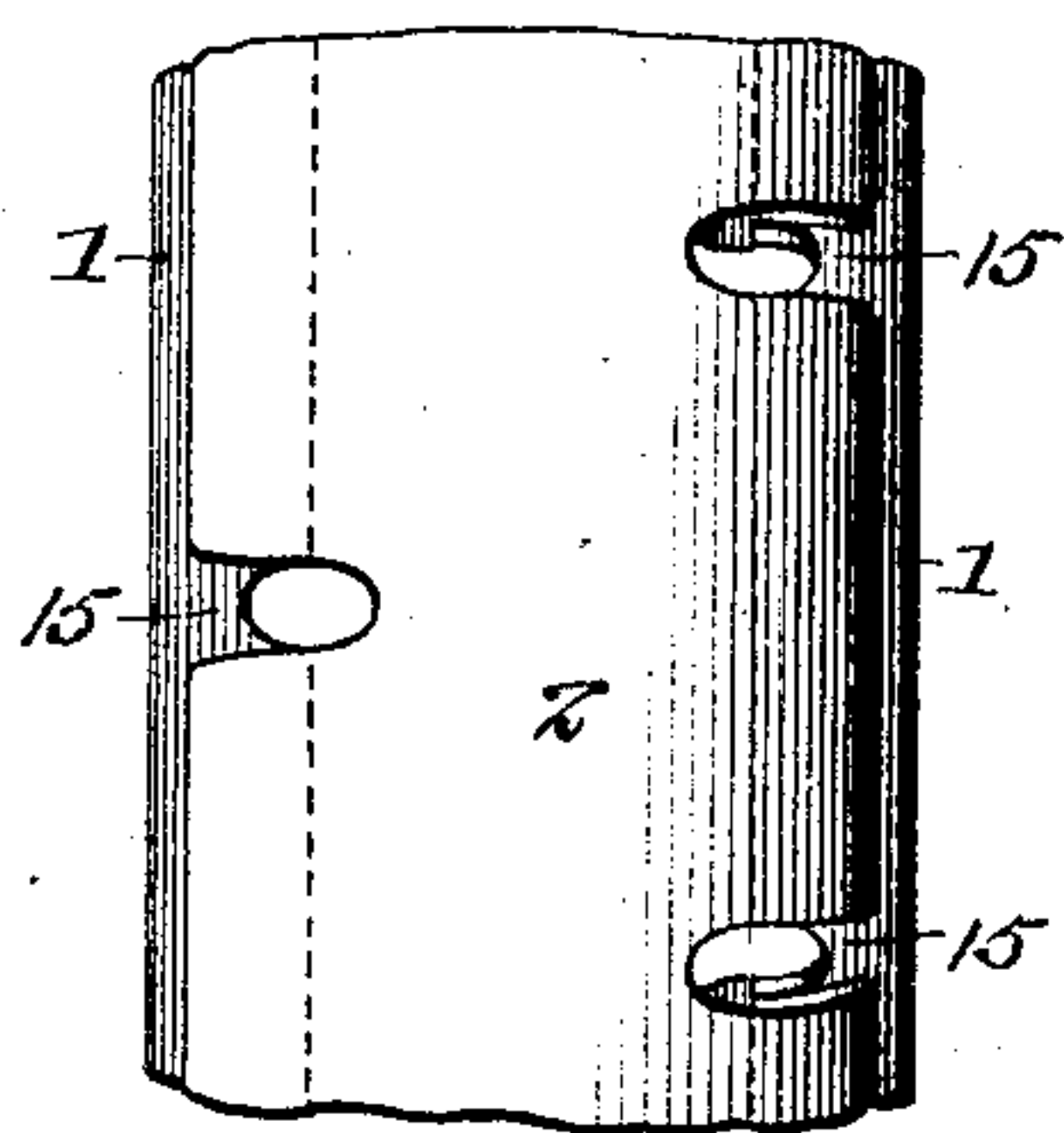


Fig. 6.

Fig. 7.



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5 SHEETS—SHEET 3.

Fig. 8.

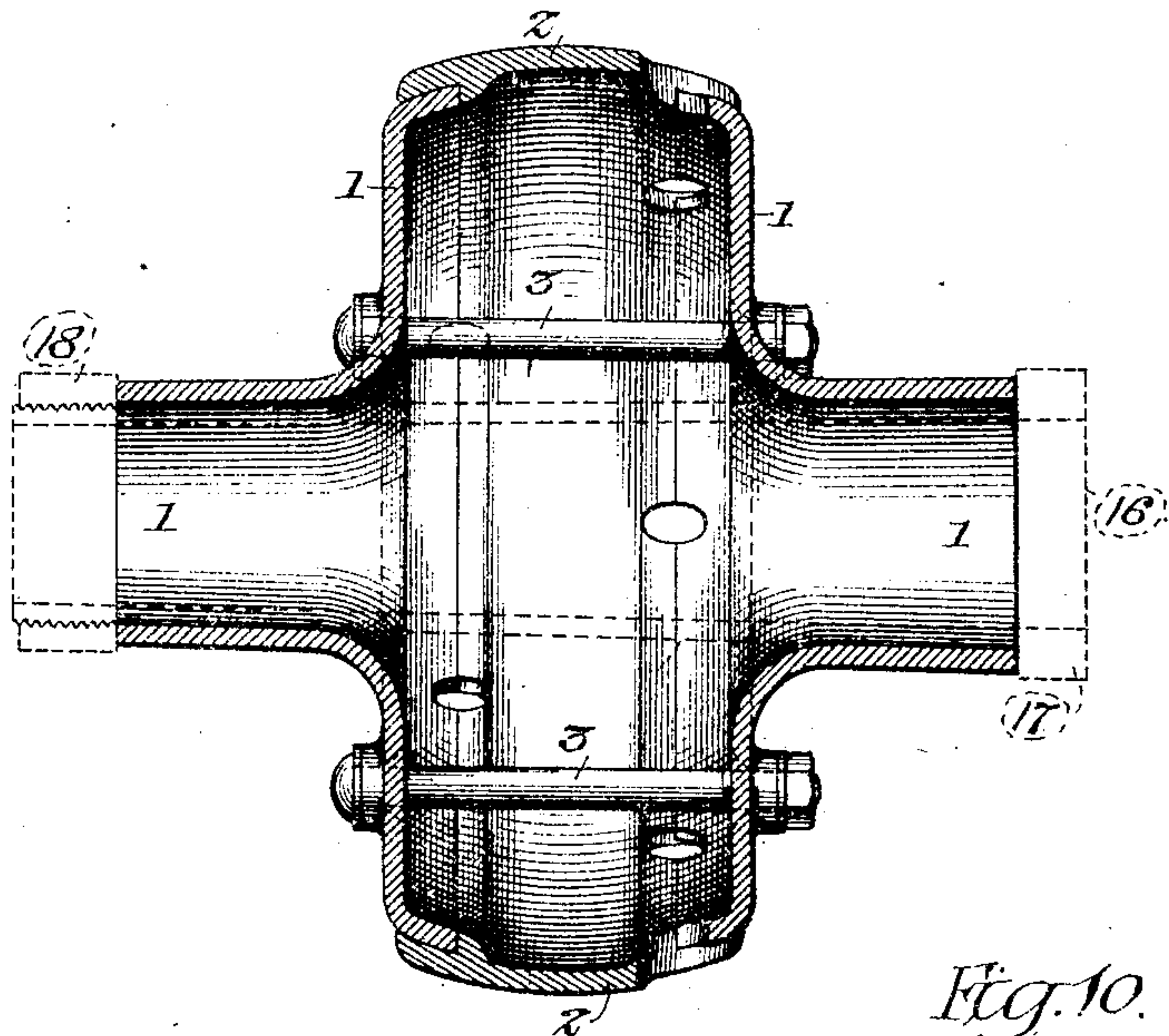


Fig. 10.

Fig. 9.

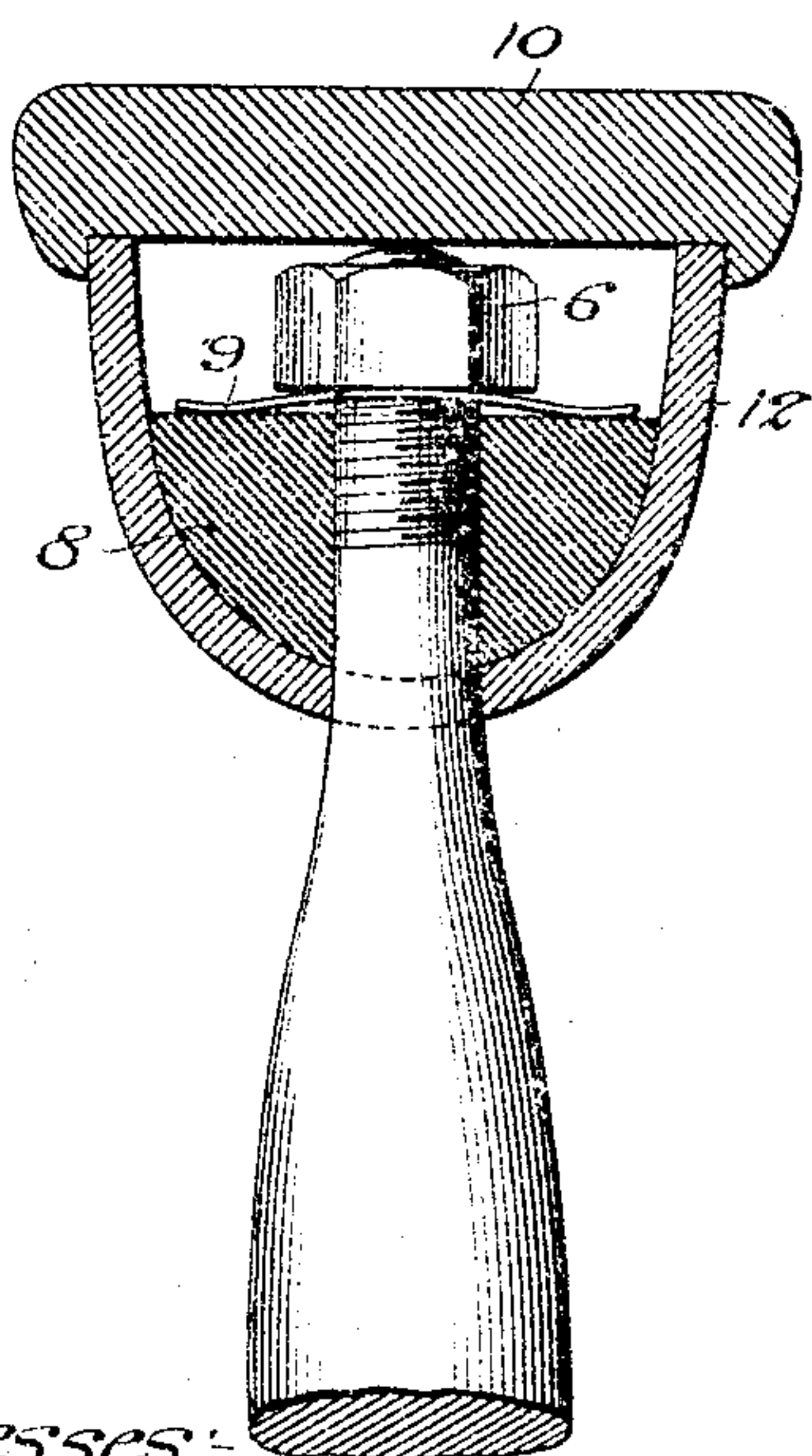
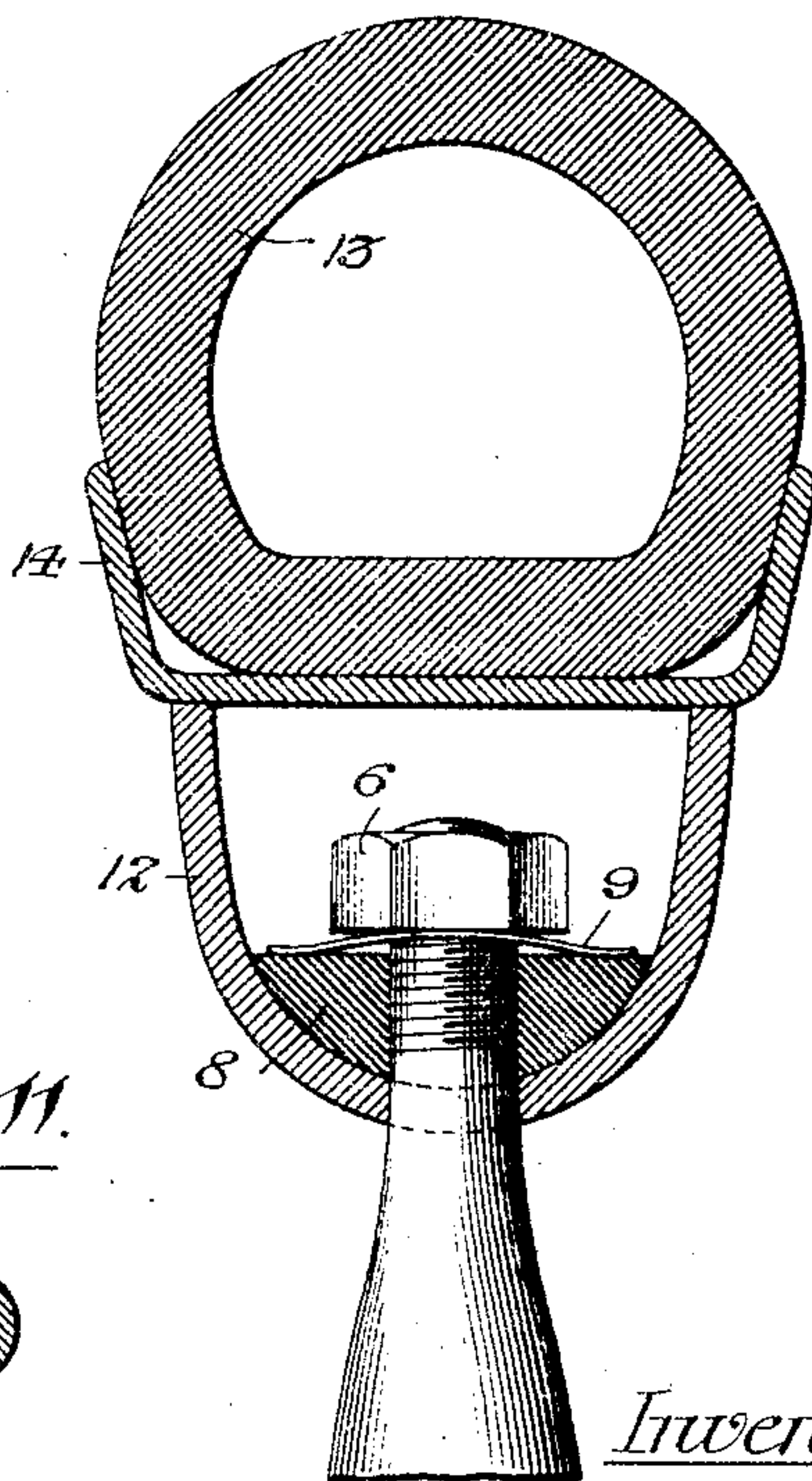


Fig. 11.



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5 SHEETS—SHEET 4.

Fig. 13.

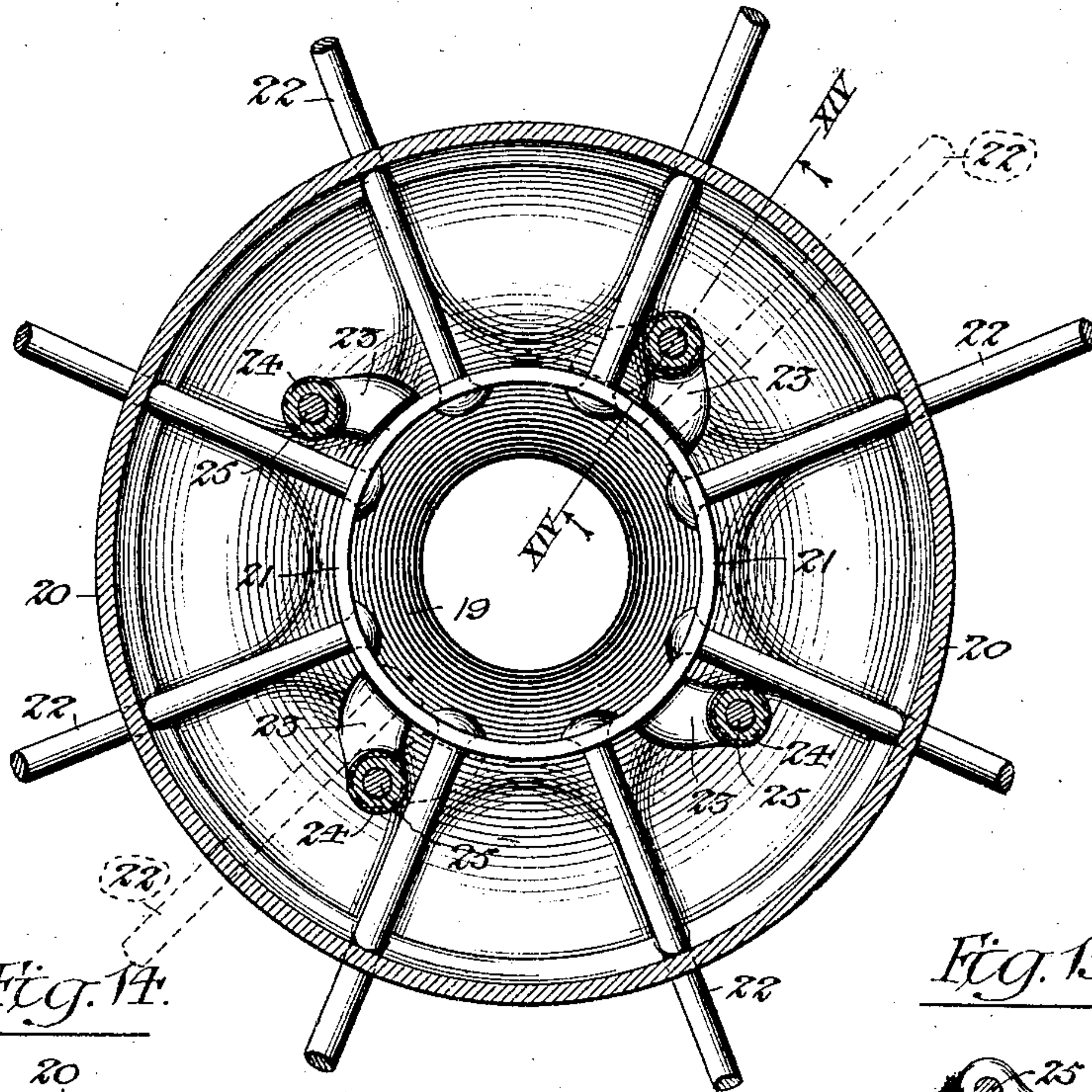


Fig. 14.

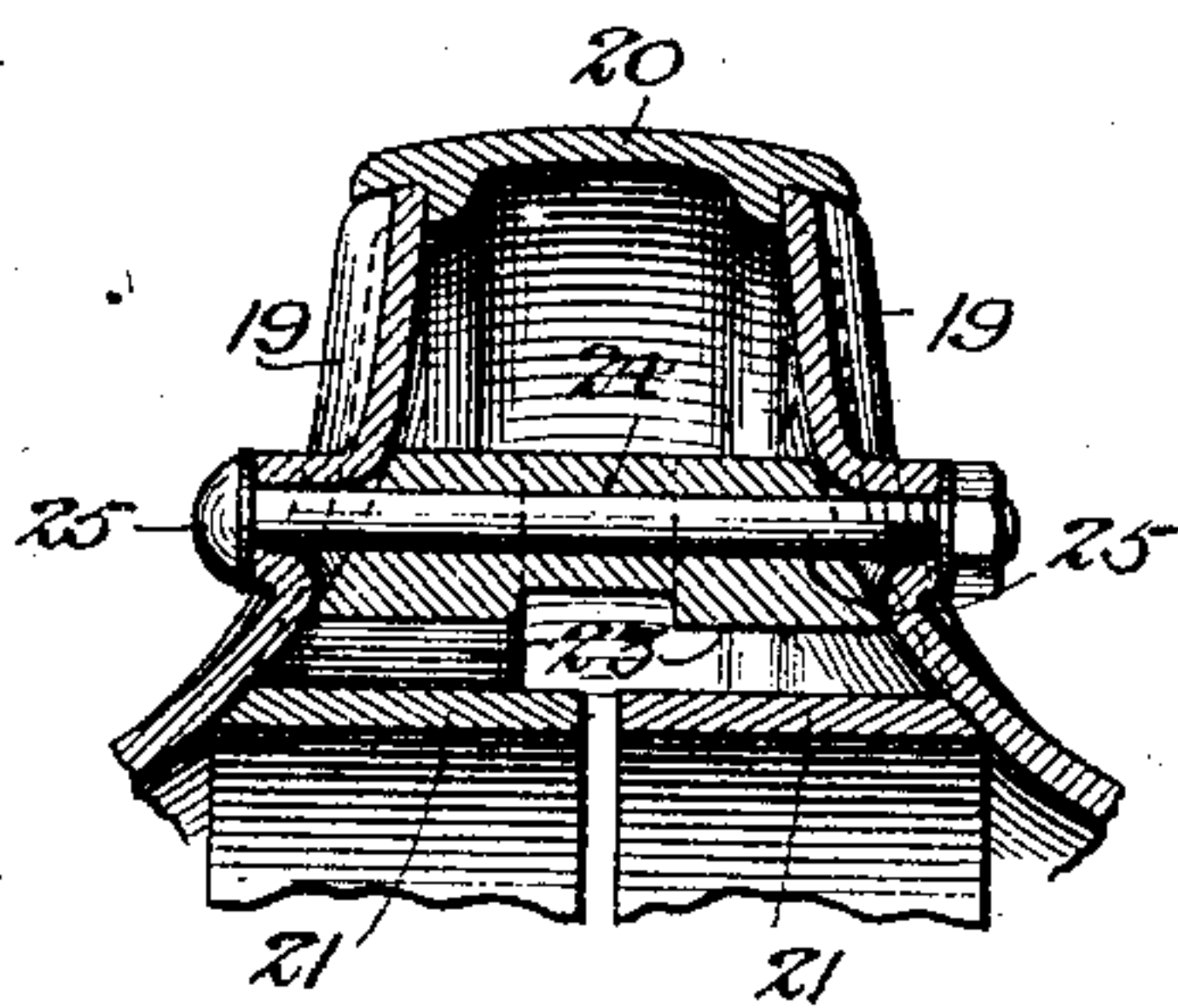


Fig. 15.

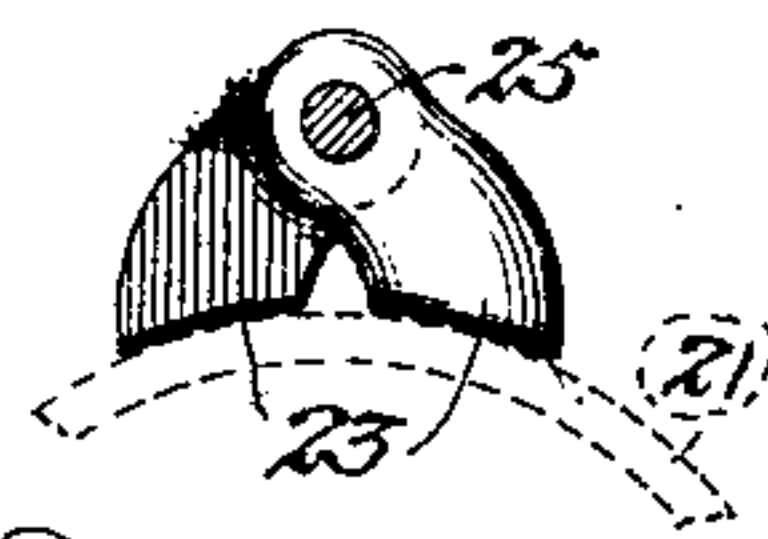


Fig. 12.

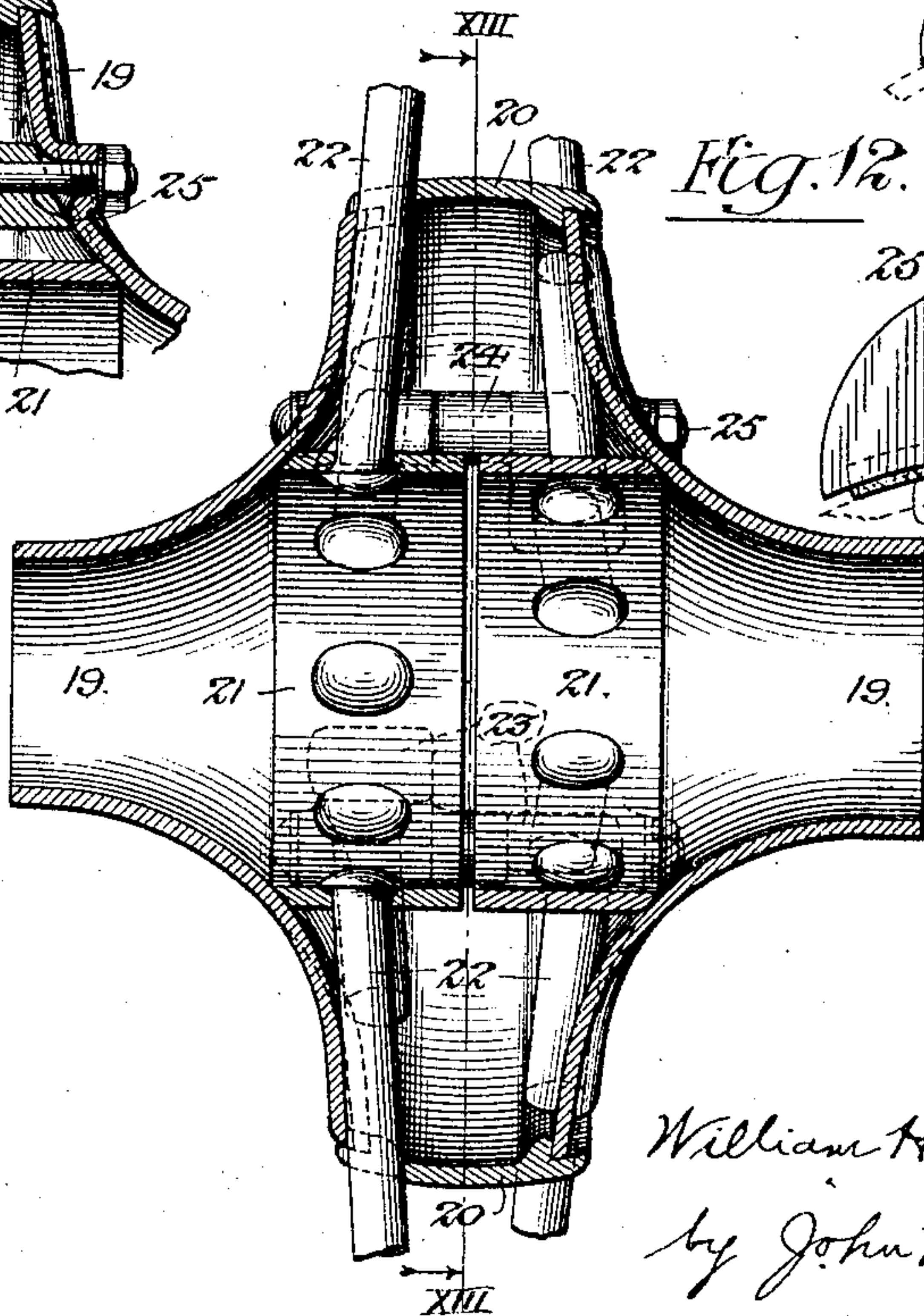
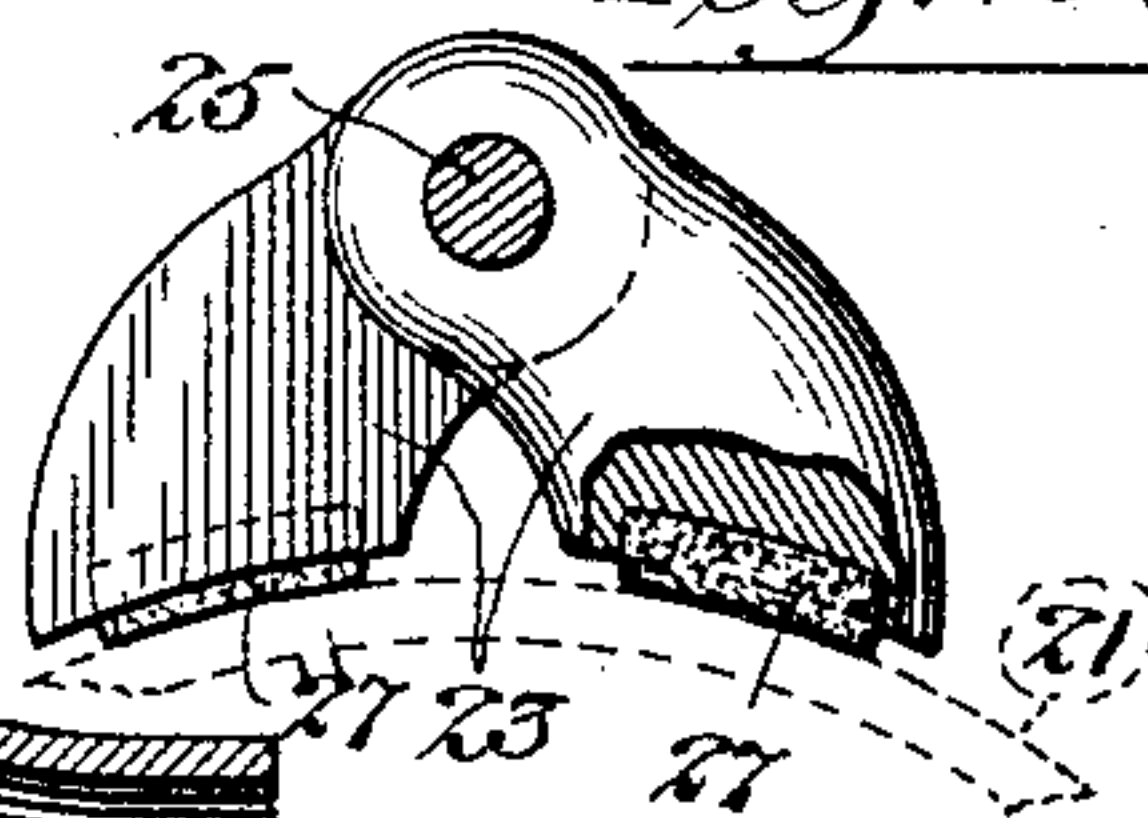


Fig. 16.



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5 SHEETS—SHEET 5.

Fig. 20.

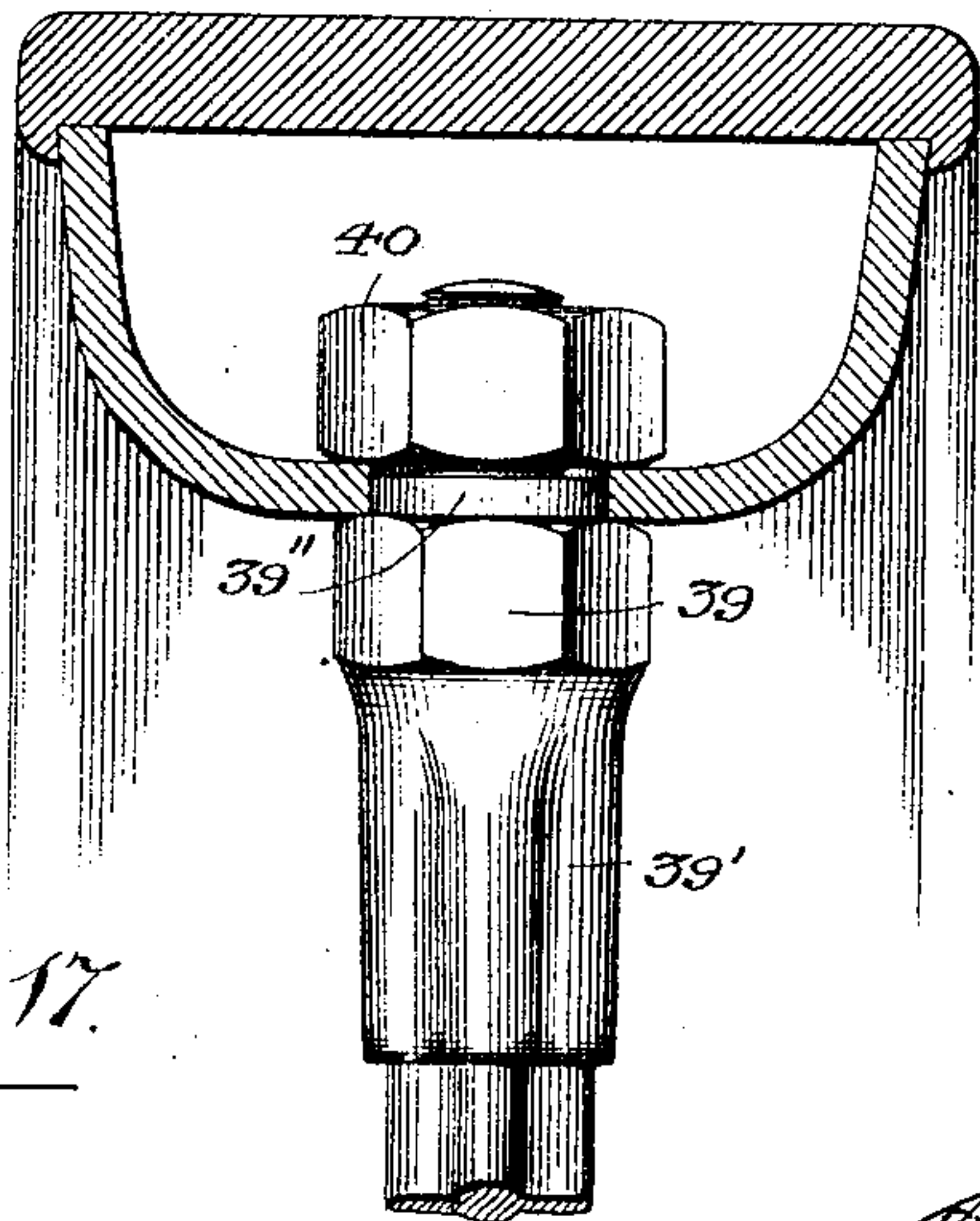


Fig. 17.

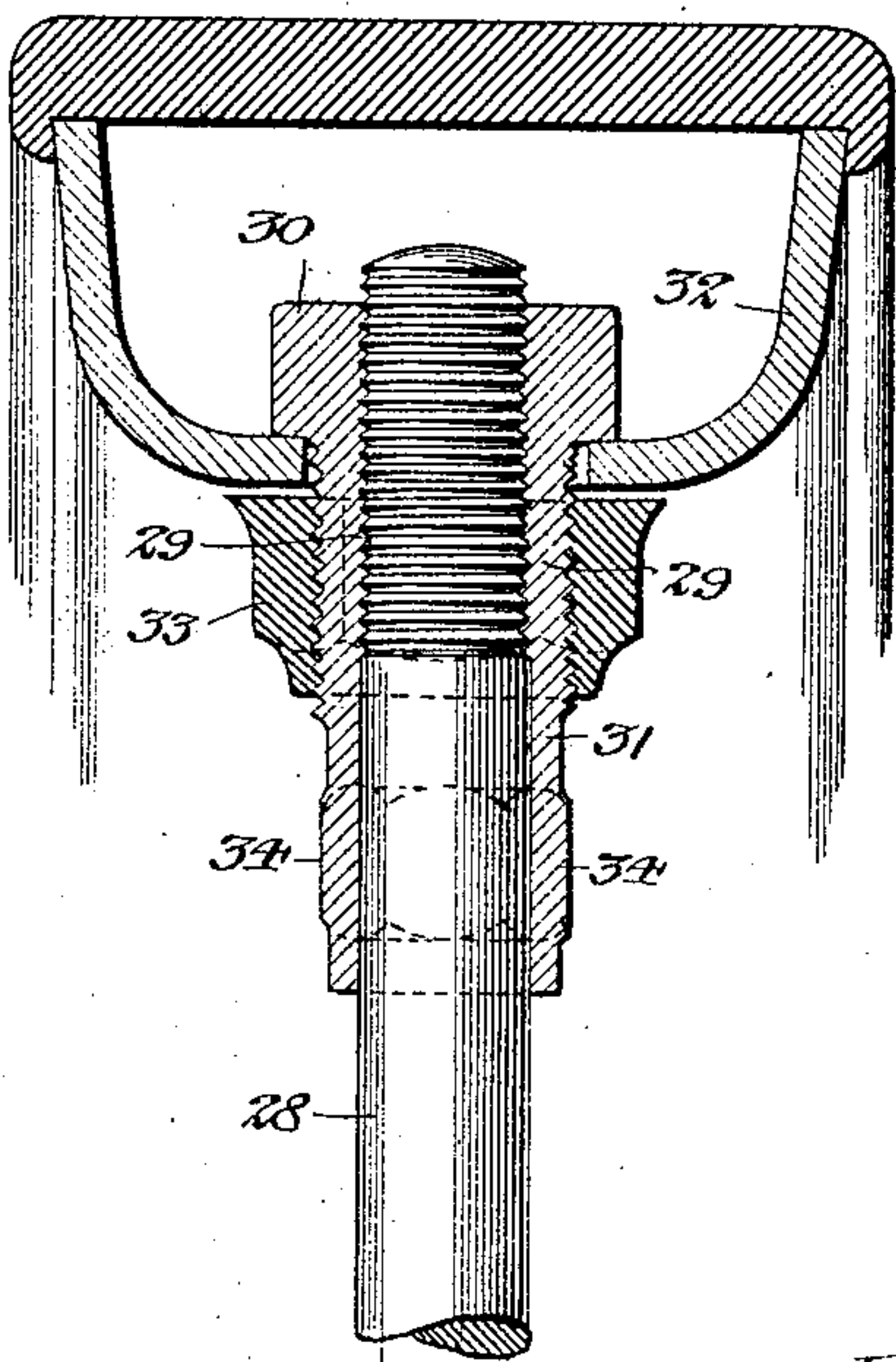


Fig. 19.

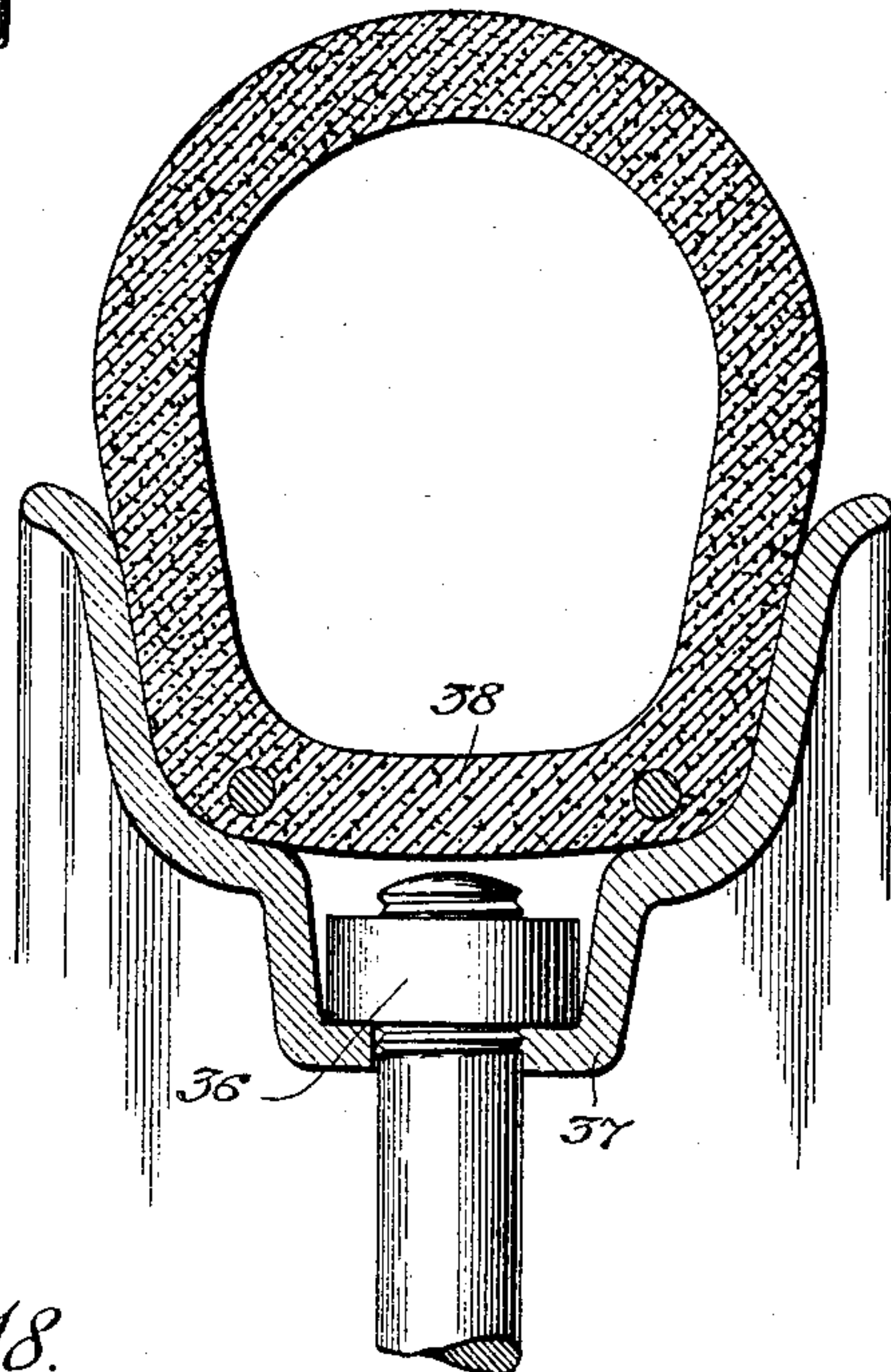
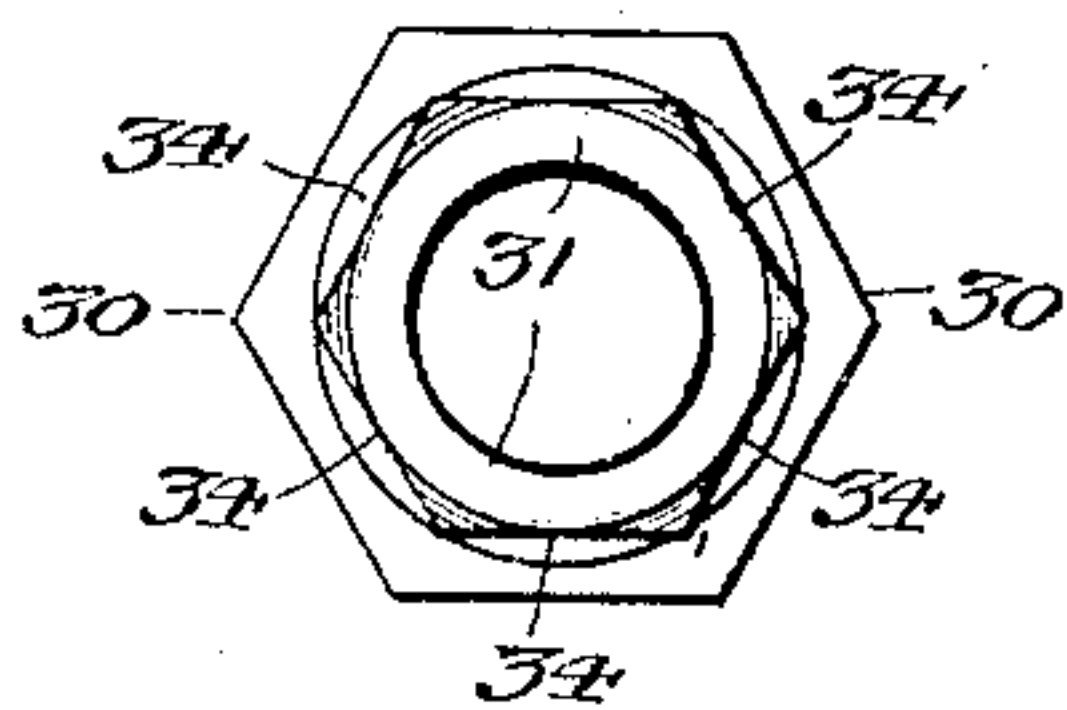


Fig. 18.



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UNITED STATES PATENT OFFICE.

WILLIAM H. SCHOFIELD, OF CHICAGO, ILLINOIS.

VEHICLE-WHEEL.

SPECIFICATION forming part of Letters Patent No. 779,877, dated January 10, 1905.

Application filed November 2, 1903. Serial No. 179,523.

To all whom it may concern:

Be it known that I, WILLIAM H. SCHOFIELD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vehicle-Wheels, of which the following is a description.

The object of my invention is to produce a wheel that will combine in the highest degree the qualities of strength, symmetry, endurance, resiliency, and finish.

With this object in view my invention consists in the novel construction, combination, and arrangement of parts, as hereinafter described and claimed.

Reference is now made to the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of a vehicle-wheel and its hub constructed in accordance with my invention. Fig. 2 is a section of the same, taken in line II II of Fig. 1. Fig. 3 is an enlarged detail view showing the interior of the hub and the preferred means for connecting the V-shaped spokes thereto. Fig. 4 illustrates the inner ends or bent portions of two of the spokes looking in the direction of arrows IV IV in Fig. 3, a portion of each spoke being broken out to expose the cushion-blocks. Fig. 5 is a section taken on line V V of Fig. 3. Fig. 6 is a detail view of a portion of the periphery of the hub, the spokes being omitted. Fig. 7 illustrates in section the swaging of the bolt-holes in one of the lateral hub members. Fig. 8 is an enlarged diametrical section of the hub without the spoke-saddles. Fig. 9 illustrates a grooved metallic rim containing a cushion for the spokes and provided with a flat metallic tire. Fig. 10 illustrates a rim adapted to receive a rubber cushion or pneumatic tire and a section of such a tire. Fig. 11 shows the preferred sectional form of the spokes. Fig. 12 is a diametrical section of a modified hub adapted for straight single spokes. Fig. 13 is a section of the same on line XIII XIII of Fig. 12. Fig. 14 is a detail view taken on line XIV XIV of Fig. 13. Fig. 15 is an end view of one of the pairs of lugs shown in Fig. 13. Fig. 16 shows cush-

ions or pads applied to the same lugs. Fig. 17 is an enlarged sectional view of my improved spoke-adjusting device. Fig. 18 is an end view of the small end of the sleeve-nut shown in Fig. 17. Fig. 19 is a sectional view of a special rim with cushion-tire. Fig. 20 shows my sleeve-lock-nut as applied to an irregularly-shaped tensioned spoke with the rim in section.

Referring now to Figs. 1 and 2, it will be observed that the hub of this wheel is composed primarily of two lateral or side members 1 1 and a ring 2, which is held securely between the outer edges of the side members. The latter are secured together preferably with bolts 3, though rivets may be employed for that purpose. Mounted on each bolt 3 is a sleeve 4, and each sleeve is preferably formed or provided with two spoke-saddles 5, which are shown detached in Figs. 4 and 5 and in position in Figs. 1 and 3. These saddles extend in substantially opposite directions from the sleeve. They are also placed in proximity to the ends of the sleeve to permit the maximum degree of bracing of the spokes, and hence the greatest lateral stiffness of the wheel.

Each spoke is formed from a metal rod, preferably of elliptical cross-section or that shown in Fig. 11, the rod being bent into a substantially V shape and its ends drawn out and threaded to receive nuts or taps 6.

The curved inner faces of the saddles 5, around which the spokes pass, are suitably concaved or grooved to form seats for the spokes, or, as a modification or improvement, the saddles may be provided with sockets or equivalent means for the same purpose in order to receive blocks 7, of rubber or similar material, (see Fig. 3,) the purpose of such blocks being to provide somewhat yielding or elastic connections between the spokes and hub when the wheel is subjected to any extraordinary jar and to maintain a continuous yielding tension upon the spokes and to prevent wear at points of contact due to vibrations of the wheel.

It is also desirable to provide a resilient rim or felly, or, to be more exact, a resilient connection between the spokes and a suitable

rim or felly, and this I accomplish by seating in the concave or groove of the rim 12 a ring, as 8, through which the spokes pass, the ring forming a bearing for the nuts 6 on the spokes, or instead of a continuous ring of such material short sections thereof, as 8', may be employed—for example, one under each nut, as shown in Fig. 1. A spring-washer, as 9, may be, if desired, placed under each nut for preventing the nuts from sinking into or cutting the cushions or cushion-ring.

A convex-concave spring-washer, such as are shown in the drawings, would be preferred to a rigid or flat washer, as the former would act as a nut-lock to prevent the nut from working loose on the spoke. In Figs. 9 and 10 the nuts are supposed to be untightened.

As shown in Figs. 1, 2, and 9, a special flanged steel tire 10 may be mounted directly on the rim or felly 12, this form of tire being adapted for wagon or truck wheels. Cushion or pneumatic tires, as 13 in Fig. 10, may be applied to the same rim 12 by providing a suitable seat for the tire—as, for example, by securing thereto an outer supplemental rim, as 14.

In order to prevent shearing or shearing strain of the hub-bolts 3, I prefer to shape the hub members outwardly around the bolt-holes, as clearly shown at 3', Fig. 7. The bearing of the hub members upon the bolts is thus removed a short distance from the ends of the sleeves 4 and shearing thereby prevented. Equivalent means may be employed for the same purpose, if desired.

The openings which are formed in the middle ring 2 of the hub may be in the shape of open slots, as 15, instead of being elliptical. (See Fig. 6.)

Referring to Fig. 2, 16 is a skein or spindle-boxing, on one end of which is an annular flange 17, adapted to bear against one of the hub members 1. The opposite end of the skein is threaded to receive a ring nut or collar 18, which when tightened up serves to hold the skein in position and also forms an outside support for the hub member 1. Any preferred means may be employed for locking the nut 18 in its adjusted position.

Some of the advantages not already mentioned of the wheel and hub construction hereinafter described are the tensile stress upon adjacent spokes is equalized, (through the intermediacy of the saddles and their connecting-sleeves,) the wheel possesses the greatest strength in proportion to its weight, and the adjustment of tension of any of the spokes at the rim or felly will be automatically transmitted to the hub and imparted to the counterbalancing-spoke through the hub connections described. The application of extra tension to any spoke transmits an equal degree of tension to the adjacent counterbalancing-spoke, as will

be readily understood. It is to be noted that these combined sleeves and spoke-saddles 5 are not made integral with the hub members as they are in my United States Patent No. 659,861, issued October 16, 1900. The absence of these parts from the hub members will simplify the forming of the hub members from sheet-steel, which process I much prefer to that of casting.

It will further be observed that the construction of this wheel is based on the suspension principle, the weight applied to the axle being sustained by the tensile strength of the spoke, whereas the wheel described in my aforesaid patent is a "compression-wheel."

Figs. 12, 13, and 14 illustrate a modified form of suspension-wheel, in which straight spokes are employed, which instead of being bent around saddles 5 are headed on their inner ends and passed through one or more inner rings, which are attached indirectly to the lateral hub members.

In the drawings, 19 19 designate the lateral hub members; 20, the outer hub-ring; 21, the inner hub ring or rings, and 22 the straight spokes, which pass through the outer ring 20 in staggered relation, as shown in Fig. 12. The inner rings 21 are held in position by double lugs or pairs of lugs 23, each pair being formed on a sleeve 24, and through each sleeve is passed a bolt or rivet 25. These bolts or rivets not only hold the sleeves 24 in position, but draw the lateral hub members 19 tightly together upon the hub-ring 20.

My reason for preferring to employ two inner hub-rings 21 instead of one ring is that it is cheaper to manufacture hubs of different lengths with two such rings than it would be to manufacture integral rings of different widths.

I may provide resilient connections between the spokes and the hub by, for example, the device shown in Fig. 16. As shown, pads 27, of rubber or such like material, may be inserted in the faces of the lugs 23 for the purpose named above. Other and equivalent means might be substituted for the pads.

As an independent improvement I have devised a means by which the spoke may be tightened or slackened at the felly without removing the tire or disturbing any portion of the felly. This device is shown complete in Fig. 17, Fig. 18 being an end view of the sleeve-nut detached. The end of the spoke 28 is threaded, either "right" or "left" hand, and the spoke-hole in the felly is made larger than the spoke to receive the sleeve portion 29 of a sleeve-nut 30 31, which is turned onto the spoke before the tire is applied to the felly, and preferably has a head 30, which engages the groove in the felly 32. Before the insertion of the spoke into the felly a jam-nut 33 has been placed upon the spoke. The sleeve portion of the nut 30 31 is externally threaded

at 29 for the reception of this jam-nut. Flat faces 34 are formed upon the sleeve-nut near its inner end, so that the tension of the spoke may be finally adjusted after the tire has been set. Before the tire is applied, however, the spoke may be drawn to the proper tension, and after the final adjustment of the sleeve-nut the jam-nut 33 should be run up tightly against the felly. The faced portion 34 of the sleeve-nut must be small enough to pass through the jam-nut, as shown.

Fig. 19 shows in transverse section a steel rim known as the "drop-center" style, which is especially adapted for pneumatic or cushion tires. This rim may be embodied in my improved wheel in the form shown in Fig. 19, and a pad or cushion for the nut may be dispensed with, as the rubber tire provides an adequate degree of resiliency.

It may be desirable to provide spoke-nuts engaging the inner side of the felly for the purpose of preventing any slipping inwardly of the felly along the spokes at the bottom of the wheel when the wheel is heavily loaded and subjected to an extraordinary shock.

In Fig. 20 I illustrate such a nut as applied to a spoke of non-circular cross-section. The end of the spoke is rounded and threaded to receive this nut 39 and the usual tensioning-nut 40. Nut 39 is made with a sleeve portion 39', which is adapted to be crimped around the spoke, as shown, and also with an outer extension 39'', which protects the spoke-threads from the edges of the hole in the felly.

After the wheel is trued and the outer nuts 40 finally adjusted the ends of the spokes may be upset or other means employed for accomplishing the same purpose—that of holding the parts in their adjusted positions. The sleeve-nuts 39 are then turned up tight against the felly and are held in that position by having their sleeve portions 39' crimped inwardly to fit the non-circular portions of the spokes, for example, as shown in Fig. 20.

In the claims by the phrase "outer side (or face) of the felly" I wish to be understood as meaning the side or face nearest the tire, and by the phrase "inner side (or face) of the felly" I wish to be understood as meaning the side or face nearest the hub. This explanation is made necessary by the concavity of the felly being directed outwardly, on account of which the words "inner" and "outer" with reference thereto might be misunderstood. The explanation of the words "inner" and "outer" will apply to the spoke-nuts 39 and 6, respectively.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a vehicle-wheel a pair of substantially V-shaped spokes, in combination with a pair of equalizing devices which are embodied in the hub and which form connecting means be-

tween said spokes and the hub; substantially as described.

2. In a vehicle-wheel a plurality of pairs of substantially V-shaped spokes, in combination with a hub containing a plurality of pairs of connected equalizing-saddles which form connecting means between said spokes and the hub; substantially as described.

3. In a vehicle-wheel a hub comprising two lateral members, bolts connecting the same, and pairs of oppositely-extending spoke-saddles mounted on the bolts, in combination with a plurality of "hair-pin" spokes the bends of which are engaged by said saddles; substantially as described.

4. In a vehicle-wheel a hub the inclosing shell of which is composed of two lateral members and a spacing-ring, bolts connecting said members, and pairs of oppositely-extending connected spoke-saddles mounted on the bolts, in combination with "hair-pin" spokes the bends of which are engaged by the saddles; substantially as described.

5. In a vehicle-wheel a hub provided with pairs of connected spoke-saddles, in combination with pairs of "hair-pin" spokes the bends of which pass around the saddles, cushions between the spoke-bends and the saddles, a felly, nuts on the spoke ends, and cushioning material arranged between said nuts and the felly; substantially as described.

6. In a vehicle-wheel a hub provided with pairs of connected spoke-saddles, in combination with pairs of "hair-pin" spokes the bends of which engage said saddles, cushions between the spoke-bends and the saddles, and means for securing the outer ends of the spokes to the felly; substantially as described.

7. In a vehicle-wheel a hub comprising two lateral members, bolts connecting the same, and sleeves mounted on the bolts and each provided with oppositely-extending spoke-saddles, in combination with substantially V-shaped spokes bent around the saddles, whereby the tension and stress upon adjacent spokes are balanced; substantially as described.

8. In a vehicle-wheel a hub having two lateral members, bolts connecting the same, and sleeves forming strengthening and spacing means between said members, said sleeves being provided with pairs of oppositely-extending spoke-saddles, in combination with "hair-pin" spokes bent around said saddles, whereby the tension and stress upon adjacent spokes is balanced; substantially as described.

9. A vehicle-wheel comprising a grooved rim substantially V-shaped spokes, means for tightening the spokes at the rim, a hub provided with two connected lateral members, bolts, pairs of oppositely-extending spoke-saddles mounted on the bolts, the bends of the spokes passing around said saddles, whereby the tension and stress upon adjacent spokes are equalized; substantially as described.

10. A vehicle-wheel comprising a rim of U-shaped section, substantially V-shaped spokes, means for tightening the spokes at the rim, cushioning material between said tightening
5 means and the rim, and a hub which includes bolts, pairs of oppositely-extending spoke-saddles mounted thereon, the bent portions of the spokes being engaged by said saddles, and cushioning material between the last-
10 named elements; substantially as described.

11. In a wheel-hub, a pair of hub-shells, means for drawing them together, and a plurality of sleeves each forming a solid connection between the hub-shells, said sleeves being
15 provided with devices for engaging spokes of the wheel; substantially as described.

12. In a wheel-hub, a plurality of similar sleeves each provided with two projections

which extend from opposite ends thereof, said projections extending in substantially opposite directions and being adapted to engage spokes of the wheel; substantially as described. 20

13. In a wheel-hub, a plurality of similar sleeves each provided with two projections which extend in substantially opposite directions, each of said projections being adapted to engage a spoke of the wheel, and means for securing the sleeves in position within the hub; substantially as described. 25

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses. 30

WILLIAM H. SCHOFIELD.

Witnesses:

K. M. IMBODEN,
CHARLES I. COBB.