Aug. 15, 1933. W. STEIGER 1,922,985

CHARGING PUMP FOR MULTICYLINDER TWO-STROKE COMBUSTION ENGINES OR COMPRESSORS

Filed Oct. 15, 1931 2 Sheets-Sheet 1

Fig. 1.

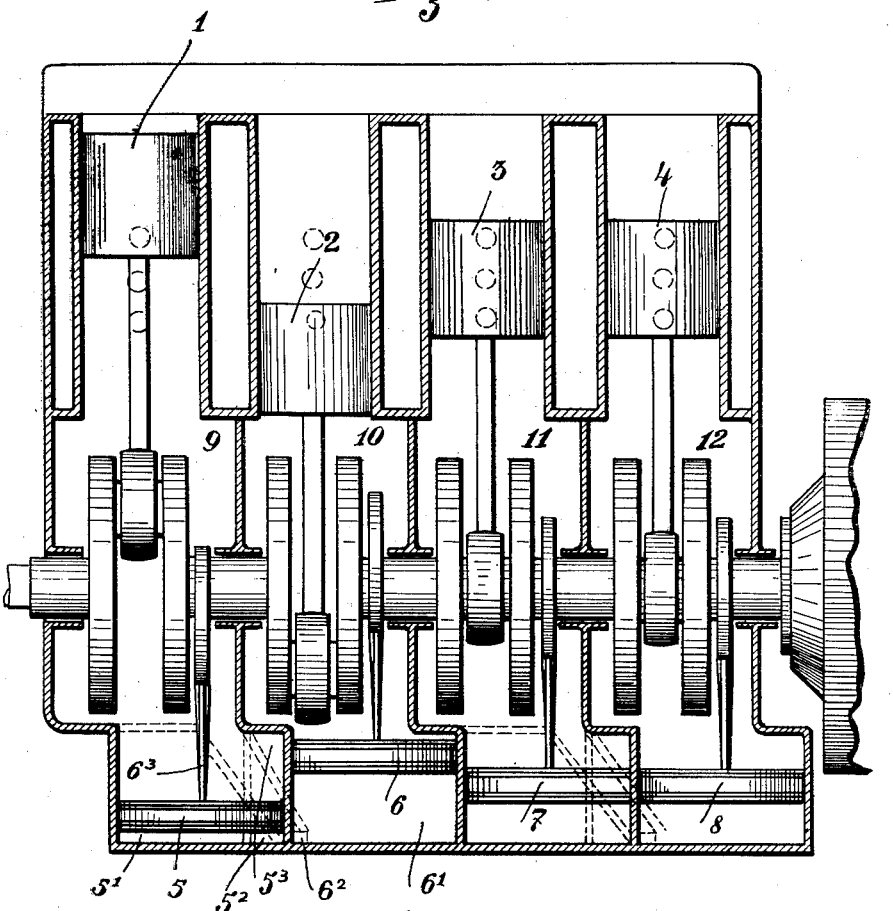
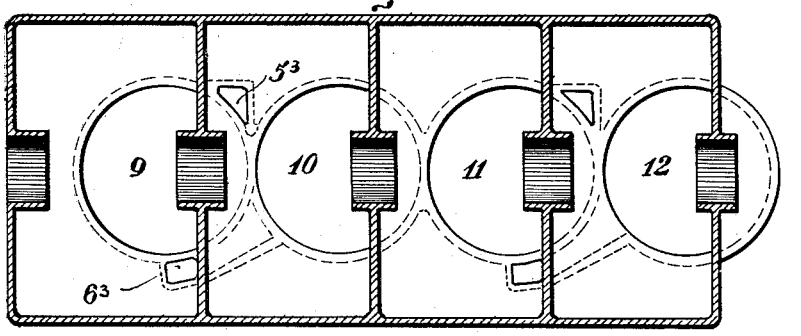


Fig. 2.



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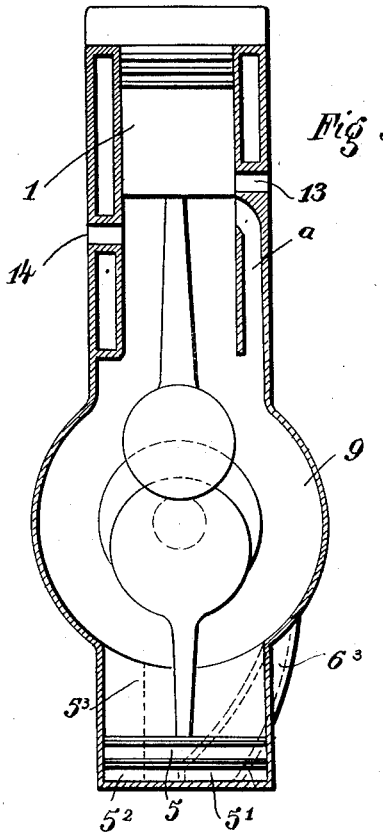

Fig. 3.

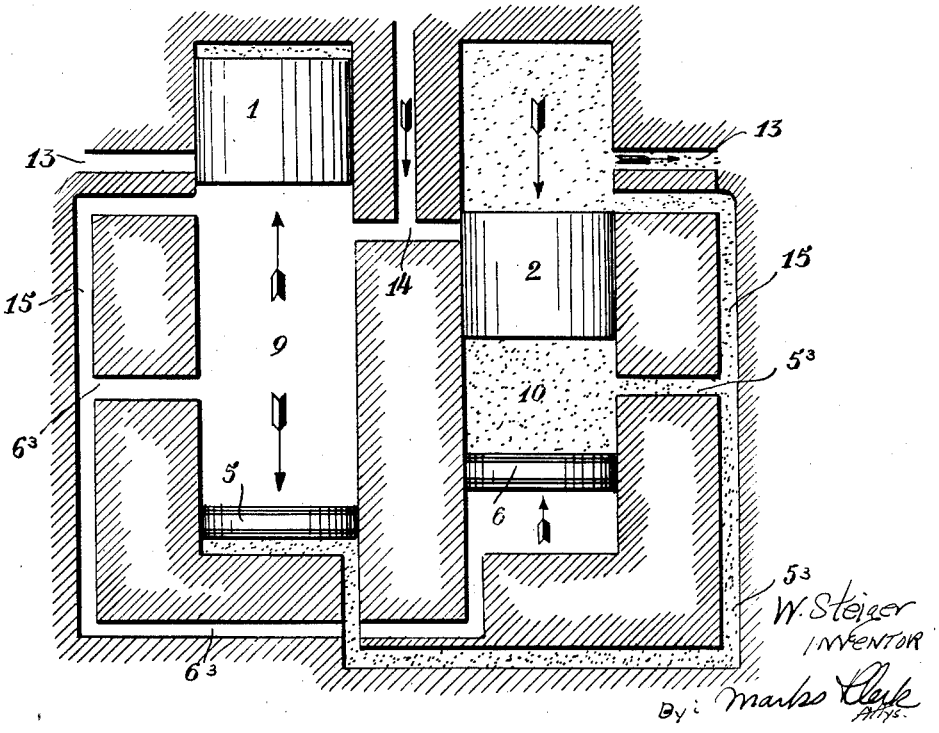

Fig. 4.

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1,922,985

UNITED STATES PATENT OFFICE

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CHARGING PUMP FOR MULTICYLINDER TWO-STROKE COMBUSTION ENGINES OR COMPRESSORS

Walther Steiger, Bern, Switzerland

Application October 15, 1931, Serial No. 569,047, and in Germany October 22, 1930

1 Claim. (Cl. 123—59)

The present invention relates to charging pumps for multi-cylinder two-stroke internal combustion engines or compressors and has for its object to supply the required quantity of air especially for high speed engines fed with crude oil.

Since a two-stroke crude oil motor needs considerably more air for obtaining a good output than is needed for a two-stroke petrol motor the ordinary charging pumps would not suffice and charging devices of greater capacity would be required. But such larger devices would have to be separated from the crank chamber and would require separate driving and controlling means.

The present invention therefore consists in a two-stroke internal combustion piston engine provided with a crank case pump and a double acting auxiliary pump arranged coaxially with the main cylinder on the other side of the crank shaft so that the piston of this pump will help with its inner face to effect the suction and the preliminary compression of the charge.

The novelty resides in that the machine comprises at least two complete units consisting of working and pump cylinders displaced at 180° the outer side of each auxiliary pump being in constant open communication with the crank case of the said units.

The annexed drawings represent diagrammatically a working example of a four cylinder plant. There

Fig. 1 is a longitudinal section,

Fig. 2 a plan

Fig. 3 a cross section and

Fig. 4 is a diagrammatical view.

According to the drawings the cylinders are divided in groups of two. The cylinders 1, 2 and 3, 4 are two such groups. 5, 6, 7 and 8 are the appertaining charging pumps. Not only the cranks of the power pistons and pump pistons are mutually displaced at 180° but also the cranks of the power pistons and the cranks of the two pump pistons. Besides the chambers of the two pump cylinders 5′, 6′ are communicating mutually with the chambers of the crank chambers 9 and 10 by passageways 5^3, 6^3 opening at the bottom of the pump chambers at 5^2, 6^2. In a similar way also the pistons of the power cylinders 3, 4 and the pump pistons 7, 8 and the crank chambers 11, 12 are arranged accordingly. The exhaust orifice 13 and the inlet orifice 14 of the air are so arranged, that the former is overlapped by the power piston in its upper dead center and the latter in the lower dead center position of the piston. Each crank chamber is communicating with the chamber of the power cylinder by an overflow passageway *a* opening between the exhaust and the air inlet.

According to this arrangement the working is as follows:

If the piston of the first cylinder of the first group, as seen from Fig. 4 assumes the outer dead center position and the piston of the second cylinder assumes the inner dead center position a vacuum is formed between pistons 1 and 5 in the crank case 9 and under the piston 6 of the second group and fresh air will fill these chambers through the unlapped air inlet 14. On the other side the air between pistons 2 and 6 and under the piston 5 will be compressed and pressed into the upper chamber of the cylinder 2 through the passageway 15. The crank case communicates with the power cylinder through the passageway *a*, which also affords communication between the crank case and the inlet and exhaust orifices. But since also the exhaust orifice 13 is free said cylinder 2 will have his scavenging or his filling while in the cylinder 1 the compression is ready for injecting the fuel and for firing.

Thus the pump pistons are double acting and the dimensions of the chambers are chosen so that these pumps will feed a volume of air which is a multiple of that of the volume of the power cylinder.

Of course this arrangement of the air pump could also be employed for air compressors.

What I claim is:

In a multi-cylinder two stroke internal combustion engine and in combination with charging pumps, power cylinders arranged in groups of pairs, a common crankshaft with cranks displaced in each pair at 180°, pump cylinders one for each power cylinder and juxtaposed to them with regard to said crank shaft, separate crank cases open towards the chambers of each set of power and pump cylinder, passageways mutually connecting in each group the crank cases of one power cylinder to the compression chamber of the pump of the other cylinder, air inlets arranged so as to be overlapped in the lower dead center position of the power piston and exhaust orifices arranged so as to be overlapped in the upper dead center position of the power piston.

WALTHER STEIGER.