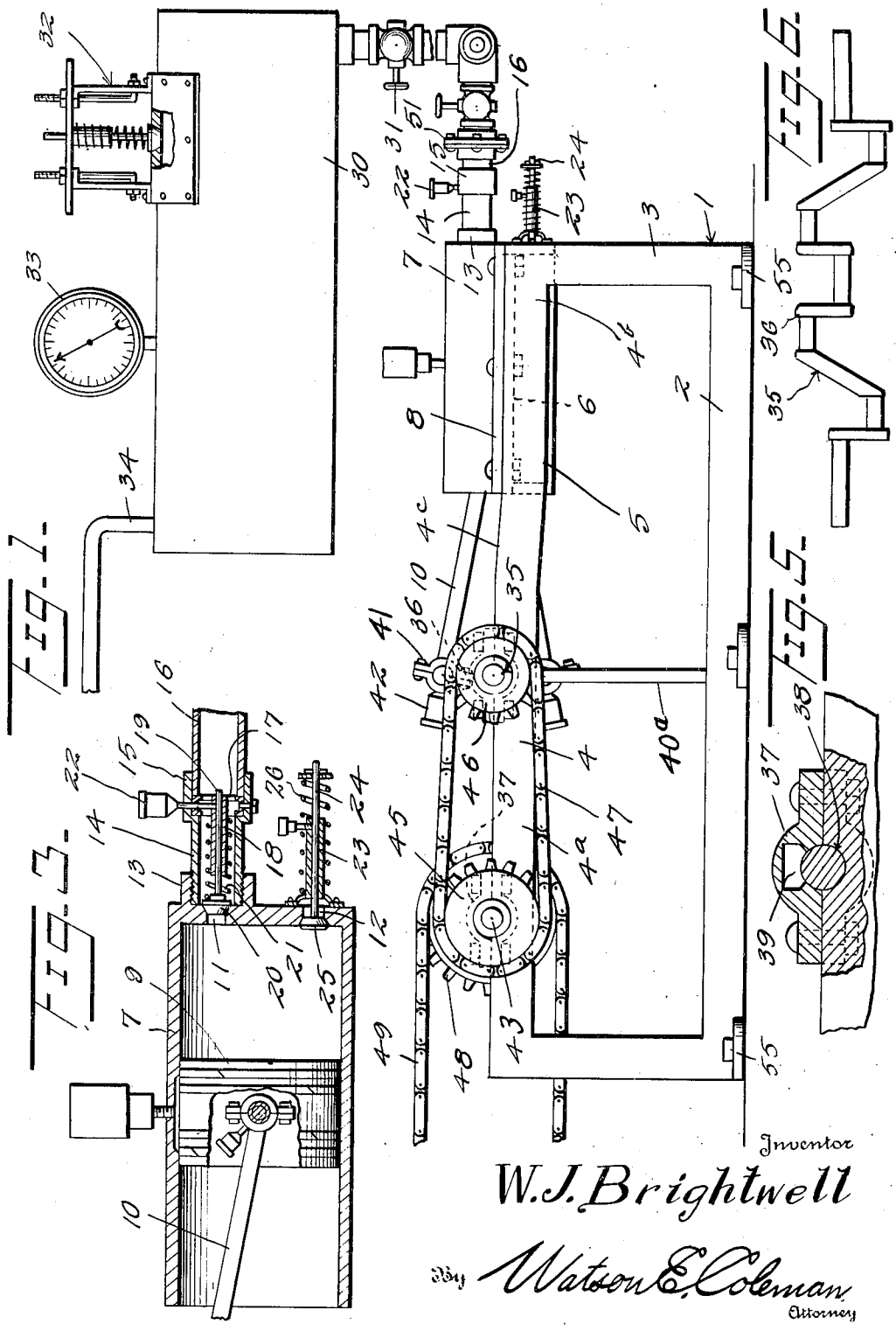
Feb. 22, 1938. W. J. BRIGHTWELL 2,108,958

AIR COMPRESSING MACHINE

Filed Oct. 20, 1936 2 Sheets-Sheet 1



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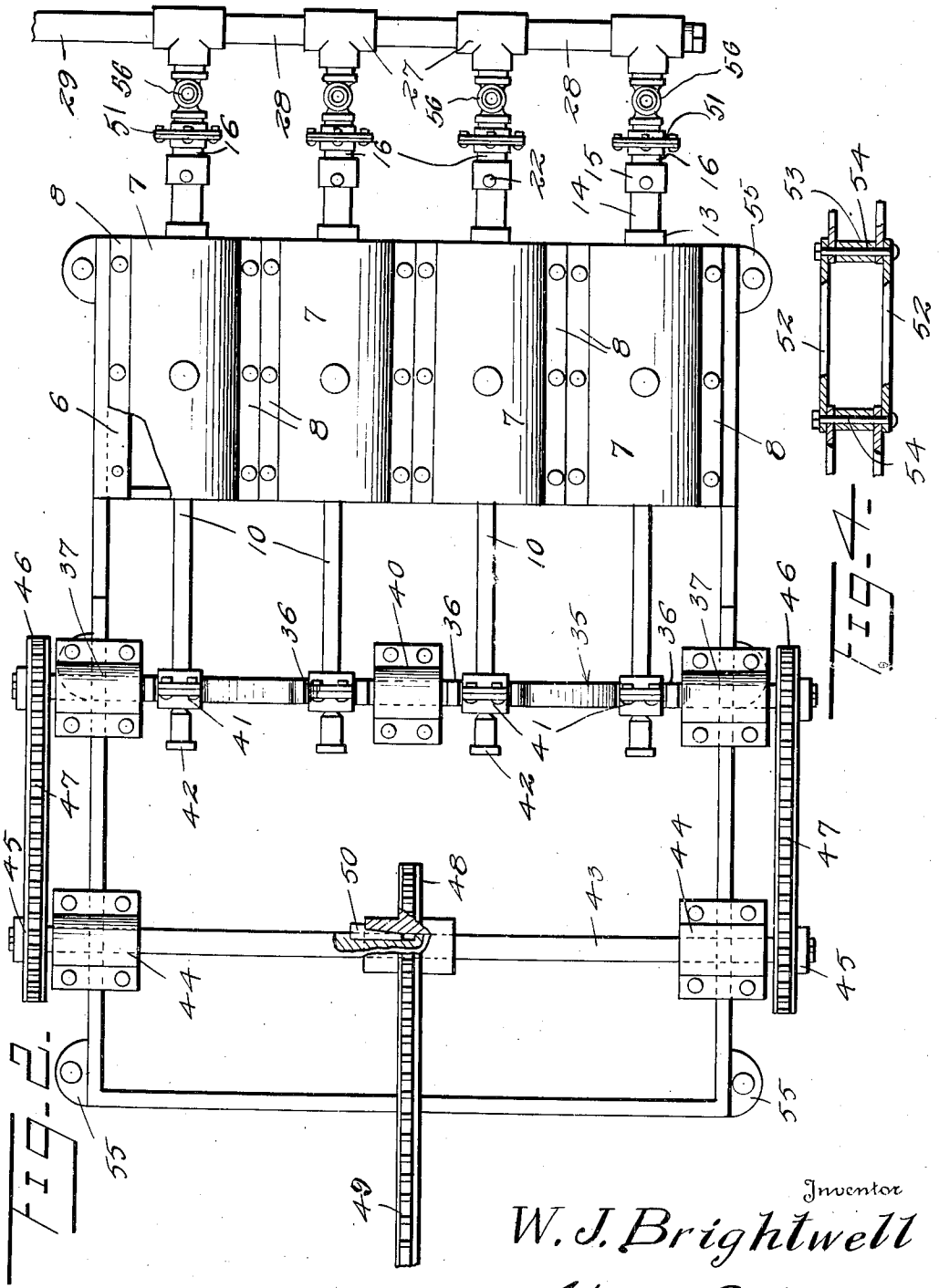


FIG. 2.

FIG. 4.

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AIR COMPRESSING MACHINE

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2 Claims. (Cl. 230—184)

This invention relates to air compressors and has for an object to generally improve the construction of such mechanism and more particularly to improve the mechanism disclosed in my prior Patent No. 1,815,828.

Another and important object of the invention is to provide a compressing machine so improved in design that a larger volume of air may be handled at one time and subjected to a high degree of compression, and further so designed that a plurality of compressors are arranged in such a manner and so connected that the necessity of repairing or replacing any one thereof will not require the stopping of the entire machine, thus making it possible to make repairs or replacements without interfering with the action of the machine.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention, as expressed in the appended claims.

In the drawings:

Figure 1 is a view in side elevation of the machine embodying the present invention.

Fig. 2 is a top plan view of the machine, the compressed air receiving tank having been removed.

Fig. 3 is a view in longitudinal section through one of the compressor units.

Fig. 4 is a detail view of the chain designed particularly for connecting the driving and driven elements of the machine.

Fig. 5 is a transverse sectional view of one of the bearings showing the improved lubricating features thereof.

Fig. 6 is a view in elevation of a form of crank shaft preferred for use in the present machine.

Referring now more particularly to the drawings, wherein like numerals of reference indicate corresponding parts, the numeral 1 generally designates the supporting frame or bed for the compressors and the driving mechanism associated therewith. This bed is of skeleton construction having a base frame 2, vertical corner uprights 3, and a top frame 4, which is divided into the two portions 4^a and 4^b which are joined by the inclined intermediate portions 4^c. Transversely of the top frame at the rear part of the portion 4^b is a beam 5, and this beam is connected with the forward end of the top frame by the apertured cylinder supporting bars 6. The numeral 7 designates cylinders of compressor units which are supported by the forward part 4^b of the top frame of the machine bed and which are provided with longitudinally extending side fins 8 which rest upon the supporting bars 6 and are bolted thereto. Each of the compressor units includes in addition to the cylinder a piston 9 which operates therein, as indicated in Fig. 3, to which is coupled the rearwardly extending connecting rod 10. The forward end or head of the compressor cylinder is provided with an air outlet aperture 11 and an inlet aperture 12, and the outlet aperture is encircled upon the outer side of the head by the nipple 13, in which is threadably engaged a union 14, the outer end of which is enlarged, as indicated at 15, to receive an end of a pipe 16 which conducts compressed air from the cylinder 7 to a receiving tank, hereinafter described. Between the end of the pipe 16 and the union 14, is a spider 17 which carries a sleeve 18 and through this sleeve extends a valve stem 19 which carries the valve head 20 which normally closes the outlet opening 11 of the cylinder. The valve is controlled by a spring 21 in the manner illustrated and the stem of the valve is kept lubricated by the provision of a grease or oil cup 22 which is connected by a suitable tube with the interior of the sleeve, as shown in Fig. 3.

Adjacent the union 14 of each compressor, a sleeve 23 is secured in alinement with the air inlet aperture 12 and through this sleeve extends the stem 24 of an inlet valve 25. Suitable spring mechanism 26 is employed for maintaining the inlet valve 25 closed in the manner illustrated.

The outer end of each air conducting pipe 16 is joined with a T coupling 27, and these T couplings are joined together by intervening pipe sections 28 so that the air compressed in each of the cylinders is conducted through a common communicating line to the pipe 29 which leads to a receiving tank 30. A suitable control valve 31 is located in the line between the T couplings and the tank 30, and the tank is provided with safety mechanism which is indicated generally by the numeral 32 and which is illustrated and described in detail in my prior patent previously referred to. The compressed air receiving tank is provided with a gauge 33 to indicate the degree of pressure within the tank and with a lead-off pipe 34 by means of which the compressed air

may be conducted to points where it may be made use of. Extending transversely of the top frame portion 4a is a crank shaft which is indicated generally by the numeral 35 and which is provided with a crank 36 for each compressor cylinder 7. The side rails of this portion 4a of the top frame have secured thereto bearing caps 37 which engage over the adjacent ends of the crank shaft 35 and maintain the same in place in the bearing recesses 38 which are formed in the frame rail. Each of these bearing caps 37 is bolted to the adjacent frame rail, as illustrated and each cap is provided with a chamber 39 which opens through its inner side toward the shaft so that grease may be packed into this chamber and will be constantly fed therefrom to the shaft. The enclosed end of the shaft will thus be kept well lubricated and dust and dirt will be prevented from getting into the lubricant and damaging the bearing surfaces.

In addition to the bearings 37 at the ends of the crank shaft, there is employed a bearing 40 at the central part thereof which is supported upon a suitable standard 40a or in any other suitable manner. This bearing 40 is constructed like the bearing illustrated in detail in Fig. 5, in that it has a grease chamber to constantly supply lubricant to the shaft. The rear end of each of the connecting rods 10 of the compressor cylinders is coupled in the usual manner with a crank 36, the coupling being indicated by the numeral 41' and each of the couplings is provided with a grease cup 42 by means of which the connection between the connecting rod and the crank may be constantly lubricated.

Extending transversely of the portion 4a of the top frame of the machine bed is a bearing shaft 43, the ends of which are supported in bearings 44 mounted upon the side rails of the top frame rearwardly of the bearings 37. These bearings 44, while not illustrated in detail, are of the same construction as the bearings 37 and 40. Upon each end of the shaft 43 is a sprocket wheel 45, and each end of the crank shaft 35 upon the outer side of the adjacent bearing 37 carries a sprocket wheel 46. These wheels 45 and 46 are connected by sprocket chains 47.

At the central part of the shaft 43 there is secured a sprocket wheel 48 over which is passed the chain 49 which is coupled with any suitable source of power so that the necessary motion can be transmitted through the wheel 48 to the shaft 43 and through the other mechanism to the air compressing pistons 9. Each of the several sprocket wheels is coupled with the shaft upon which it is mounted by a key of the nature illustrated in Fig. 2. This key which is indicated by the numeral 50 seats in a groove in the shaft and engages in a corresponding groove in the encircling hub of the adjacent wall, in the usual manner.

As will be seen from Fig. 1, the lowered forward part 4b of the top frame 4 of the machine bed places the cylinders 7 so that their longitudinal centers will be in the horizontal plane of the center of the crank shaft 35 and by this means an easier and smoother operation of the compressors is obtained.

The numeral 51 indicates a flanged union and a gasket in one of the connecting pipes 16 between the compressor and the line leading to the tank or reservoir 30. These flanged couplings permit of the ready division of the pipes 16 so that the cylinders coupled therewith may be removed for repairs or replacements without interfering with the operation of the other compressor units.

Fig. 4 illustrates in detail the construction of the sprocket chains which it is preferred to use in connection with this machine. As shown the chain consists of a series of sections each of which is made up of the two spaced parallel links 52 between the ends of which is a cylindrical sleeve 53, and passing through this sleeve and through the adjacent ends of the links 52 is a bolt or pin 54. As illustrated the ends of the adjacent links of each section are in overlapping relation and the bolts 54 join these overlapped ends of the alined link sections together. Thus the cylinders or sleeves 53 in addition to serving as a means of keeping the ends of the links separated, operate in the nature of roller bearings so as to make the engagement of the chains with the sprocket wheels smooth and to reduce the friction.

From the foregoing it will be readily apparent that power applied to the shaft 43 through the medium of the chain 49 from any suitable source will be transmitted by the chains 47 to the two ends of the crank shaft 35 so that the pistons of all of the compressor units will be simultaneously actuated and the air which is drawn in thru the intake valves 25 will be expelled under pressure thru the valves 20 and will pass thru the pipe line 29 into the reservoir 30 where it will be stored until ready for use. By the provision of the several compressor units in the manner illustrated and described, it will be obvious that if any one of the units gets out of order, it may be disconnected from the rest of the machine by detaching the connecting rod 10 thereof from the crank shaft and the machine continued in operation while the damaged unit is being repaired or replaced. Thus the operation of the machine can be made continuous even though portions of the same may get out of order.

The numeral 55 designates lugs forming a part of the lower frame of the machine bed, by means of which the machine may be bolted or otherwise suitably secured to the supporting floor.

Each of the lines 16 which couples a cylinder 7 with the pipe line 29 is provided with a valve 56 by means of which any one of the cylinders may be segregated from the rest in the event that repair of the same becomes necessary, and the remaining cylinders may be continued in operation and at the same time loss of compressed air from the pipe line back through the shut-off cylinder will be prevented. The crank shaft which is illustrated in detail in Fig. 6 is preferably of the type employed in internal combustion engines so that the operation of the cylinder pistons will be smooth and the vibration of the machine reduced to a minimum.

What is claimed, is:

1. A compressor machine, comprising a base having a plurality of spaced parallel bars, a plurality of compressor units each including a piston, a cylinder housing the piston, a connecting rod coupled with the piston extending beyond one end of the cylinder, a pair of fins formed integral with each cylinder and extending longitudinally thereof, each of said cylinders being disposed between a pair of said parallel bars and having the fins thereof resting on and secured to said bars, a compressed air reservoir, an air lead-off pipe from each of said cylinders, a pipe line connecting each of said lead-off pipes with the reservoir, each of said lead-off pipes

having an outwardly opening valve controlling the flow of air from the cylinder into the lead-off pipe, and power means coupled with said connecting rods for effecting simultaneous reciprocation of the same.

2. A compressor machine, comprising a base having a horizontal top frame which is divided in two portions, one of which is disposed at a lower elevation than the other, a transverse bar mounted between the sides of the frame in that portion thereof which is at a lower elevation and in spaced parallel relation with the adjacent end of the frame, a plurality of spaced parallel supporting bars lying between said transverse bar and the said end of the frame and paralleling the sides of the frame, a plurality of cylinders each disposed between a pair of supporting bars, a pair of fin members extending longitudinally of each cylinder on opposite sides thereof and resting upon and secured to a supporting bar, each of the supporting bars between the sides of the frame supporting two fins, a piston in each cylinder, a connecting rod coupled with each piston and extending rearwardly from the adjacent cylinder, a crank shaft mounted to extend transversely of said frame over the portion thereof which is at the highest elevation, said crank shaft lying in the same horizontal plane as the longitudinal centers of the cylinders, valved air lead-off pipes for the cylinders, a compressed air reservoir connected with said pipes, and means for transmitting power to said crank shaft to rotate the latter.

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