

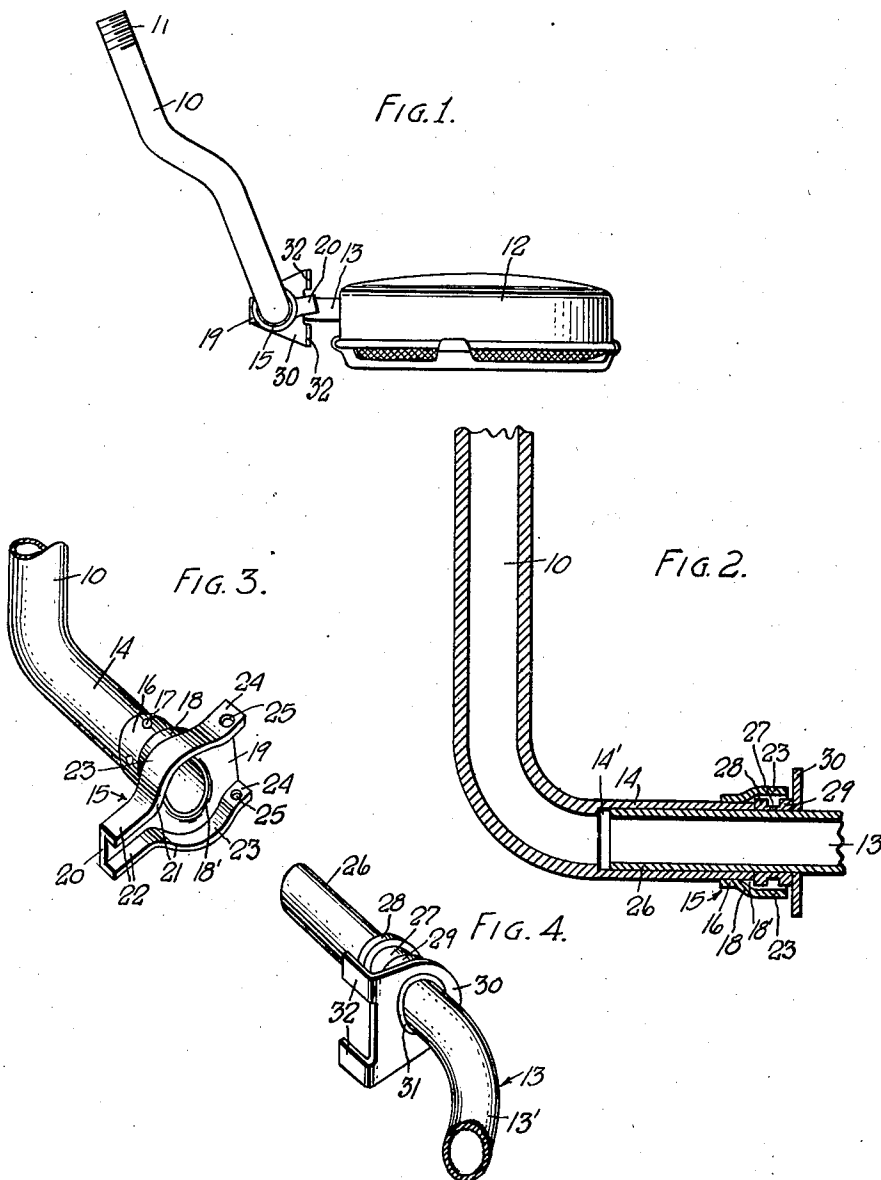
May 4, 1943.

W. E. HASELWOOD

2,318,220

FLOATING OIL FILTER

Filed Oct. 2, 1940



INVENTOR.
WILLIS E. HASELWOOD.
BY *Oltsch & Knoblock*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,318,220

FLOATING OIL FILTER

Willis E. Haselwood, Elkhart, Ind., assignor to
Charles E. Taylor and Harry E. Lerner, both of
Elkhart, Ind., copartners, doing business as
Taylor Sales Engineering Co.

Application October 2, 1940, Serial No. 359,306

8 Claims. (Cl. 210-97)

This invention relates to floating oil filters and more particularly to oil filters disposed within the crank case or oil pan of an internal combustion engine to float upon the oil therein, and connected with a suitable oil pump for circulating the oil from the crank case to the various bearing surfaces of the engine requiring lubrication. Oil filters of this character are conventionally provided with means for limiting the extent of travel of the float, so that the same will not extend into the path of movement of the connecting rods and crank shaft of the engine. Likewise, devices of this character are usually provided with a loose pivot connection with a fixedly positioned conduit extending to the oil pump. The suction of the oil pump is utilized to hold the shiftable filter unit in operative relation to the fixed pump feed conduit.

Heretofore, it has been customary to manufacture at least some of the parts of the aforesaid loose pivot connection from metal castings of rigid character. Such castings are expensive and also are non-yielding. The non-yielding characteristic of such cast fittings results in shock loading of the device, so that when the filter shifts or pivots rapidly to one of its limit positions incident to a change in the oil level in the crank case, the shock of the impact against the cast fitting is liable to injure soldered joints of the device.

Also, in conventional constructions, particularly those using cast fittings, no means is provided to prevent the passage of particles of foreign matter in the oil into the conduit leading to the oil pump incident to the seepage of oil through the loose pivot joint or connection between the filter unit and the pump connected conduit.

Therefore, it is the primary object of this invention to provide a device of this character which is inexpensive, which has a certain degree of resiliency capable of absorbing shock, and which is provided with means to accommodate flushing of oil seeping through the pivot joint between a filter unit and a conduit connected with a pump or the like.

A further object is to provide a device of this character wherein the conduit connected with the pump has a wall of thin section at the end portion thereof on which the oil filter is pivotally mounted and against a bearing member of which it has an edge abutment, whereby a higher unit pressure is provided per unit of suction generated by the pump between the end of said tube and said bearing member than has heretofore been

possible with conduits having thicker wall sections.

A further object is to provide a device of this character having a pivot limiting fitting fixedly mounted upon the end of a pump-connected conduit in such relation thereto that an annular cavity is provided around the end of said tube to receive and trap impurities of oil drawn to the pivot joint between said conduit and a filter unit by leakage of suction through said joint.

A further object is to provide a device of this character having a stop member secured to a fixedly positioned tube, wherein said stop member is formed, bent or stamped from sheet metal of a gage which will produce a rigid stop member and at the same time be sufficiently resilient to dampen shock incident to impact of a pivotally connected floating filter unit therewith.

A further object is to provide a device of this character which is simple in construction and assembly and which is inexpensive to manufacture.

Other objects will be apparent from the description and appended claims.

In the drawing:

Fig. 1 is a view in side elevation of a floating filter assembly.

Fig. 2 is an enlarged longitudinal detail sectional view illustrating the construction of the loose pivot joint between tubes connected with the filter unit and with a pump.

Fig. 3 is a fragmentary perspective view of the lower end of the fixed pump-connected conduit and the fitting carried thereby.

Fig. 4 is a fragmentary perspective view of the conduit carried by a filter unit and adapted to cooperate with the conduit and fitting illustrated in Fig. 3 for the purpose of providing a limited-pivot joint between the floating filter element and the fixed conduit.

Referring to the drawing which illustrates the preferred embodiment of the invention, the numeral 10 designates a conduit or tube which is preferably of the welded tube type. Tube 10 is threaded at its upper end at 11 for connection with any conventional oil pump, as will be understood. A suitable floating type oil filter unit 12 of any desired construction is fixedly connected with a conduit 13. The conduit 13 is adapted for loose, pivotal, substantially sealed interconnection with the conduit 10.

Conduit 10 is provided with a lower end or terminal portion 14 which extends substantially horizontally. Conduit portion 14 has an enlarged bore 14', whereby at least the major portion

thereof is of reduced wall thickness. Adjacent the outer free end of the tube portion 14 is mounted a fitting 15. Fitting 15 is preferably formed of sheet metal stamped and/or spun to form, and comprises a collar 16 preferably welded to the tube portion 14 at 17 in rearwardly spaced relation to the end of tube portion 14. The fitting flares outwardly from tube 16 at 18 in rearwardly spaced relation to the outer or free end of tube portion 14, thereby providing an annular groove, cavity or depression 18' between the end of the tube portion 14 and the flared portion 18 of the fitting. Coplanar substantially flat portions 19 and 20 project from flared portion 18 at opposite sides of the fitting. A pair of opposed configured flanges 21, extending perpendicularly to the portions 19 and 20, define the outer free edges of the fitting. Opposed portions 22 at one end of the flanges 21 extend substantially perpendicularly from the sides of the flat plate portion 20. Curved intermediate portions 23 of flanges 21 are disposed substantially concentrically with tube portion 14 and merge with the flared fitting portion 18. Opposed portions 24 at the other end of flanges 21 extend perpendicularly from the opposite side edges of the plate portion 19. The flange portions 24 are provided with aligned apertures 25 adapted to receive any suitable means (not shown), such as a cotterpin or the like, for fixedly mounting the lower end of the tube 10 and fitting 15 with relation to the crank case or the frame of an engine. The gage of sheet metal employed for the manufacture of fitting 15 is preferably such that the fitting will be of rigid construction, and at the same time will be subject upon impact to at least some degree of vibration or resilience.

The tube 13 is soldered to or otherwise rigidly connected with the housing of the filter unit 12. Portion 13' of said tube adjacent the filter unit is preferably curved, and said tube has an elongated straight terminal portion 26 of an outer dimension which will fit snugly and rotatably within the enlarged bore 14' of the tube portion 14. A sleeve 27 is fixedly mounted upon the tube portion 26 intermediate thereof and spaced from the free end of the tube a distance less than the length of the enlarged bore 14' of tube portion 14. Sleeve 27 preferably includes an enlarged flange portion 28 at its outer end, a reduced diameter intermediate portion, and an enlarged flange 29 at its inner end. The diameter of the enlarged flange portions 28 and 29 is preferably slightly less than the spacing of diametrically opposed points of the curved portions 23 of the fitting 15, whereby said sleeve 27 may fit freely within the fitting 15. The diameter of said sleeve flange 28 is slightly greater than the external diameter of the tube portion 14.

An apertured flat plate 30 is mounted upon the tube portion 26 in face contacting engagement with the outer face of the sleeve flange 29, and is fixedly secured to the tube 26, as by welding or soldering at 31. The upper and lower edges of the tube diverge whereby one side thereof is enlarged, and a pair of vertically spaced coplanar ears 32 are bent from the upper and lower parts of the enlarged portion of said plate in a direction substantially perpendicular to the plane of said plate. The ears 32 are spaced apart a distance greater than the spacing between the flange portions 22 of the fitting 15, and are so positioned as to extend on opposite sides of said flanges 22 when the fitting is assembled.

It will be observed from the above that when

the tube 10 has been properly connected at 11 with the oil pump of an engine and provided with securing means received in apertures 25, the filter unit 12 with its conduit 13 can be applied to and removed from operative pivotal connection therewith by simply sliding the tube portion 26 within the bore 14' of tube portion 14. The tabs or ears 32 of the plate 30 are positioned above and below the projection 20 and flanges 22 of the fitting 15. The horizontal position of the tube parts 14 and 26 assures that the filter will remain in operative position when the engine is not operating. However, as soon as the engine is started, with incident operation of the oil pump with which the tube 10 is connected, the suction created by said pump within the tube 10 will serve to maintain the operative connection between the parts, and to draw the sleeve 27, 28 against the free outer end of the tube portion 14 for the purpose of substantially effecting a seal therebetween. By reason of the narrow wall section of the tube portion 14, the end thereof constitutes a narrow sealing ring, so that any given suction generated by the pump will create a higher unit sealing pressure between the same and sleeve 27 than would be true in instances where the thickness of said wall was greater. Hence the possibility of leakage or seepage of oil direct from the oil pan through the joint is minimized.

It will be obvious that the loose interconnection and relative rotation of the parts will almost inevitably permit a small amount of seepage or leakage of oil at the joint. However, with the instant construction, and particularly by virtue of the provision of the pocket 18', any foreign matter or particles in the oil which seeps to the joint is flushed from the oil and pocketed in recess 18', and thereby substantially prevented and excluded from passing between the end of the tube portion 14 and the face of flange 28 of sleeve 27. Hence, this construction provides a greatly improved and tighter seal for the loose pivot joint between the respective parts than is possible with previous constructions.

Attention is also directed to the fact that the formation of the flanges 22 of fitting 15 from sheet metal which is subject at least to a vibration or resilience, tends to absorb any shock incident to impact of ears 32 of plate 30 thereagainst upon rapid pivoting of the floating oil filter incident to rapid change in the oil level in the crank case or to other causes, such as jarring of the engine in a vehicle traveling over rough roads. The absorption of this shock upon interengagement of parts 22 and 32 thus minimizes the danger of weakening or breaking of soldered connections, as joint 31, and the joint (not shown) between the tube 13 for the housing of the filter unit 12. In this way the length of the life of the device is increased, the danger of failure thereof is correspondingly decreased, and the device is substantially improved for the hardest conditions of engine usage.

It will be obvious that the accurate positioning of the plate 30 and the ears 32 with reference to the tube 13, and the rigid and non-yielding securing of said plate to said tube is absolutely essential in order to insure against such misadjustment of the ears 32 as would permit the limits of tilting movement of the filter unit 12 to be varied. Any such variation of these limits would obviously be dangerous and might result in reduction or elimination of the clearance between the uppermost position of the floating filter unit

and the lowermost position of the crank shaft and connecting rods, and hence possibly permit the latter to strike the former with possible resultant injury to either or all of said parts. Hence, any resilience in the device must be limited and must be provided in fixed parts of the assembly. It will be observed that the solid securing of plate 30 at 31, and the positioning of ears 32 in a plane substantially parallel to the direction of movement of the oil filter insures against resilience thereof, while limited resilience is provided by the flanges 22 of fitting 15 which are engaged by the ears 32 and which extend in planes substantially perpendicular to the path of movement of ears 32.

While the construction herein illustrated and described is preferred, it will be understood that various changes may be made therein without departing from the spirit of my invention.

I claim:

1. A joint construction for a floating oil filter adapted for connection with an oil pump, comprising a tube adapted for connection with said pump and bent to provide a normally substantially horizontal straight end portion of thin wall section, a sheet metal abutment member secured to said tube and including a projection of substantially U-section, a second tube fitting snugly and rotatably in the end portion of said first tube and having an annular enlargement against which the end of said first tube bears, and a member fixedly carried by said second tube and having spaced projections disposed on opposite sides of said abutment and spaced apart a distance greater than the width of said abutment, said projections being engageable with opposed walls of said abutment member.

2. In a joint construction for a floating oil filter unit adapted for connection with a forced circulation oiling system, a tube fixedly connected with said system and bent to provide a substantially horizontal straight end portion of thin wall section, a second tube carried by said filter unit and having a snug rotatable fit in said first tube, a circumferential enlargement on said second tube against which the end of said first tube bears, a rigid non-resilient member fixedly carried by said second tube and having a pair of spaced complementary ears projecting laterally therefrom, and a sheet metal member fixedly secured to said first tube and having a projecting portion transverse of said tube interposed between said ears, said projecting portion including flanges disposed in planes intersecting the path of movement of and engageable by said ears.

3. A joint construction for a filter unit adapted to float in the crank case of an internal combustion engine and to be connected with a forced feed engine lubrication system, comprising a tube fixedly connected with said system and including a horizontal thin walled end portion, a second tube fitting snugly and rotatably in said end portion of said first tube and connected with said filter unit, an annular enlargement on said second tube against which the end of said first tube seats to provide a substantially sealed joint, a rigid member fixedly carried by said second tube adjacent said enlargement and having a pair of spaced rigid ears projecting therefrom, and a metal stamping secured to said first tube and including a pair of opposed projecting flanges spaced apart less than the spacing of said ears and interposed therebetween in planes disposed

substantially perpendicularly to path of movement of said ears.

4. A joint construction between a floating oil filter unit and a forced feed oil circulating system, comprising a stationary tube connected with said system and terminating in a horizontal portion, a tube carried by said filter unit and fitting rotatably in said first tube, an external ring fixed on said filter tube against which the end of said first tube bears to substantially seal said joint, and parts fixedly carried by said tubes, one of said parts having spaced stops between which the other part fits loosely to limit relative rotation of said tubes, the part carried by said first tube defining an annular recess around said tube spaced from the end thereof to trap impurities in oil drawn toward said joint at the exterior thereof by leakage of said joint.

5. The joint construction defined in claim 4, wherein said last named part constitutes a sheet metal stamping including a collar fixedly secured to said first tube in spaced relation to its end and a portion flaring therefrom to define said annular recess.

6. A joint construction comprising a pair of relatively rotatable telescoping tubes carried respectively by a floating oil filter unit and a forced feed lubrication system, a bearing ring on the inner tube against which the end of the outer tube bears, spaced rigid stops fixedly carried by said inner tube in laterally projecting relation thereto, and a sheet metal fitting fixedly secured to said outer tube adjacent the end thereof and including a sleeve portion encircling said tube, a portion flaring from said tube to provide an annular cavity around the end of the outer tube, a narrow transverse wall projecting transversely from one side of said flaring portion, and opposed flanges bent substantially perpendicularly from opposite sides of said wall, said flanges being interposed between said stops and extending in planes substantially perpendicular to the path of movement of said stops.

7. A joint construction between a floating oil filter unit and a forced feed oil circulating system comprising a substantially stationary tube connected with said system and terminating in a substantially horizontal portion, a tube carried by said filter unit, one of said tubes fitting rotatably in the other tube, a sleeve mounted on the inner tube and bearing against the end of the outer tube, spaced stops carried by one tube, and a sheet metal abutment fitting mounted on the other tube and interposed between said stops, said abutment fitting including a cylindrical portion, a portion flaring from one end of said cylindrical portion, a pair of substantially flat portions projecting from opposite sides of said flaring portion, and opposed elongated flanges each defining and extending substantially perpendicularly from one side of each of said flat portions and including an intermediate curved portion merging with said flared portion and substantially concentric with said cylindrical portion.

8. A joint construction as defined in claim 7, wherein one of the flat portions of said fitting is narrow and forms an abutment and the other is comparatively wide, and wherein the flanges are provided with aligned apertures at the ends thereof adjacent the last named portion, and a securing member extending through said apertures.

WILLIS E. HASELWOOD.