

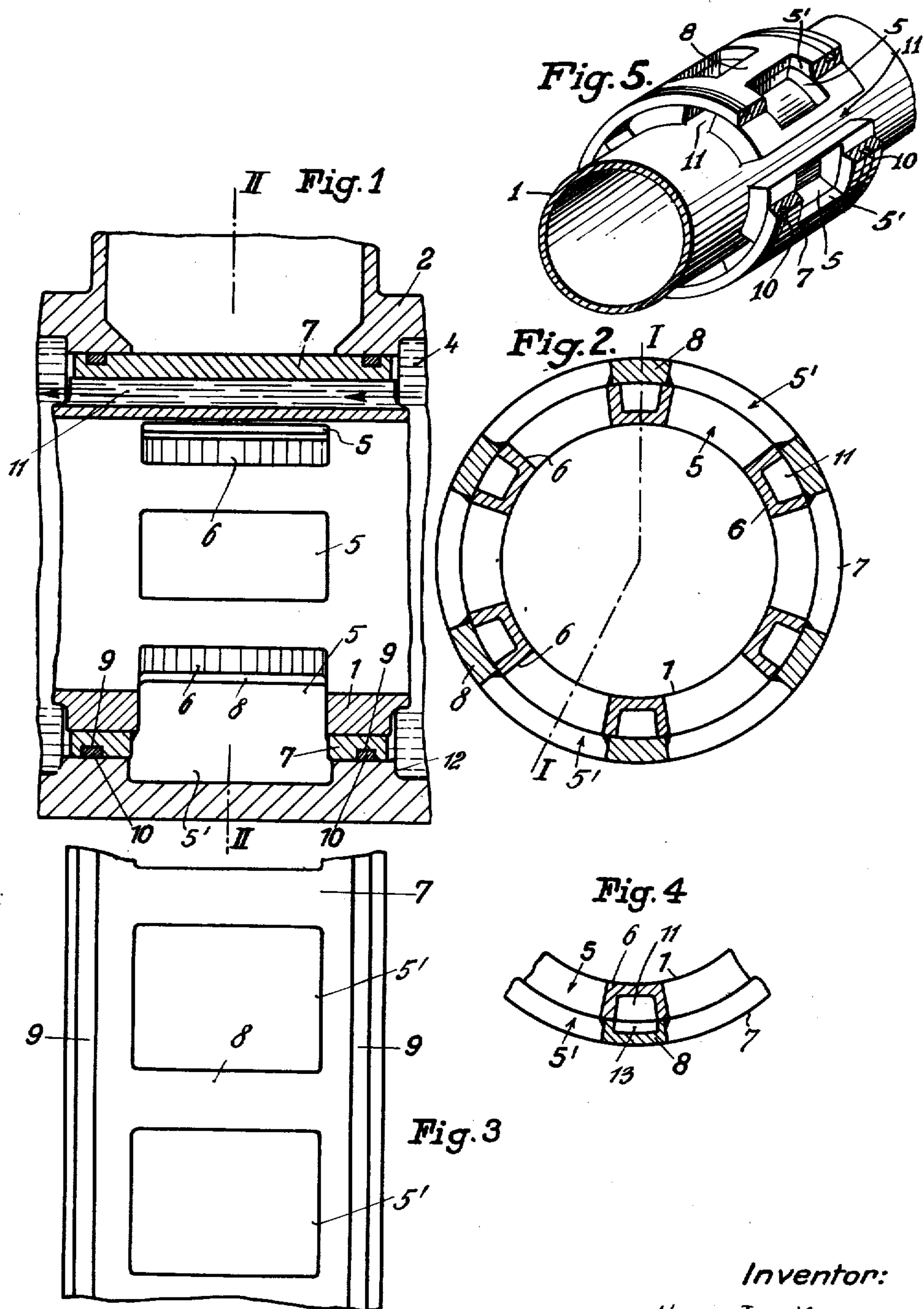
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CYLINDER FOR INTERNAL COMBUSTION ENGINES

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## UNITED STATES PATENT OFFICE

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## CYLINDER FOR INTERNAL COMBUSTION ENGINES

Application filed April 4, 1931, Serial No. 527,702, and in Germany April 30, 1930.

My invention relates to cylinders for internal combustion engines, and more especially to cylinders such as disclosed in my prior patent of the United States, 1,818,558, August 11, 1931, for "construction of engine cylinders".

In the said patent I have described a cylinder with a row of ports formed in the cylinder wall and passages for cooling liquid intermediate the ports. The walls or webs intermediate the ports are channelled and open towards the circumference of the cylinder, and a cover is mounted on each channel section for converting it into a closed canal for the cooling liquid.

It is an object of my present invention to improve a cylinder of the kind referred to. To this end I provide the channel-section webs intermediate the ports in the manner described, but instead of providing a separate cover for each channel section I place on the cylinder or on its liner a sleeve which is slotted in conformity with the ports in the cylinder, so that its intermediate webs cover the channels in the webs of the cylinder and make up for the reception of the cooling liquid.

By providing the slotted sleeve the necessity is obviated of providing a separate cover for each channel section and fitting it onto the channel section, as the slotted sleeve is a self-contained unit which is placed on the cylinder or liner with its ports registering with the ports and with its webs registering with the channel sections of the cylinder or liner. When the sleeve has been placed in position on the cylinder liner, the joints at the ports are tightened by a metallic connection, for instance by welding or soldering.

It will be understood that the manufacture is simplified and accelerated by providing the sleeve, as the extra work involved by the fitting of separate covers is eliminated. I obtain the further advantage that the sleeve, when on the cylinder or liner has no projecting parts on its outer face, so that it is readily inserted in a cooling jacket and it is not necessary to finish or retouch the welding seams. Apart therefrom cylinders hav-

ing webs inclined to their axes are readily manufactured while the provision of such webs in connection with separately mounted covers disclosed in my copending application involves great difficulties, as the covers must be curved exactly in the direction of a helical line and fitted separately to the webs.

In the drawing affixed to this specification and forming part thereof an engine cylinder embodying my invention is illustrated diagrammatically by way of example.

In the drawing

Fig. 1 shows a portion of a cylinder having a liner and a cooling jacket in section on the line I—I in Fig. 2,

Fig. 2 is a section on the line II—II in Fig. 1,

Fig. 3 shows a portion of the cylinder liner with its ports developed,

Fig. 4 is a transverse section showing a modified construction of cooling passages, and

Fig. 5 is a perspective illustration, partly broken open, showing the sleeve on the liner.

Referring now to the drawing, and first to Figs. 1, 2, 3 and 5, 1 is the cylinder liner, 2 is the cooling jacket or cylinder body, 3 and 4 are chambers filled with cooling liquid at opposite sides of an inwardly projecting seat or flange 12 of the jacket, 5 are slots or ports formed in the liner 1, and 6 are the intermediate walls or webs which are channel sectioned so that their cavities 11 form passages for the cooling liquid intermediate the slots 5. The cavities 11 are open toward the outside of the liner 1. 7 is a sleeve which is placed on the liner 1 and inserted in the seat 12 of the cooling jacket. The sleeve is slotted at 5' and equipped with webs 8 intermediate the slots. When the sleeve 7 is placed on the liner 1, the ports and webs in the liner and in the sleeve register as shown in Fig. 2. 9 are circumferential grooves in the sleeve 7, and 10 are rings serving to pack the sleeve in the seat 12 against the cooling liquid in the chambers 3 and 4.

When the sleeve 7 has been placed in position on the liner 1, the joints of the sections 6 and the webs 8 are tightened by a metallic connection such as welding or soldering, so



that the parts are combined into a single liquid-tight unit which is firmly held in the seat 12.

Referring now to Fig. 4, the webs 8 in the sleeve 7 are here recessed at 13 which may be desirable in order to reduce the weight of the sleeve. In this type the cavities 11 and 13 of the channel sections 6 and the channelled webs 8 respectively, make up together the canals for the cooling liquid.

I have described a liner 1 and a cylinder body 2 in which the liner 1 is inserted and which acts as a cooling jacket, but it is understood that I am not limited to this particular construction but may adapt my invention to any type of cylinder, with or without a liner, and in general I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any particular modification of the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by these claims is expressly reserved.

I claim:—

1. An engine cylinder with a row of ports formed in the cylinder wall, the wall sections intermediate the ports of said row having the form of channels open towards the circumference of the cylinder, and a sleeve adapted to be placed on said cylinder and having ports and webs registering with the ports and channel sections in said cylinder so as to convert said channel sections into closed canals.

2. An engine cylinder with a row of ports formed in the cylinder wall, the wall sections intermediate the ports of said row having the form of channels open towards the circumference of the cylinder, a sleeve adapted to be placed on said cylinder and having ports and webs registering with the ports and channel sections in said cylinder so as to convert said channel sections into closed canals, and cooling-liquid chambers at both ends of, and communicating with, said canals.

3. An engine cylinder with a row of ports formed in the cylinder wall, the wall sections intermediate the ports of said row having the form of channels open towards the circumference of the cylinder, and a sleeve adapted to be placed on said cylinder and having ports and webs of channel section registering with the ports and channel sections in said cylinder so as to convert said channel sections into closed canals.

4. An engine cylinder with a row of ports formed in the cylinder wall, the wall sections intermediate the ports of said row having the form of channels open towards the circumference of the cylinder, a sleeve adapted

to be placed on said cylinder and having ports and webs registering with the ports and channel sections in said cylinder so as to convert said channel sections into closed canals, the joints of said sleeve and said cylinder being tightened by a metallic connection.

5. An engine cylinder with a row of ports formed in the cylinder wall, the wall sections intermediate the ports of said row having the form of channels open towards the circumference of the cylinder, a sleeve adapted to be placed on said cylinder and having ports and webs registering with the ports and channel sections in said cylinder so as to convert said channel sections into closed canals, a cooling-liquid jacket adapted to receive said sleeve, and packing rings in grooves of said sleeve adapted to make a tight fit with said jacket.

6. An engine cylinder having ports with webs intermediate said ports, each web having a cavity, and a sleeve having ports and webs in registering relation to the ports and webs in said cylinder and adapted to be placed on said cylinder so that its webs cover the cavities in the webs of said cylinder.

7. An engine cylinder having ports with webs intermediate said ports, each web having a cavity, and a sleeve having ports and webs in registering relation to the ports and webs in said cylinder and adapted to be placed on said cylinder so that its webs cover the cavities in the webs of said cylinder, and said webs in said sleeve having cavities in line with the cavities in the webs of said cylinder.

In testimony whereof I affix my signature.  
HUGO JUNKERS.

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