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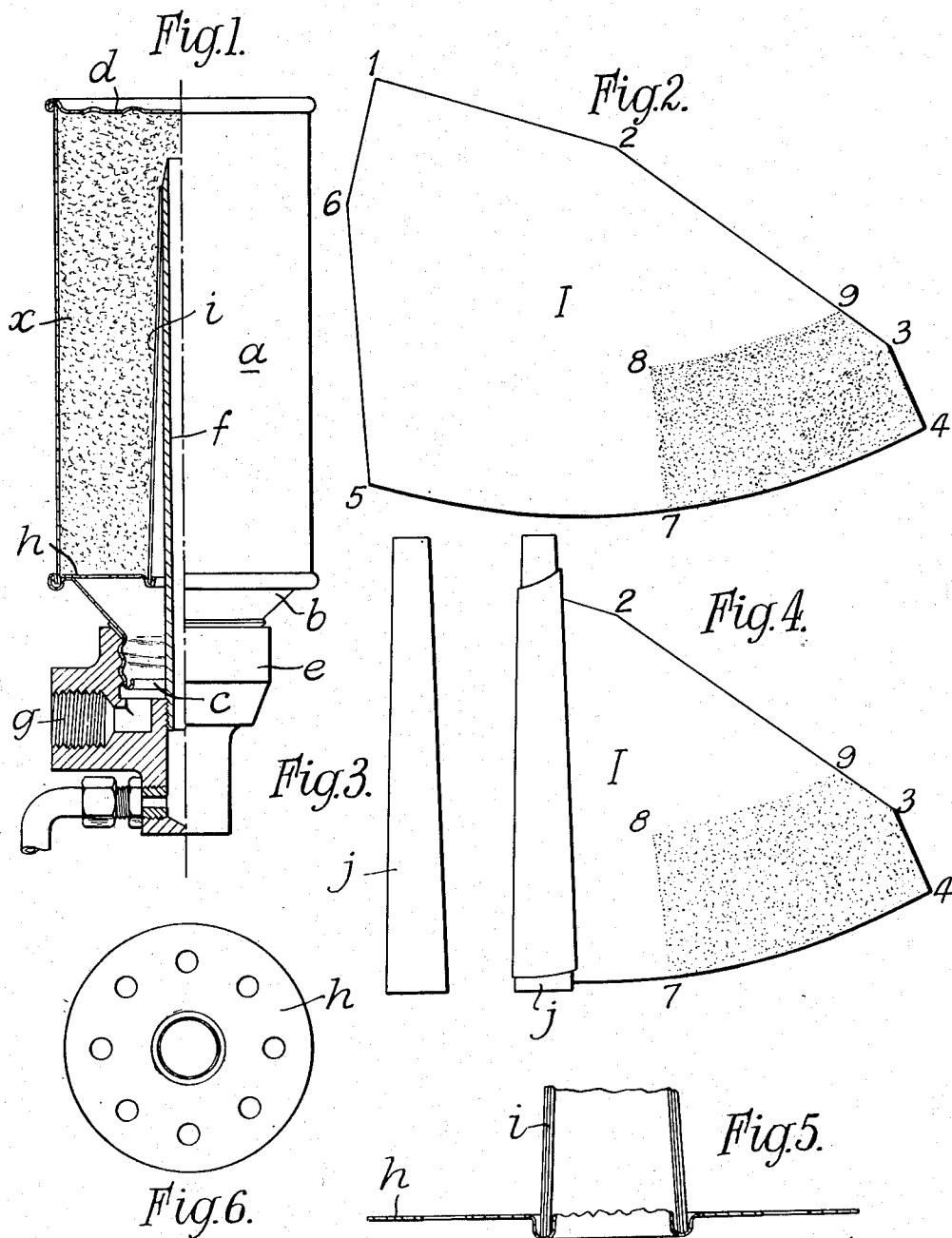
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OIL FILTER

Filed April 6, 1945

2 Sheets-Sheet 1



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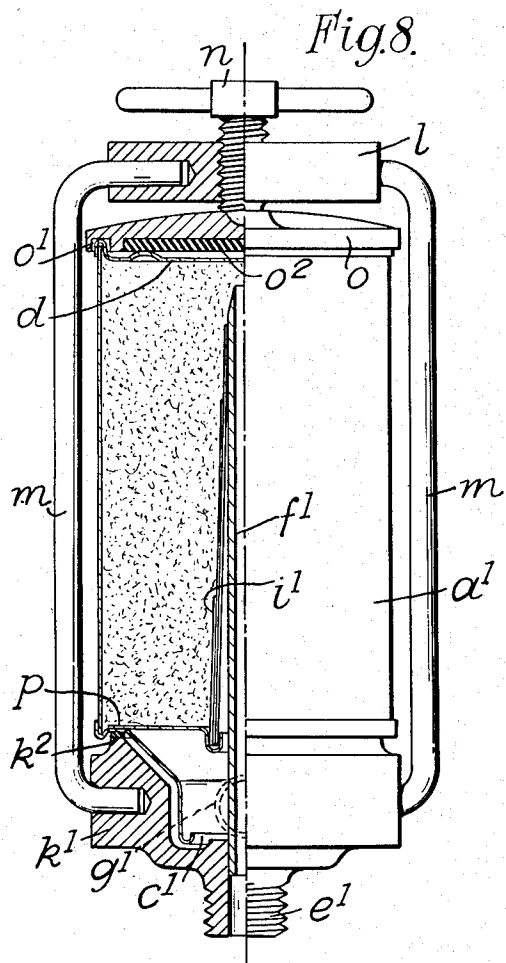
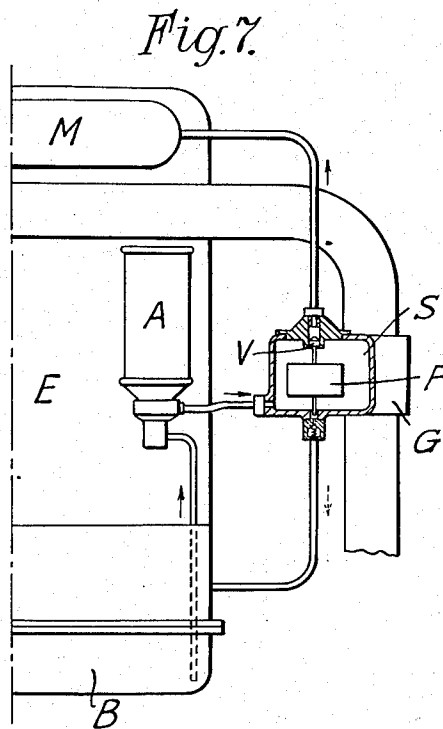
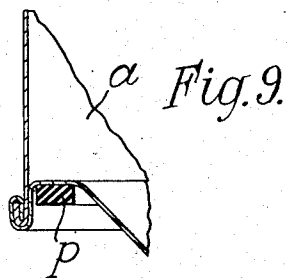
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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OIL FILTER

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3 Claims. (Cl. 210-164)

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This invention relates to oil filters for removing impurities from the lubricating oil of internal combustion engines.

The main object of the invention is to provide a simple and relatively inexpensive device which can be fitted to existing oil pipe systems for motor car and other internal combustion engines.

Another object is to provide an improved oil filter having a replaceable element made from cheap fibrous material which can be thrown away after use.

A further object is to provide an improved oil filter having a replaceable element made from a coil of paper or like material arranged to be self-sealing against leakage when fitted in position.

Other objects and advantages of the invention will hereinafter appear from the following description given with reference to the accompanying drawings, in which:

Fig. 1 is a part-sectional elevation of the improved oil filter, in one embodiment.

Fig. 2 represents a suitable paper blank for the coiled paper sleeve.

Fig. 3 represents a mandrel for the coiling of the sleeve.

Fig. 4 illustrates the coiling of the paper sleeve.

Fig. 5 is a section of the metal disc with the lower end of the paper sleeve secured thereto, and Fig. 6 is a plan of the disc before insertion of the paper sleeve.

Fig. 7 represents diagrammatically the lubricating system of an engine, including the improved oil filter and means for separating out unvaporized fuel from the oil, the separated fuel being fed to the inlet manifold and the purified oil returned to the engine base or sump.

Fig. 8 shows the application of the invention to a pressure system of oil circulation, such as used on motor cars, and Fig. 9 is a detail in section on a larger scale.

Referring to Fig. 1, the improved oil filter comprises a sheet metal canister *a*, which is conveniently made open at one end but having at its other end a conical neck *b*, leading to the mouth *c* which is screw-threaded externally; the open end is subsequently closed by a disc *d*, which may be seamed in place, as shown, or made removable to facilitate access to the interior of the canister. The mouth of the canister is adapted to be screwed into an internally-threaded mounting *e* which has a centrally projecting oil pipe *f* which allows oil from the engine to be by-passed into the canister, and has also a lateral or eccentric port *g* which allows the filtered oil to be subsequently collected from the mouth of the canister. A perforated metal disc *h* is dropped into the canister, while its upper end is still open, this disc being secured transversely upon a tapered paper tube *i* made from coiled paper strip; the disc is suitably held in place, for example by rolling the

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edge of the central perforation in the disc over the base of the tube *i*. Between the exterior of the tapered paper tube *i* and the wall of the canister is inserted and packed white cotton waste as the filtering medium, this being represented diagrammatically at *x*; the end disc *d* is then secured in place and the canister screwed into the mounting *e*.

As illustrated in Figs. 2-4, the tapered paper tube *i* is formed by coiling a paper blank *l* of the shape represented by the outline 1-2-3-4-5-6 in Fig. 2, around a tapered wooden mandrel *j*, such as represented in Fig. 3, the shaded area 3-4-7-8-9 of the blank being coated with adhesive such as glue unaffected by oil or by moderate heat; in the position shown in Fig. 4, the blank is already partly coiled around the mandrel, but continued rolling will bring the coated area into contact with the underlying portion of the blank, thus fastening them together to provide a rigid lower end for the tube. This rigid end may extend for about one third of the length of the tube, corresponding to the height of the adhesively coated area, the remainder of the length of the tube having the coils loose or separated.

The central perforation in the metal disc *h* is preferably punched with a ragged edge (not a clean-cut edge) in order to facilitate the engagement and locking together of the disc and the rigid end or base of the tapered paper tube after the latter has been removed from the mandrel; the punching may form a cylindrical wall which is then doubled back internally to provide an annular groove in which the paper tube is engaged, the two thicknesses of the wall being then crimped together to lock the tube in place, as shown more clearly in Fig. 5.

The oil inlet pipe *f* which stands up from the mounting *e*, passes up into the coiled paper tube *i* when the neck of the canister is screwed into its mounting *e* and during this screwing action the coils of the paper tube at the inner portion of the said tube tighten upon the central oil inlet pipe. In this way an oil-tight joint is formed between the tapered paper tube and the exterior of the oil pipe, the paper tube directing the oil away from the pipe and through the filtering medium *x*.

The inner end of the oil inlet pipe *f* should project slightly beyond the inner end of the tapered paper tube. The spiral of the paper tube should be of the same hand as the thread on the neck or mouth of the canister *a*.

The kind of paper used for the spirally-rolled tube may be that commonly known as kraft paper or hard brown paper.

The mounting shown in Fig. 1 is particularly applicable in connection with the lubricating system of an engine such as employed on agricul-

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tural tractors, the oil being fed to the filter by the suction of the inlet manifold which separates out unvaporized fuel from the lubricating oil. As shown diagrammatically in Fig. 7, the engine E has its inlet manifold M connected to the top of a separator chamber S enclosing a float F which carries a valve V to control the inlet connection; in the open position of the valve, the suction draws up oil from the engine base B, as shown by the full-line arrows, through the filter A into the chamber S, which is heated by the engine exhaust gases at G, the oil continuing to rise in this chamber until the float shuts off the suction. The heating of the oil drives off the unvaporized fuel contained therein, the resulting pressure aiding the gravity effect to return the filtered and stripped oil to the engine base, as indicated by the dotted arrow; when the oil level in the chamber S falls, the float opens the inlet connection again and the cycle is repeated.

In applying the invention to an engine having pressure lubrication, as customary in motor cars, the oil may be forced through the filter by the pressure in the oil system, created by the usual oil pump. In this case, the oil filter is preferably fitted in a mounting e^1 such as illustrated in Figs. 8 and 9, where the oil pipe f^1 extends upwards from a socket k^1 recessed around the pipe to accommodate the neck or mouth c^1 of the canister a^1 ; a lateral port g^1 in the side of the recess allows the filtered oil to return into circulation. The canister is twisted in position so as to contract the upper coils of the paper tube i^1 around the oil pipe, and is then held firmly in place upon the socket k^1 by tightening a clamp l connected by side links m and fitted with a pressure screw n for the platen o ; the latter is formed with an annular groove or seating o^1 for the rim of the canister, and may be provided with a rubber cushion o^2 to support the end disc d against bellng out. A suitable gasket p is fitted between the lower end of the canister and the rim k^2 of the socket to prevent leakage therefrom.

The spirally wound paper tube i or i^1 is provided for two principal purposes. First, it prevents the cotton-waste or equivalent filtering material from fouling the upstanding oil inlet pipe f or f^1 when the canister a or a^1 is being screwed into its mounting e or e^1 and secondly, due to the way the spiral is formed, the action of screwing the canister into its mounting (as described with reference to Fig. 1) or twisting it in position therein (as described with reference to Fig. 8) in the absence of a screw-threaded connection, causes the free or inner portion of the spirally wound tube to contract by constrictive action upon the inner oil pipe; as stated, the coils of the spirally wound tube are not secured together at the inner end of the oil pipe. In this way, contaminated oil issuing from the inlet pipe f or f^1 inside the canister a or a^1 must travel down through the cotton-waste filtering material instead of down the exterior of the oil inlet pipe.

What I claim is:

1. An oil filter for internal combustion engines, comprising a container, means for connecting one end of said container with the oil-pipe system of the engine, an inlet pipe associated with said connecting means and extending into said container, said pipe being adapted to deliver oil

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from said system to the opposite end of said container, a directive sleeve of paper material coiled into a tapered spiral around said pipe with its inner coil contacting said pipe near its delivery end but leaving said delivery end free, the remainder of said sleeve being spaced at gradually increasing distance from the exterior of said pipe, a perforated disc secured transversely upon said sleeve at a position remote from the delivery end of said pipe, the periphery of said disc engaging the interior of said container so as to maintain said sleeve spaced from said pipe at the first-mentioned end of the container, filtering material arranged inside said container outside said sleeve, and an outlet associated with said connecting means, said outlet being in communication with the interior of said container outside said sleeve.

2. An oil filter for internal combustion engines, comprising a container, said container having an open end adapted for screwing to a threaded mounting in the oil pipe system of the engine, an inlet pipe projecting from said mounting through the open end of said container, said inlet pipe being adapted to deliver oil from said system to near the opposite end of said container, a sleeve of fibrous material surrounding said inlet pipe in the interior of said container, said sleeve being coiled into a tapered spiral with its smaller end contacting said pipe near its delivery end but leaving said delivery end free, means for securing together the lapping coils of said sleeve at the larger end thereof and spacing said larger end from said pipe, filtering material arranged inside said container and outside said sleeve, and an outlet through said mounting in communication with the interior of said casing outside said sleeve, said sleeve being adapted to wrap its smaller end into tight contact with said inlet pipe as said container is twisted to screw it into engagement with said mounting.

3. In an oil filter of the character described, an element consisting of a blank of paper coiled to tapered tubular shape, an area towards one end of said blank being coated with material to cause adhesion of superposed coils near the larger end of said coiled paper blank, and a centrally perforated disc applied transversely to said coiled paper blank at said larger end, the central perforation of said disc having its edge grooved and crimped over said larger end for securing said disc to said coiled paper blank, and the remainder of said coiled paper blank towards the smaller end thereof forming loose coils internal of said superposed coils.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 6,114	Sinclair	Nov. 3, 1874
661,151	McCausland	Nov. 6, 1900
886,884	Smith	May 5, 1908
2,093,877	Von Pentz	Sept. 21, 1937
2,098,725	Hurn	Nov. 9, 1937
2,168,124	Hurn	Aug. 1, 1939
2,175,775	Hurn	Oct. 10, 1939
2,209,180	Von Pentz	July 23, 1940
2,379,582	Kracklauer	July 3, 1945