

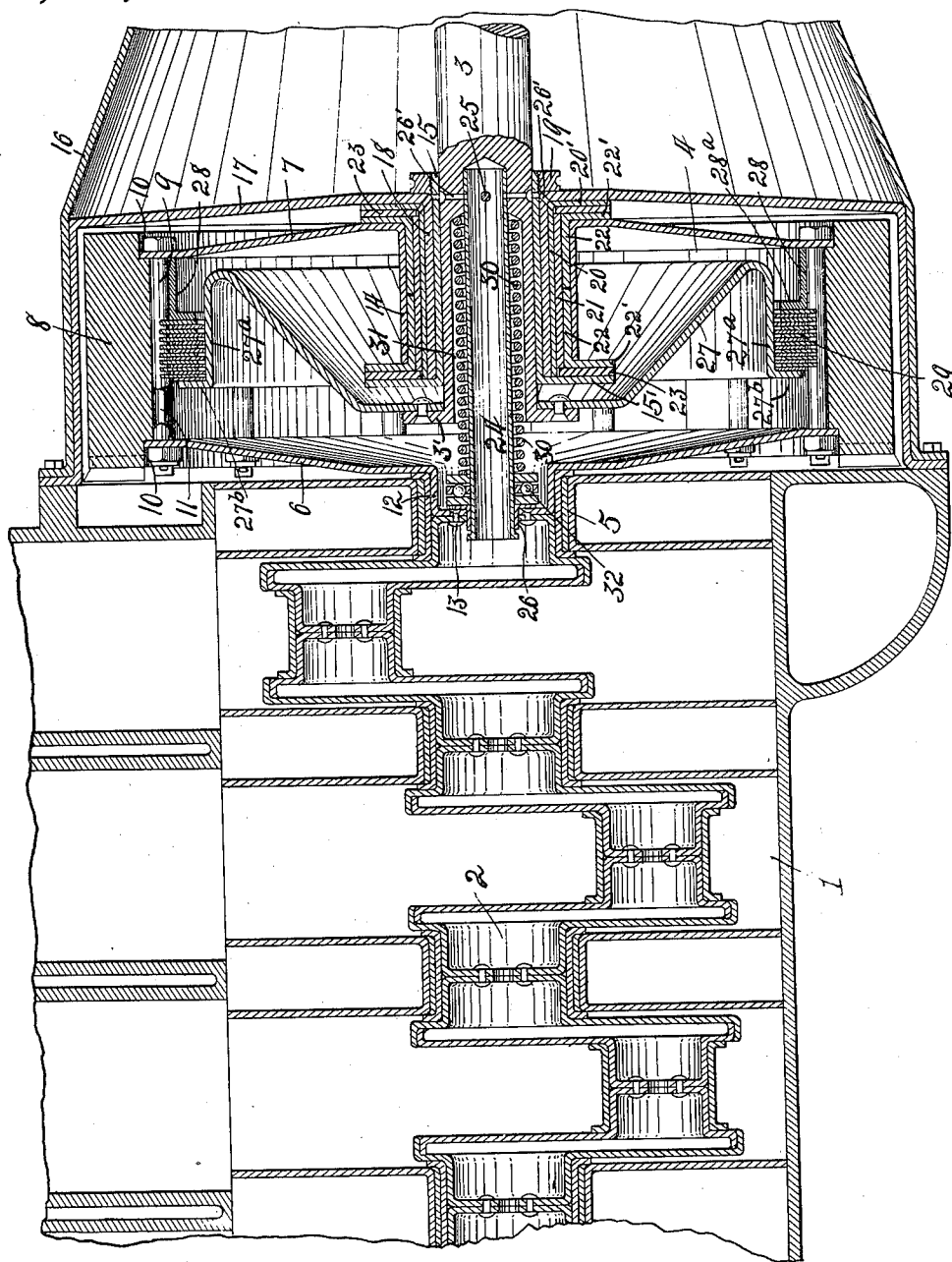
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FLY WHEEL.

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1,093,246.

Patented Apr. 14, 1914.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## FLY-WHEEL.

1,093,246.

Specification of Letters Patent.

Patented Apr. 14, 1914.

Application filed April 10, 1911. Serial No. 620,215.

*To all whom it may concern:*

Be it known that I, HENRY L. BOCK, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Fly-Wheel or Similar Article; and I do hereby 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, reference being had to the accompanying drawings and to the figures of reference marked thereon, which form a part of this specification.

My invention relates particularly to the construction of fly-wheels, but is not restricted to such use, as it may be used for any purpose for which it may be adapted or appropriate.

The object of my invention is the provision of an improved flywheel for use in engines or the like, which is simple and inexpensive in its construction and manufacture, and combines a maximum of strength and durability with a minimum of material.

A further object of my invention is the provision, in a stamped sheet metal wheel of this character, of a friction clutch of simple and efficient construction.

The invention is fully described in the following specification, and while in its broader aspect, it is capable of embodiment in numerous forms a preferred embodiment thereof is illustrated in the accompanying drawing, which is a central sectional view of a fly-wheel comprising the invention and an associated portion of an engine.

Referring to the drawings, 1 designates the crank-chamber of an engine, 2 a hollow crank-shaft having the longitudinally shiftable end portion 3, and 4 the fly-wheel comprising my present invention, the end of the shaft adjacent to the wheel being mounted in a suitable bearing 5.

The fly-wheel 4 comprises in main the two opposing web or disk members 6 and 7, and the heavy rim portion 8, which is secured to the outer peripheral edges of said members by bolts 9. These bolts draw the edges of the web members within marginal incuts 10 in the inner edges of the rim 8 against the shoulders formed thereby, the bolts themselves preferably seating in registering recesses 11 in the inner side of the rim, as indicated, to prevent a relative turning of the web and rim portions.

The web members 6 and 7 are preferably dishd outwardly as shown, and the member 6 has a cylindrical portion 12 drawn outward from its center to provide a stub shaft or trunnion for journaling in the associated end of the bearing 5. The end of the trunnion 12 and also that of the crank-shaft 2, which journals in the bearing 5, are closed except for registering axial openings there-through, for the purpose hereinafter described and are rigidly secured together as by rivets 13, electric-welding, or in any other suitable manner. The web member 7 has its central portion drawn inwardly to provide the elongated cylindrical hub flange 14 for bearing upon the parts hereinafter described.

The inner end of the shaft section 3 projects within the fly-wheel 4 through the hub flange 14 of the member 7 and is encompassed by a sleeve 15 in which it may have free rotary and longitudinal movements. The sleeve 15 has its inner end projected beyond the inner end of the hub flange 14 and formed with a radial annular flange 15' which projects beyond said hub flange, as indicated.

The fly wheel is shown in the present instance as being inclosed by an outer case 16 and an inner case 17, which are preferably of sheet metal and project outwardly from the engine casing. The outer end of the casing 17, or that opposed to the engine casing, is of disk form with its central portion drawn inwardly to provide a broadened bearing 18 for snugly receiving the sleeve 15. This bearing portion 18 is of greater length than the hub-flange 14 of the wheel disk 7 to enable it to project entirely through the flange opening and to abut at its inner end against the flange 15' of the sleeve 15. The outer end of the sleeve 15 projects beyond the associated end of the bearing 18 and a nut 19 threads thereon and cooperates with the sleeve flange 15' to prevent relative endwise movements of said sleeve and the bearing 18.

For efficiency in operation, the space between the bearing 18 and hub flange 14 is preferably filled with three rings or sleeves 20, 21 and 22, which encircle each other in succession, as shown. The inner ring 20 abuts at its inner end against the sleeve flange 15' and has its outer end formed with a radial flange 20' which projects outward in lateral abutment with the casing end 17. The outer ring 22 is in two duplicate sec-

tions, which abut at their inner ends and have their outer ends radially flanged, as at 22' to cooperate to form an annular channel bearing for the hub-flange 14. An annulus or washer 23 is preferably disposed between the flanges of the ring 22 and the respective flanges 15' and 20'.

For the purpose of oiling the parts encircling the shaft section 3 a tube 24 is inserted into a socket in the inner end of said shaft section, being secured therein by a pin 25, and has its outer or free end slidably projected through the registering axial openings in the fly-wheel trunnion 12 and attached end of the crank shaft 2, a bushing 26 being preferably mounted in said openings to provide a bearing therefor. The oil which is intended to circulate through the hollow shaft 2, flows from the end thereof through the tube 24, and thence through radial passages 26' in the inner end-portion of said tube, the shaft 3, sleeve 15, bearing 18 and sleeve 20, and between the coating surfaces of the several bearing parts to thoroughly lubricate the same.

The inner end of the shaft section 3 which terminates within the wheel 4, is flanged, as at 3' and to this is rigidly secured the movable clutch member 27. This clutch member is preferably stamped from sheet metal and is shown in the present instance as extending radially a short distance from the shaft, then flaring outwardly toward the web member 7 of the fly wheel to adjacent the outer edge thereof where it extends inwardly over said flaring portion to provide the cylindrical drum-shaped part 27<sup>a</sup>, with the inner edge thereof terminating in the outwardly projecting radial flange 27<sup>b</sup>.

The fixed member of the clutch preferably comprises an annulus 28 of sheet metal, which fits snugly within the rim portion 8 of the wheel 4 with its outer edge in abutment with the wheel member 7 and its inner edge terminating without the flange 27<sup>b</sup> of the clutch member 27 in opposition thereto in an inwardly projecting annular flange 28<sup>a</sup>. A plurality of friction rings 29 are interposed between the flanges 27<sup>b</sup> and 28<sup>a</sup> of the respective members to cooperate therewith to cause the fly wheel to frictionally drive the shaft section 3, as is apparent. Alternate ones of the rings 29 are fixed to the wheel for rotation therewith by having peripheral notches in which the shanks of the wheel bolts 9 seat.

The clutch members and friction rings are normally held in clutch engagement by the action on the shaft section 3 of a coiled compression spring 30. This spring encircles the oil circulating tube 24 with an end portion fitting within a socket 31 in the inner end of the shaft section 3 in thrust contact with the inner end thereof and its other

end bearing against a thrust bearing 32. To release the clutch the shaft section 3 is moved inwardly against the tension of the spring 30 by any suitable mechanism not shown, as is common in connection with drive-shaft clutches.

It is apparent that practically all of the parts of my improved wheel and its clutch, excepting the wheel rim, are stamped or drawn from sheet metal, and are in such form as to provide an exceedingly strong, durable, cheap and light construction, the bulk of the weight being located at the rim portion of the wheel where needed.

The crank-shaft 2 is shown in the present instance as being of hollow construction for the circulation of oil therethrough and as being made up of a plurality of stamped sheet metal sections. In the form of crank-shaft shown in the present case the crank-arms thereof, which may either be of the single or double arm type, comprise the outer and inner members 35 and 36, respectively, which are preferably stamped or drawn from sheet metal. These members are shown as being male and female to facilitate a securing of the same together, one within the other, and the outer member of at least the arm thereof which is disposed adjacent to the fly wheel 4 is provided at its shaft end with an outwardly drawn cylindrical cup shaped portion 37. The said shaft portion 37 is intended to abut at its outer end, or that which is opposite to the arm member from which it projects, against the outer end of the cylindrically drawn portion 12 of the wheel disk 6, being substantially the same shape as said wheel portion, and is rigidly secured thereto by rivets 13 or in any other suitable manner as hereinbefore stated. A sleeve 38 closely encircles the portions 12 and 37 to cooperate therewith to form the part of the crank-shaft disposed intermediate the fly-wheel and adjoining crank-arm, and this sleeve is intended to journal in the bearing 5, as shown. It is evident that this feature of my invention, which is divided out of a copending application Serial No. 620,214, filed under even date herewith and patented on June 3, 1913, No. 1,063,323, forms a simple, strong, durable and rigid means of interconnecting the crank-shaft and fly-wheel, and that in case of an extension of the crank-shaft from both sides of the wheel the shaft can be attached in the same manner to both disks of the wheel. The wrist-pin construction of the crank-shaft is not described in the present application as such construction forms the subject-matter of my said copending application.

It is obvious that while I have shown and described what I believe to be a preferred form of my invention, the form and arrangement of the parts may, if desired, be

changed within a wide range, and I therefore wish it understood that the invention is not limited to any specific construction or arrangement of the parts except in so far as such limitations are specified in the claims.

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

1. An article of the class described, having a rim portion and laterally-spaced disk-like web members of sheet-metal secured at their outer edges to the rim portion, one of said members having an integral outwardly projecting central portion forming a trunnion and the other having an integral inwardly projecting central portion forming a broadened hub bearing surface.

2. An article of the class described, having a rim portion and laterally-spaced outwardly dished disk-like web members of sheet-metal, one of said members having an integral outwardly projecting central part of cylindrical form with its end partly closed to provide a trunnion and the other of said members having an integral inwardly projecting central part providing a broadened hub bearing surface.

3. In combination, a shaft, a wheel having a rim portion and sheet-metal web members, one of which has an integral outwardly projecting central part forming a trunnion and the other having an integral laterally projecting central portion providing a broadened hub opening for the shaft to project through, and bearing members disposed between said shaft and said laterally turned portion of the web member.

4. In combination, a shaft, a wheel comprising a rim portion and sheet-metal web members, one of which has an integral inwardly projecting central portion providing a broadened hub opening for the shaft to project through, a casing part having a cylindrical bearing portion projecting within the hub opening of said web member, and bearing members cooperating with said shaft, cylindrical casing part and inwardly-projecting portion of the web member to carry the wheel.

5. In combination, a shaft, a wheel having a rim portion and sheet-metal web members, one of which has an integral outwardly projecting central portion forming a trunnion and the other having an integral inwardly projecting central portion forming a broadened hub opening for the shaft, a casing part inclosing a part at least of the wheel

and having a cylindrical bearing portion projecting within said inwardly projecting portion of one of said web members, and members cooperating with said shaft and cylindrical casing part to form a bearing for the inwardly projecting portion of the web member.

6. In combination, a shaft, a wheel comprising a rim portion and sheet-metal web members, one of which has an integral inwardly projecting central portion forming an elongated hub opening for the shaft, a casing part for the wheel having a cylindrical portion projecting within said hub opening, and means cooperating with said shaft and cylindrical casing part to form a bearing for the inwardly projecting portion of said web member and serving to bind the cylindrical casing part and inwardly-projecting portion of the web member against relative longitudinal movements.

7. In combination, a shaft, a wheel having a rim portion and sheet-metal web members, one of which has an integral inwardly projecting central portion forming an elongated hub opening, a casing part having a cylindrical portion projecting within said hub opening intermediate said shaft and the inwardly projecting portion of said member, means intermediate the inwardly projecting portion of said member and said cylindrical casing part for forming a bearing therebetween, and means intermediate the shaft and said cylindrical casing part to form a bearing therebetween and serving to bind the cylindrical casing part, the inwardly projecting portion of said member and the bearing means together.

8. A sheet metal wheel having a sheet metal web and an integral sheet metal bearing shaft, a sheet metal rotor for rotating the wheel having a sheet metal bearing shaft, the shafts having intumed abutting flanges, and means for locking the flanges together.

9. In combination with a bearing, a wheel having a sheet metal web portion, and a sheet metal shaft, said web portion and shaft each having parts extending within said bearing and rigidly connected together therein.

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

HENRY L. BOCK.

Witnesses:

C. W. OWEN,  
C. H. BILLS.