

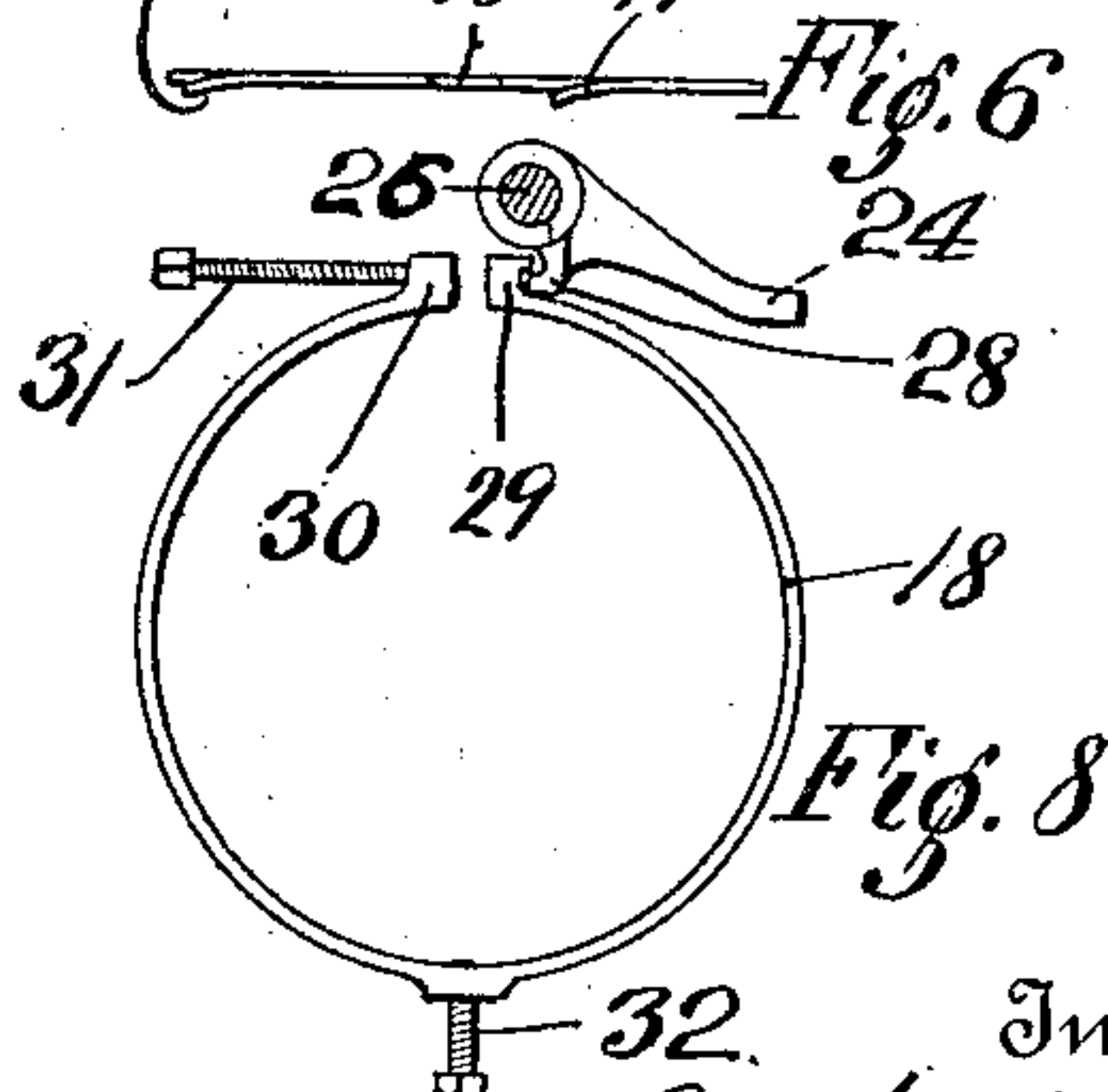
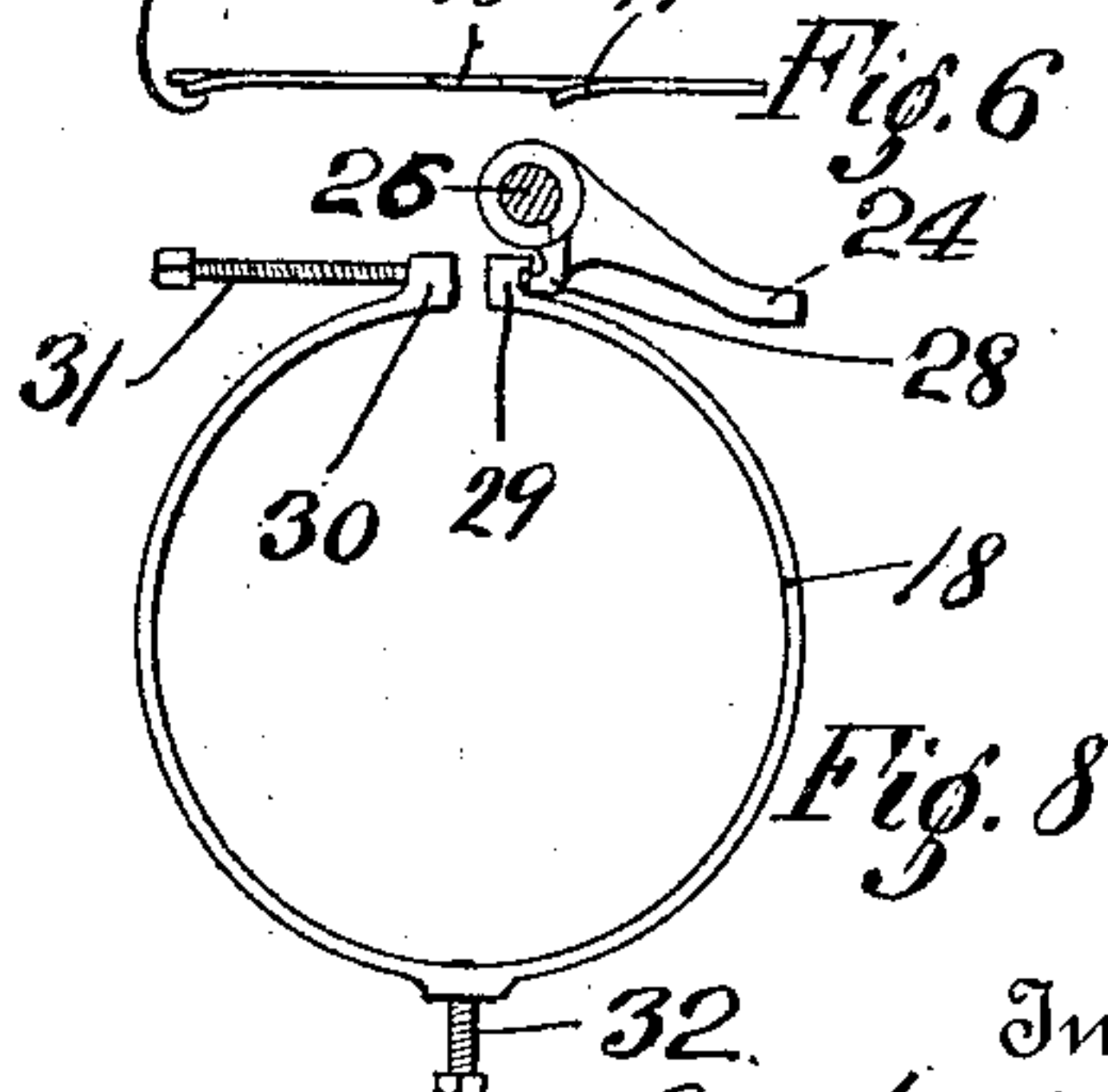
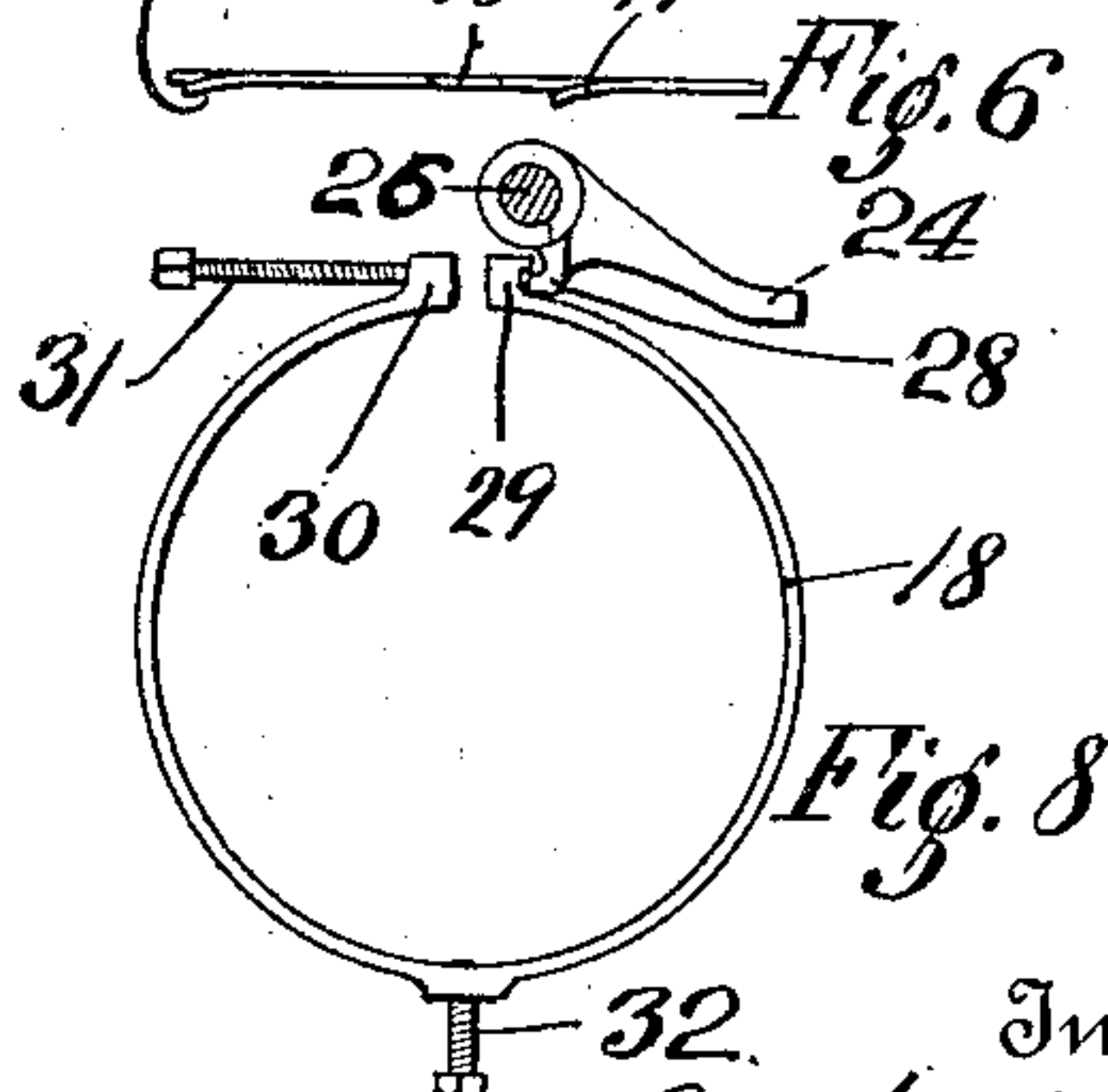
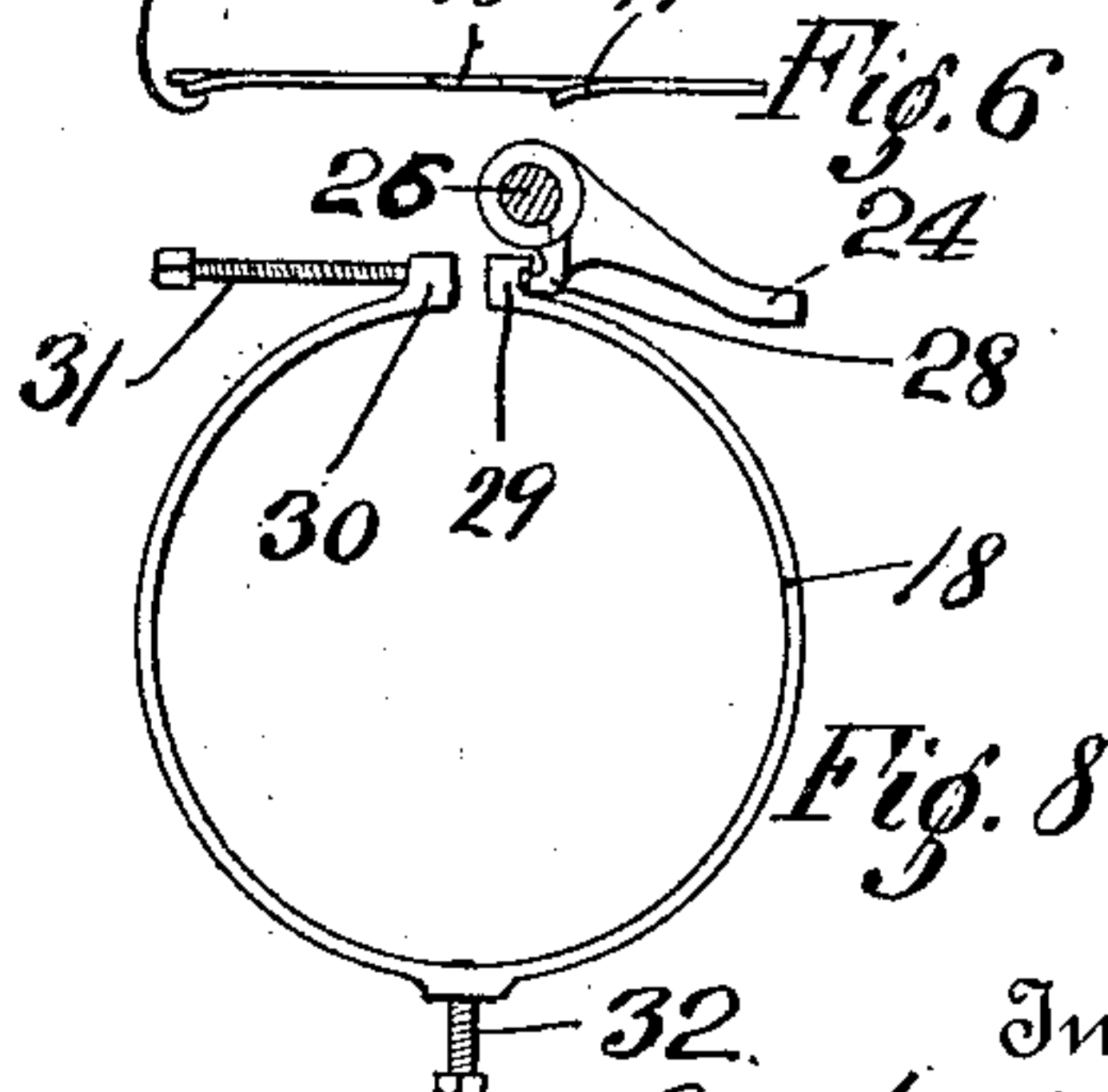
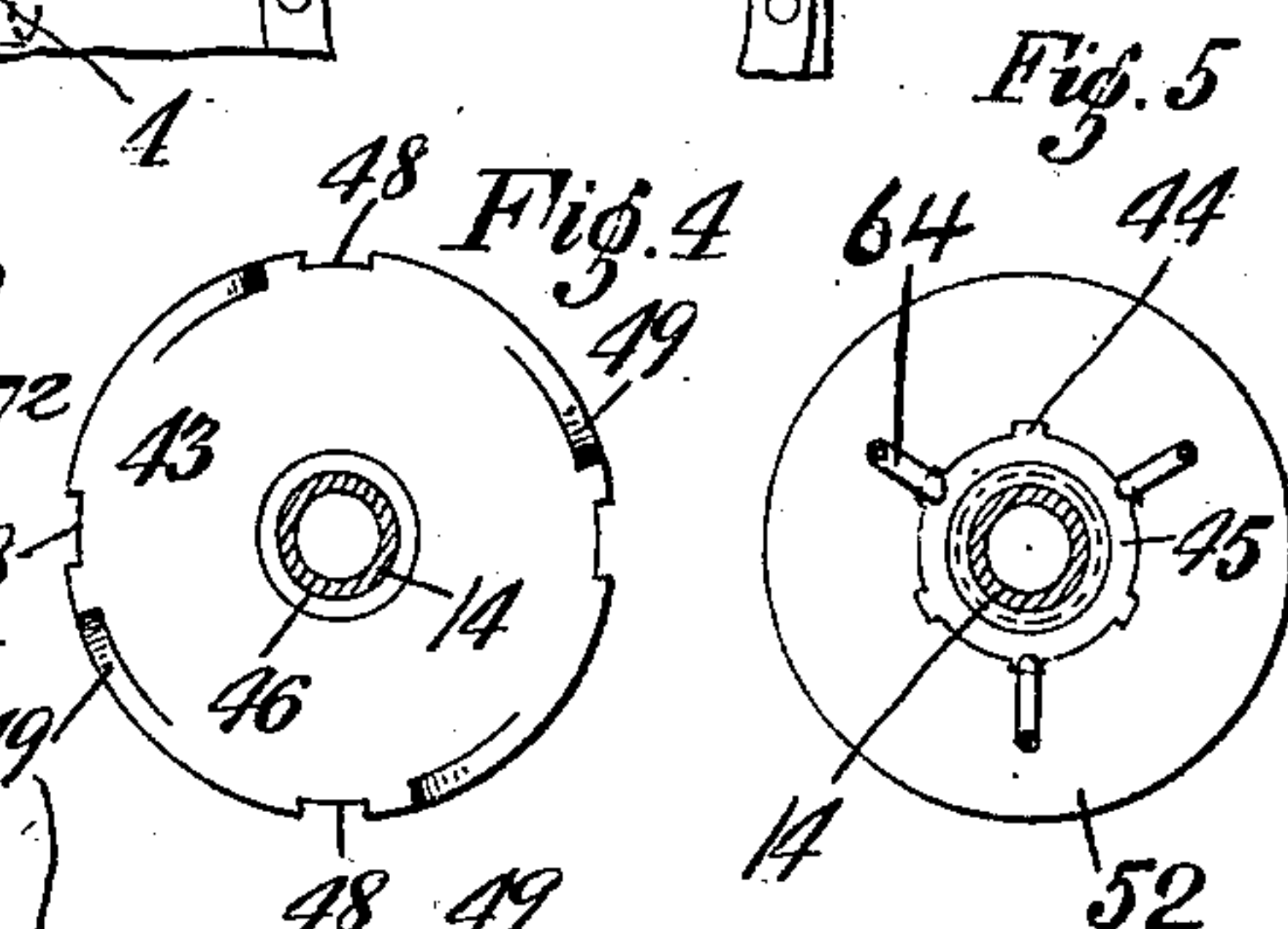
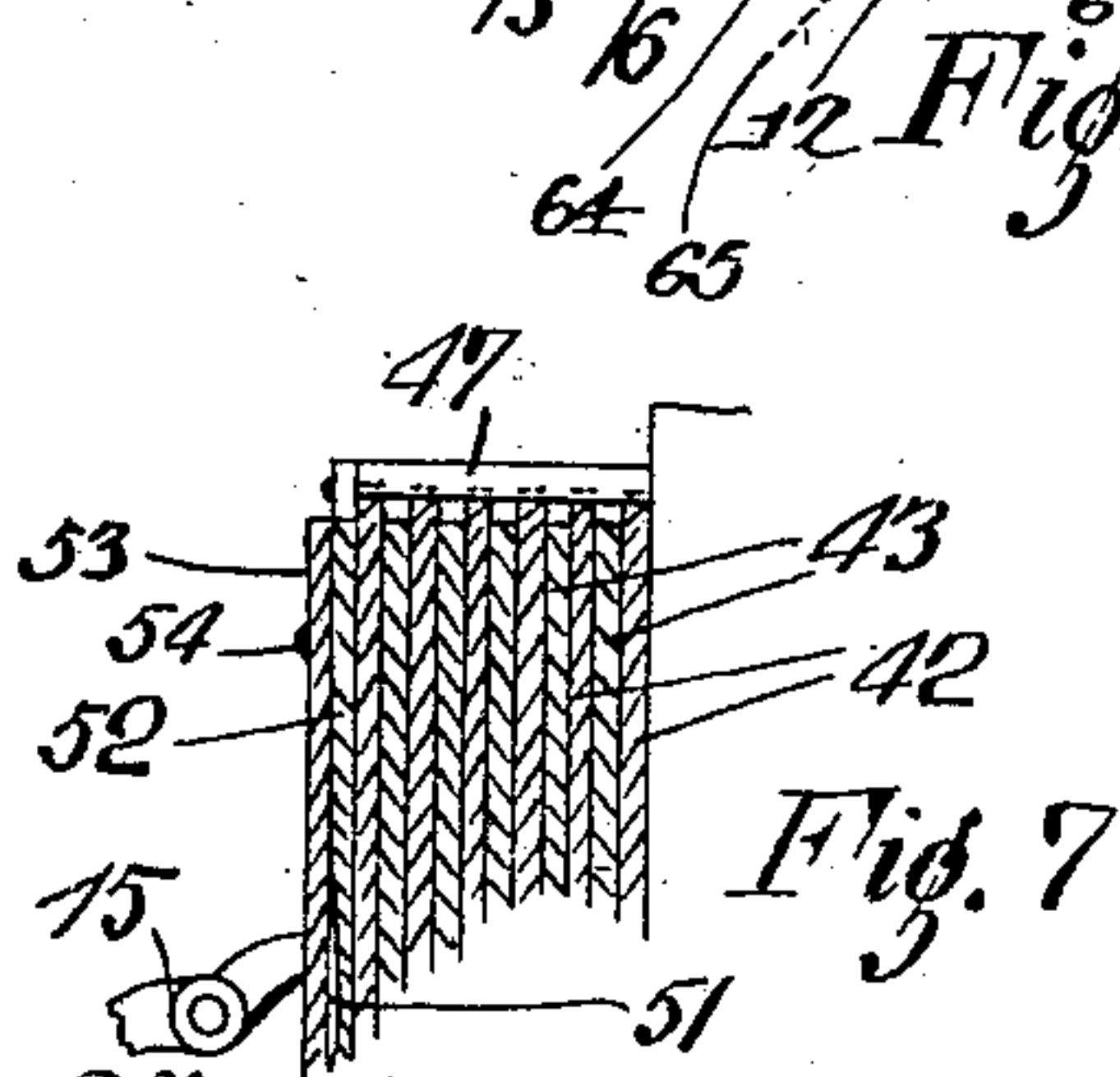
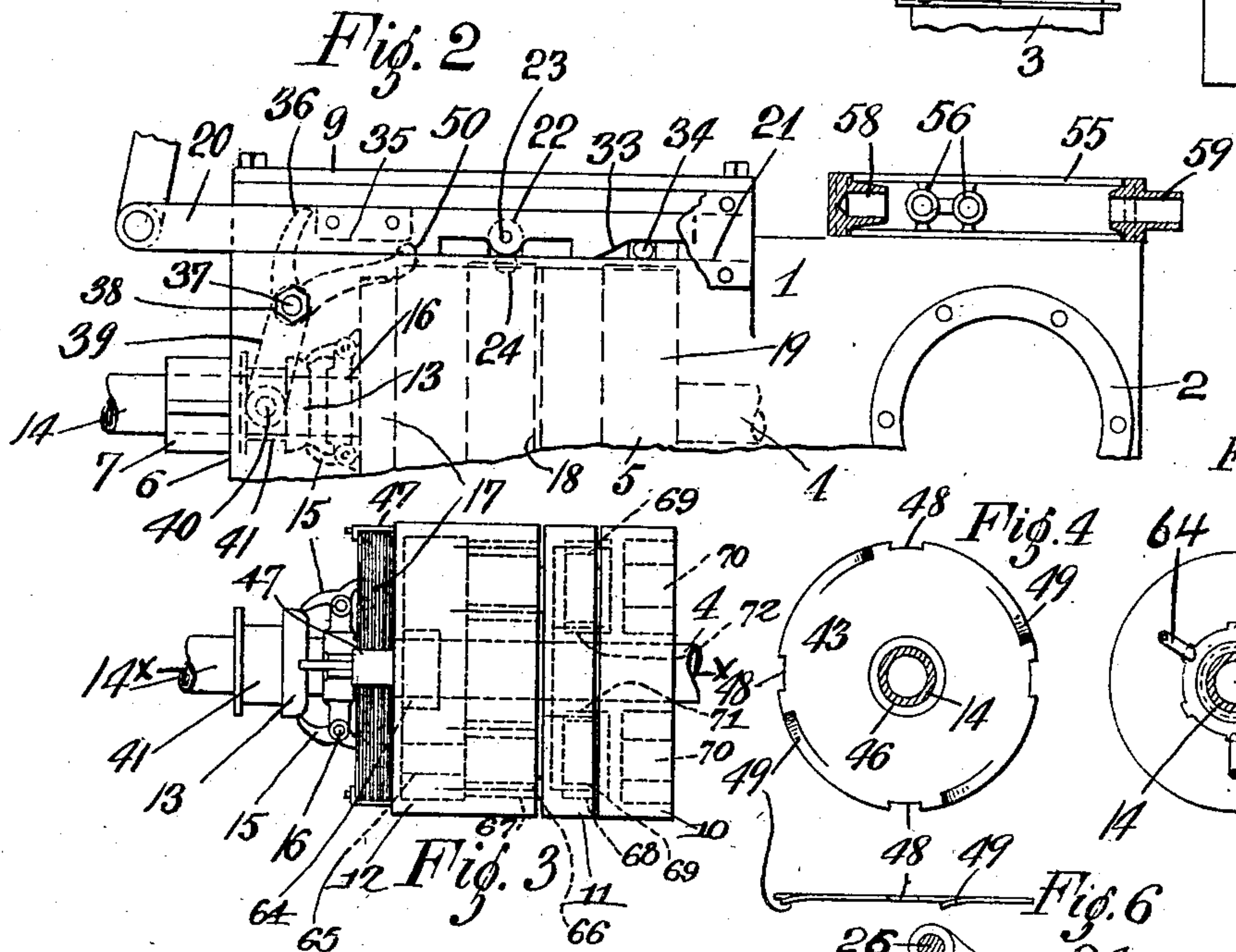
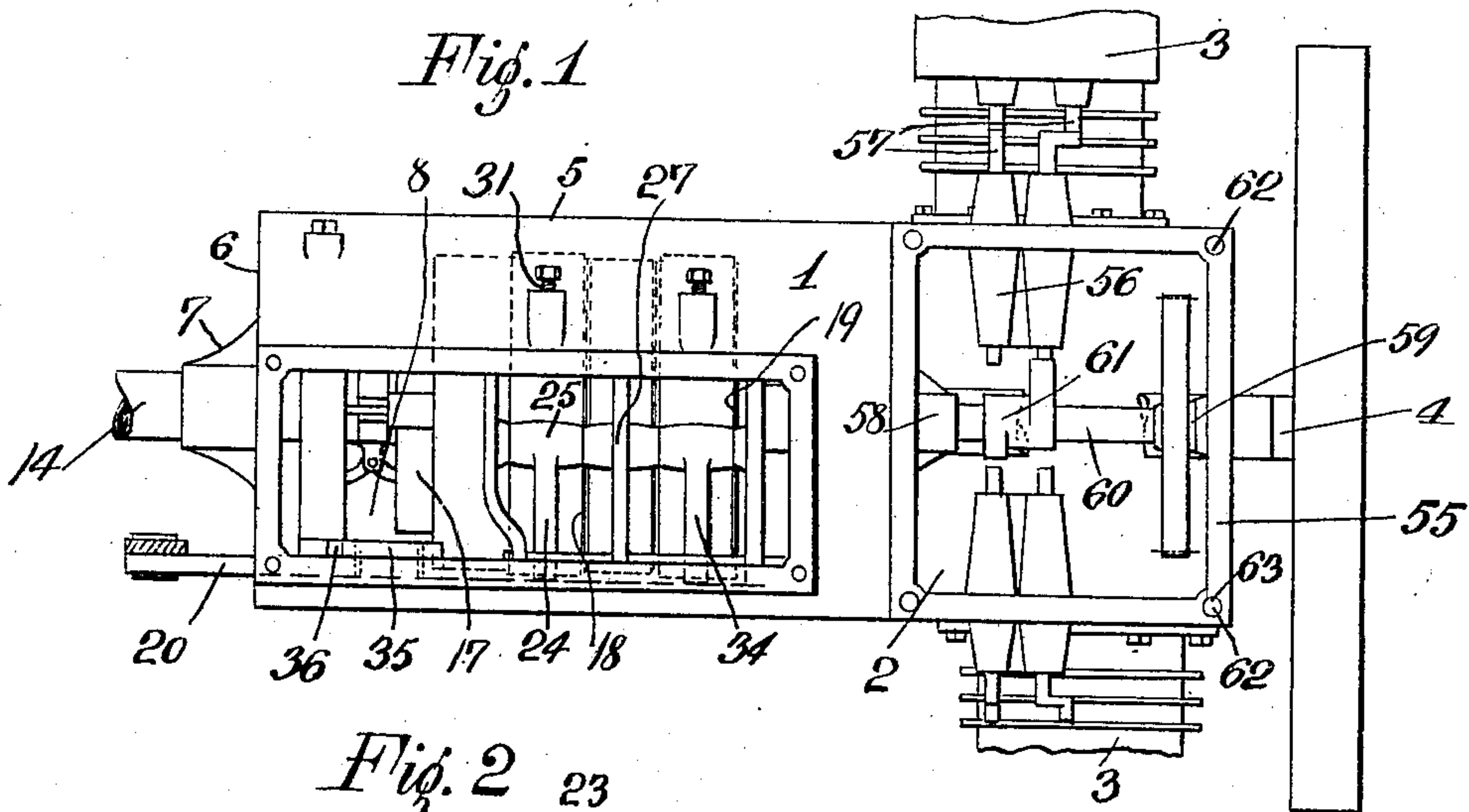
J. D. MAXWELL.

GEARING.

APPLICATION FILED DEC. 31, 1904.

907,616.

Patented Dec. 22, 1908.



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GEARING.

No. 907,616.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed December 31, 1904. Serial No. 239,161.

To all whom it may concern:

Be it known that I, JONATHAN D. MAXWELL, of Tarrytown, New York, have invented certain Improvements in Gearing, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings designating like parts.

This invention relates to engines and my improvements are of particular utility when embodied in explosion engines for automobiles, although I wish it understood that I contemplate the utilization of my invention in any field for which it is adapted by reason of the nature of my improvements.

The object of my invention is to simplify and make more compact the transmitting and controlling portions of such engines so that there will be few parts to replace, and these will be of a character which can readily be made interchangeable, enabling them to be kept in stock in large quantities, and replaced quickly, to avoid long delays incidental to replacement of parts in automobiles as constructed at present.

The various features of my invention will be illustrated and described fully in the accompanying drawings and specification and pointed out in the claims.

In the drawing, Figure 1 is a plan view of an explosion engine for automobiles, in the construction of which my improvements have been embodied; Fig. 2 is a view in side elevation of the same looking from bottom to top of Fig. 1, parts being shown in section and parts broken away for the sake of clearness; Fig. 3 is a view in side elevation of the speed changing apparatus removed from the gear case at the left of Fig. 2; Figs. 4, 5 and 6 show separately, details of the clutch illustrated in Fig. 3; Fig. 7 is a sectional view on the line $x-x$ Fig. 3, showing on an enlarged scale part of the clutch mechanism, and Fig. 8 is a view in side elevation of one of the clutch bands shown in Figs. 1 and 2 but removed from the gear case with its actuating member.

In the embodiment of my invention selected for illustration and description as a convenient form to enable ready and complete understanding of my improvements, the part designated by the reference numeral 1 is a casing, which may be cast of aluminum or other suitable material, and in the instance illustrated has a crank chamber

2 to which are bolted the cylinders 3, and through which passes the crank shaft 4 actuated by suitable cranks and connecting rods which are omitted for the sake of clearness, the shaft being broken away at the crank portion.

The reference numeral 5 designates the gear case, which I prefer to form integral with the crank chamber 2, as illustrated, although I do not limit myself to such construction nor to the general contour and arrangement of the gear case, which in the instance illustrated is shown as having a removable head 6 provided with a bearing 7.

At 8 I have shown a handhole through which access can be had to the operating parts, a plate 9, shown in Fig. 2, serving as a closure for the handhole.

Upon the shaft 4 are gear drums 10, 11 and 12 of which 11 and 12 are connected to the shaft through the medium of planetary gearing of a well-known type to be described briefly hereinafter.

A cone 13 is provided to enable the shaft member 14 to be operated at high speed when the cam operates the dogs 15 mounted upon a carrier 16, throwing in a plate clutch 17, the construction of which will be described later, these parts being shown in the high speed position in Fig. 3.

The shaft member 14 is provided with a hub 64 (see Fig. 3) having a post 65 which carries a planetary gear 66, and this gear meshes with an inner peripheral rack 67 upon the drum 12, the post 65 being also connected with, and supporting, the gear drum 11, within which latter an inner peripheral rack 68 meshes with planetary gears 69 mounted upon posts 70 carried by the drum 10, and the planetary gears 69 mesh also respectively with pinions 71 and 72 upon the shaft member 4.

The shaft member 14 will be operated at low speed when, as shown in Fig. 2, the pulley 12 is held from rotation by the brake band 18, the operation of which will be described more at length hereinafter.

Reverse motion of the member 14 relatively to the member 4 will be secured when the pulley 10 is held from rotation by the brake band 19, similar in construction and operation to the member 18.

The change of speeds is controlled through the medium of the slide 20 moving on a slide-way 21, best seen in Fig. 2, near the hand-

hole 8, at the upper part of the gear case, the slide moving longitudinally with relation to the gear case.

When in the position shown in Figs. 1 and 2, the slide 20 acts through the medium of an antifriction roll 22 pivoted at 23 upon the slide, to depress the arm 24 of a dog mounted at 25 upon a stud or shaft 26 carried by a bearing member 27 within the gear case, at the region of the handhole, the dog having a member 28, best seen in Fig. 8, in position to engage a lug 29 at the free end of the brake band 18. Depression of the arm 24 causes the arm 28 to move the lug 29 toward the lug 30, the latter being held in adjusted position preferably by suitable means, such as a set screw 31 passing through the wall of the gear case to permit its regulation from the outside. Fastening means such as the screw 32 will preferably be provided to secure the brake band 18 firmly in place at its middle, to the bottom of the gear case. The parts being in this position and the shaft member 4 actuated at a given speed, the rotation of the shaft member 4 will be transmitted through the planetary gearing already described contained in the pulleys 10, 11 and 12 in a manner too well-known to require description, and communicated to the independent shaft member 14 at a rate of speed lower than that of the shaft member 4. If the plate 20 be moved toward the right from the position shown in Fig. 2 a cam surface 33 on the slide will engage a dog 34 similar in construction and operation to the dog 24 and through it will tighten band 19, hold the pulley 10 against operation, and the motion of the shaft member 4 will be transmitted to the shaft member 14 but in a reverse direction through the planetary gears, and at a lower speed. If the plate 20 be now moved to the left beyond the position shown in Fig. 2, the cam surface 33 and the antifriction roll 22 will respectively release the dogs 34 and 24, and thereafter the slide member will, through the medium of a cam block 35 engage the arm 36 of a lever mounted upon a bearing bolt 37 which passes through the gear case and is provided with nuts 38 to enable its removal from the outside of the case. The specific construction of this yoke-lever is not claimed herein, as it forms the subject of my divisional application, Serial No. 377,000, filed June 3rd, 1907. When thus actuated by leftward movement of the slide and its cam block 35, the arm 39 of the lever will, through the medium of pins 40 working in a collar 41 of the cone 13, force the cone toward the right to operate the dogs 15 against the plate clutch 17 and thereby will couple the shaft members 4 and 14 directly together, enabling the member 4 to rotate the member 14 at high speed.

The clutch member 17 is constructed of a series of plates 42, 43 of which the former are

secured to the shaft member 14 through a feather connection 44 with a bushing 45 fastened upon the shaft member 14, while the members 43 have central apertures 46 in which the shaft member 14 is free to rotate and are connected to the pulley 12 through the medium of yoke members 47 lying in notches 48 in the periphery of the members 43. To separate the adjacent members of the two series when not in cooperation, separating spring devices are provided as illustrated at 49, formed from fingers bent up as illustrated from the material of the disks 43, at their periphery, and best seen in Fig. 6.

When the slide 20 is first thrown from the high speed position toward the right the cam block 35 engages an arm 50 of the lever 36 and draws the lever arm 39 toward the left carrying with it the cone 13 and releasing the dogs so that the spring devices 49 are free to throw apart the series of disks and this is accomplished before the low speed is brought into actuation by engagement of the antifriction roll 22 with the dog 24. Additional spring members 64 may be provided to separate the disks, these springs engaging the feathers on the bushing.

I have shown in Fig. 7 a detail of construction of the disk clutch which insures freedom from failure on the part of the clutch dogs in operating the clutch, this feature consisting of an annular groove or recess 51 in the outer member 52 of the series of clutch disks, a disk 53 of spring steel being secured loosely by rivets 54 to the disk 52. The interposition of the spring disk 53 insures sufficient frictional engagement of the clutch disks even after some wear of the dogs 15, as the latter can crowd the material of the spring disk into the annular groove.

The above described clutch mechanism is not claimed specifically herein, as the same forms the subject of my divisional application, Serial No. 280,450, filed September 28, 1905.

An important feature of my invention is found in the frame 55 illustrated in plan view in Fig. 1 and in vertical section in Fig. 2, which carries the bearings 56 for the valve actuating members 57 and also the bearings 58, 59 for the shaft 60 on which is mounted the cam 61 to operate the valve actuating members. The bearings are all formed integral with this frame and the frame may be applied interchangeably throughout all engines of this type, having bolt holes 62 at its corners which receive bolts 63 when in place upon an engine, and also permit application of the frame to similar bolts on suitable jigs prior to assembly of the frame with the engine, so that perfect adjustment of the valve actuating members may be made upon the jig and the exact operation of the valve motion insured for the completed engine.

The above described frame is not claimed

specifically herein, as the same forms the subject of my divisional application, Serial No. 375,572, filed May 25, 1907.

Having thus described my invention, I do not limit myself to the specific construction illustrated nor in general otherwise than as set forth in the claims read in connection with this specification.

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

1. Power transmitting apparatus; comprising a casing having an external slideway; a gear drum and gears, a brake band to control said drum, and a dog to operate said band, all carried within said casing; said dog having a portion projecting through the wall of said casing into said slideway; and a slide in said slideway to actuate said dog, substantially as described.

2. Power transmitting apparatus comprising a casing having an external slideway; a series of cooperating gear drums and gears, brake bands to control said drums and operating means for said brake bands, including a dog to operate one of said bands, all carried within said casing; said dog having a portion projecting through the wall of said casing into said slideway; and a slide having an anti-friction device to engage and actuate said dog, substantially as described.

3. Power transmitting apparatus comprising a driving member, a driven member, a series of gear drums and gears to transmit power from one to the other of said members at various speeds, a clutch to connect said members at times, means to control said drums and clutch, and a slide to actuate said controlling means.

4. Power transmitting apparatus, comprising a driving member, a driven member, a series of gear drums and gears to transmit power from one to the other of said members at various speeds, controlling bands for said drums, dogs to operate said bands, and a gear case within which said foregoing instrumentalities are contained, said gear case having a slideway, and a slide mounted on said slideway and arranged to engage and actuate

said operating devices, substantially as described.

5. Power transmitting apparatus, comprising a driving member, a driven member, a series of gear drums and gears to transmit power from one to the other of said members at various speeds, controlling bands for said drums, dogs to operate said bands, and a gear case within which said foregoing instrumentalities are contained, said gear case having an external slideway, into which project arms of said dogs, through apertures in said case, and a slide mounted on said slideway and arranged to engage and actuate said operating devices, substantially as described.

6. Power transmitting apparatus comprising a driving member, a driven member, a clutch to connect said members for co-rotation at high speed, gear drums and gears to connect said members for co-rotation, direct and reverse, at different speeds, a cone and yoke-lever to control said clutch, and brake bands to control said drums, and a slide having cams to engage and actuate said controlling instrumentalities respectively, substantially as described.

7. Power transmitting apparatus comprising a driving member, a driven member, a clutch to connect said members for co-rotation at high speed, gear drums and gears to connect said members for co-rotation, direct and reverse, at different speeds, a cone and yoke-lever to control said clutch, and brake bands to control said drums, and a slide having cams to engage and actuate said controlling instrumentalities respectively, the cams for said high speed and reverse being respectively near opposite extremes of said slide, and the direct low-speed cam medial.

Signed at 25 Broad St. New York city in the county of New York and State of New York this twenty-ninth day of December 90 A. D. 1904.

JONATHAN D. MAXWELL.

Witnesses:

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