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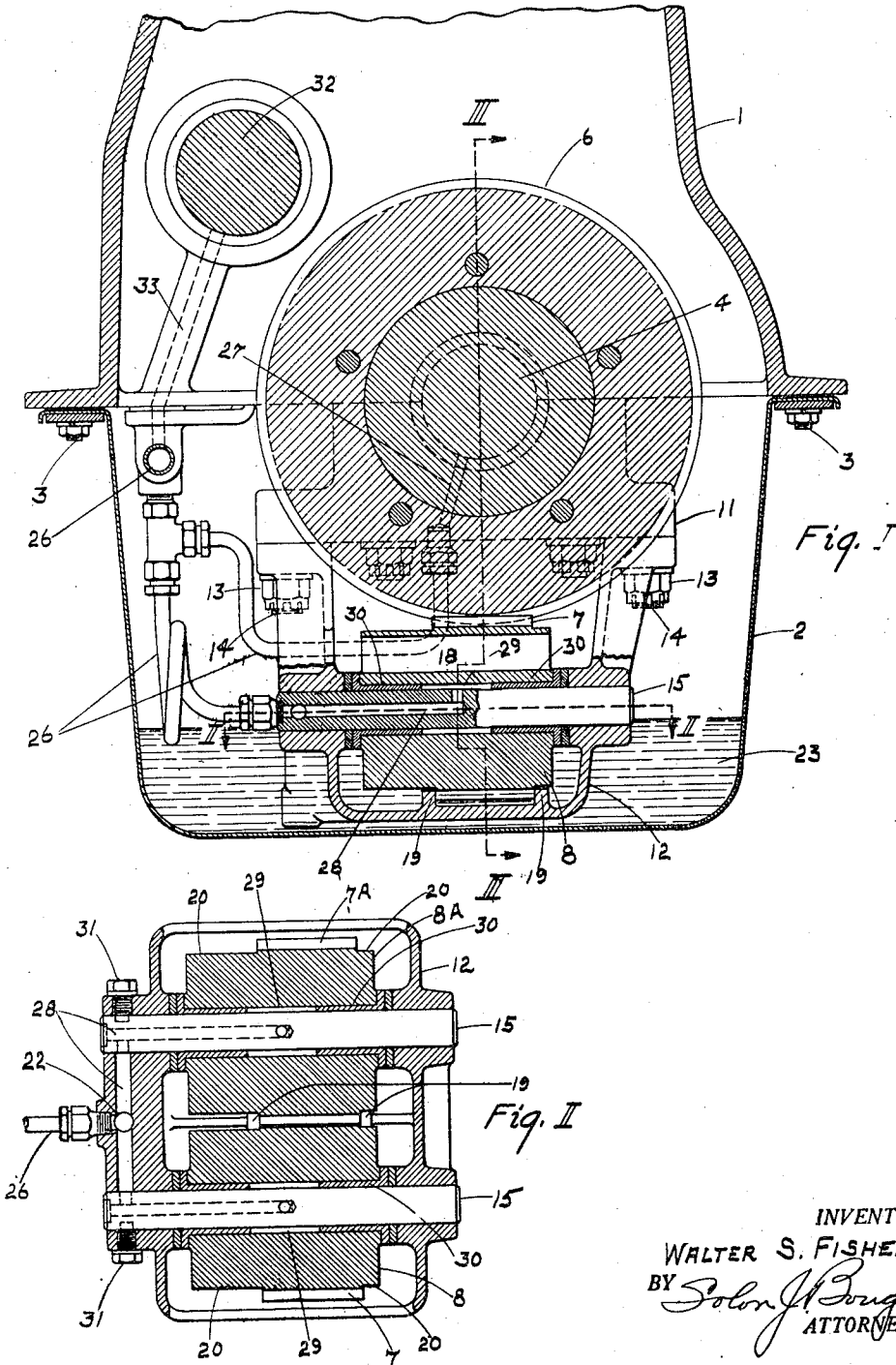
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BALANCER FOR INTERNAL COMBUSTION ENGINES

Filed March 23, 1925

2 Sheets-Sheet 1



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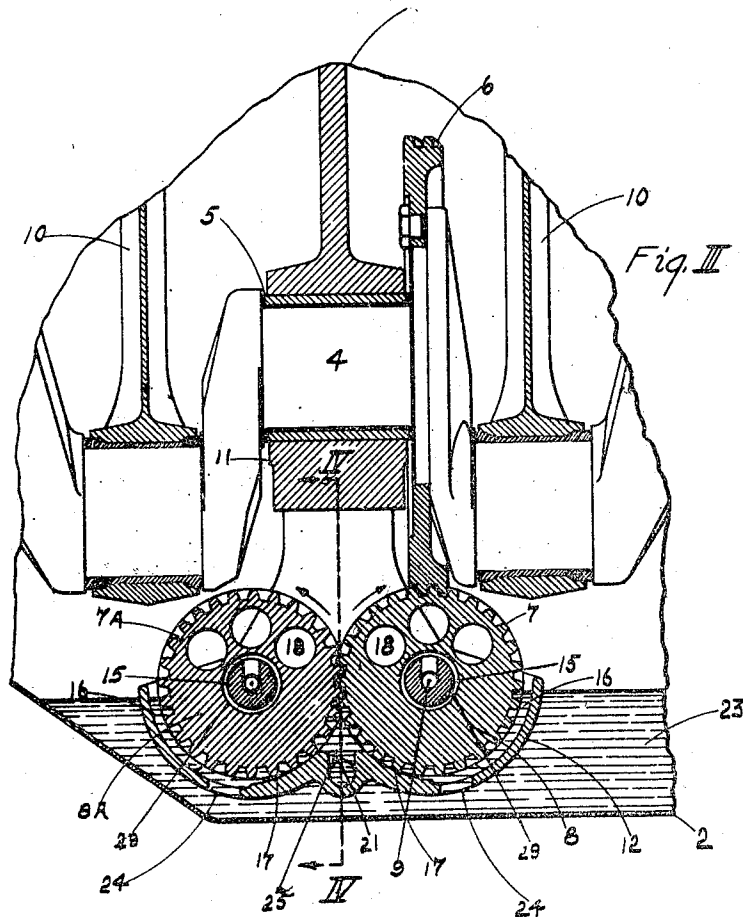
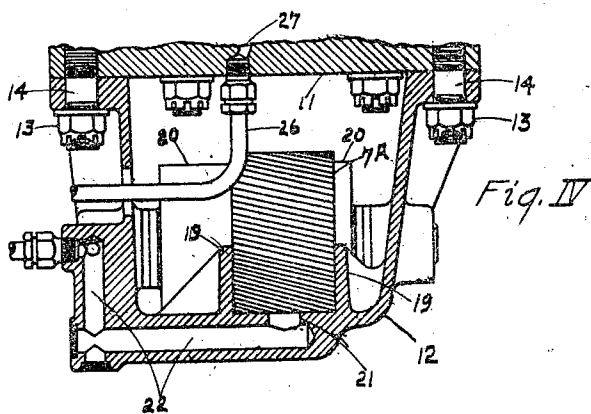
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BALANCER FOR INTERNAL COMBUSTION ENGINES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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BALANCER FOR INTERNAL-COMBUSTION ENGINES.

Application filed March 23, 1925. Serial No. 17,510.

This invention relates to balancers for internal combustion engines, and more particularly to the so-called harmonic balancers used for balancing the secondary inertia forces of the reciprocating parts in internal combustion engines.

One object of this invention is to provide a harmonic balancer that is well lubricated.

Another object of the invention is to provide a harmonic balancer that will act as an engine oil pump.

A further object of the invention is to provide a harmonic balancer that will have its moving parts cushioned by a copious flow of oil.

Other objects will appear from the description to follow, covering certain embodiments of the invention, which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which:

Figure I is a sectional view through a portion of an internal combustion engine having a harmonic balancer constructed according to one embodiment of the invention.

Fig. II is a sectional view taken on the line II—II of Fig. I.

Fig. III is a sectional view taken on the line III—III of Fig. I, and

Fig. IV is a sectional view taken on the line IV—IV of Fig. III.

Referring to the drawings, in which like characters represent like parts throughout the respective views, 1 is the upper portion of an internal combustion engine crankcase, and 2 is the lower or oil base portion of the crankcase, which is secured to the upper portion 1 by bolts 3. Secured to the crankshaft 4, which is supported at the center by a bearing 5 and bearing cap 11 in the crankcase 1, is a gear 6 which meshes with gear 7 of weight 8. Weight 8^A, which is a duplicate of weight 8, has its gear 7^A meshed with gear 7 on weight 8, and the ratio of gears 6 and 7 is such, that weights 8 and 8^A are driven at twice the speed of crankshaft 4. Weights 8 and 8^A are unbalanced about their rotative centers 9 by holes 18, and because of their rotation, produce unbalanced forces which counteract the secondary forces of the pistons (not shown), which are secured to connecting rods 10.

The weights 8 and 8^A of the balancer are rotatably supported by shafts 15 fixed by screws 31 in the housing 12, which in turn

is secured to bearing cap 11 by studs 14 and nuts 13. Housing 12 conforms to the general outer contour of weights 8 and 8^A, but has its inner surface spaced from the weights 8 and 8^A at their outer portions, as shown at 16. The space formed between the weights 8, 8^A and the housing 12, gradually diminishes toward the center-line between the two weights 8, 8^A, and at points 17, reaches a minimum. From points 17 the housing 12 is in close proximity to the gears 7 and 7^A for a short distance, as in an ordinary gear pump. Webs 19 are in sliding engagement with the faces of gears 7 and 7^A and cylindrical portions 20 of the weights 8, 8^A, so as to make a pocket 25 between the lower halves of weights.

The operation of the balancer is as follows: The rotating crankshaft 4, by means of gear 6, drives weights 8, 8^A in the direction shown by the arrows in Fig. III. The fluid oil 23 in which housing 12 is immersed, enters inlet holes 24 into space 16 between the gears and housing 12, fills the spaces between the teeth of gears 7 and 7^A, and is carried into the pocket 25 surrounded by gears 7, 7^A and webs 19. Oil is delivered from pocket 25 through outlet 21 into passages 22, and from thence through conduits 28 into recesses 29 for oiling the balancer weight bearings 30, and through pipes 26 and conduits 33 and 27 for oiling camshaft 32, crankshaft 4, and other parts of the engine (not shown).

While I have illustrated and described somewhat in detail, certain embodiments of my invention, it is to be understood that this showing and description are illustrative only, and that I do not regard the invention as limited to the details of construction illustrated and described, except in so far as I have included such limitations within the terms of the following claims, in which it is my intention to claim all novelty inherent in my invention, broadly, as well as specifically.

I claim as my invention:

1. In a harmonic balancer for an internal combustion engine, the combination of a plurality of balancing weights, a supporting housing for said weights, and means for causing said weights to co-operate with said housing for pumping liquids.

2. In a harmonic balancer for an internal combustion engine, the combination of a plurality of revolving weights, and a supporting

housing therefor co-operating with said weights for pumping liquids.

3. In a harmonic balancer for an internal combustion engine, the combination of a plurality of moving weights, a housing therefor and forming a pocket therewith, said pocket having an outlet, and means for causing the weights to co-operate with the housing for urging a liquid into said pocket and out of said outlet.

4. In a harmonic balancer for an internal combustion engine, the combination of a housing, a plurality of rotating unbalanced weights supported thereby and forming a pocket with the housing, an outlet from said pocket communicating with a conduit in the housing, and said weights co-operating with said housing for causing a liquid to be received into said pocket and forced out of said outlet.

5. The combination of an internal combustion engine, an oil base containing lubricating oil, a harmonic balancer for said engine depending into the oil in said oil base, a housing surrounding said balancer, and said balancer comprising movable weights cooperating with said housing to force oil from the oil base to other parts of said engine.

6. In an internal combustion engine, the combination of an oil base containing lubricating oil, a crankshaft having reciprocating parts operatively connected thereto, a harmonic balancer driven by said crankshaft, said balancer comprising a pair of weights arranged to rotate in said oil and having intermeshing gear teeth, and a housing for said weights having a portion thereof adja-

cent said teeth whereby said weights are caused to pump oil from said base.

7. The combination of an internal combustion engine, a harmonic balancer therefor, lubricating oil in said engine, said harmonic balancer comprising movable members in fixed relation to a housing whereby the balancer is secured to the engine, inlet openings in said housing in communication with the lubricating oil, outlet openings in said housing in communication with engine parts, and said movable members co-operating with the housing for causing oil to be drawn through the inlet opening and forced out of the outlet openings to parts of said engine.

8. In a harmonic balancer for an internal combustion engine, the combination of a housing, rotating unbalanced weights supported thereby, said weights being disposed within the housing so that a pocket is formed by the lower surfaces of the weights and the inner surfaces of the housing, said pocket having an outlet, and means whereby the rotation of the weights urges a surrounding liquid into the pocket and out of said outlet.

9. In combination with an internal combustion engine having a harmonic balancer operated thereby including a set of intermeshing gears, an oil baffle mechanism adapted to have oil supplied thereto and provided with means for discharging the oil, said baffle being disposed with respect to the gears in a manner whereby the intermeshing teeth of the gears act as a pump to force the oil through the discharge means.

In testimony whereof, I affix my signature.
WALTER S. FISHER.