Figs. 403 and 404 represent an Engine in which the cylinders are set at a right angle, and the piston-rods being prolonged past the crank-pins, and passing through guides, no guide bars are necessary.

Fig. 403 is a front, and fig. 404 a plan view of the

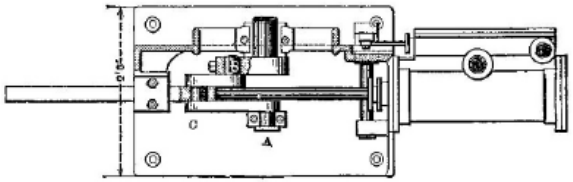


Fig. 405.

engine. A is a crank-pin fast in the crank C, which carries a crank-pin for the other piston-rod. This crank-pin has journal bearing in the crank cheek B, the latter having a crank-pin with journal bearing in

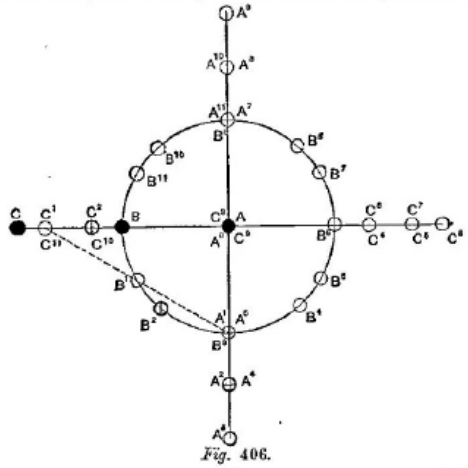


Fig. 406.

the crank D, which is fast upon the main shaft of the engine. The combined lengths of B and D equal the length of crank C, which is half that of the piston-stroke.

It will be observed that crank B is what may be termed a floating or free crank, its two pins revolving during each engine revolution in the cranks D and C.

As the crank-pins A and C must always move at right angles to each other, it is evident that the long arm of the floating crank has a very peculiar motion. Thus, starting from the positions A, B, and C in the diagram, fig. 406, during the first quarter revolution, it lies at varying angles at the left of the vertical line. During the next quarter it inclines in the opposite direction, and to the right of the vertical line, while during the third quarter the end that was previously at the bottom reaches the top, and continues so during the rest of the stroke. This floating crank seems to revolve in a direction opposite to that of the main shaft. Its position may be found at any position of the piston, by

means of the diagram Fig. 406. Suppose, for example, that the parts are in the position shown in Fig. 405, the three crank cheeks or arms being then all in line. The black dots in Fig. 406 will then represent the crank-pins, A being the pin attached to the outer piston-rod, the black dot at B representing the inner pin, whose path of motion is the circle, and the black dot at C representing the crank-pin, for the other piston-rod.

It is obvious that the pin B will always be somewhere on the circle, which represents its path of motion, and to find its position for any given piston position, all we require to do is to set a pair of compasses to the radius of crank-pins A C, and another pair to the radius of crank-pins B C, and we may trace the motion as follows: Suppose the outer crank-pin moves from A to A^1, and from A^1 (with the radius of crank-pins A C), we may mark at C^1 the corresponding position of the crank-pin C. To find the position crank-pin B will have moved to, we mark from C^1 (with a radius equal to that of the crank-pins C B, fig. 406), position B^1. Again suppose the outer crank-pin (A fig. 406) moves from A^1 to A^2, and the middle pin (C fig. 404) will have moved to position C^2, and the inner pin (B fig. 404) to position B^2, and so on through all the other numbered letters, similar numbers indicating simultaneous positions. Twelve positions are plotted on the diagram, and it is easy to follow the parts throughout the stroke.

It is obvious, that the cylinders may be placed in any required positions, so long as their bores are at a right angle, and also that in place of two cylinders, four may be used, two taking the place of the guides shown in the illustrations.

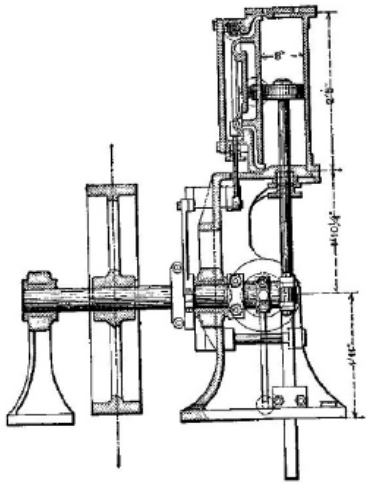


Fig. 407.

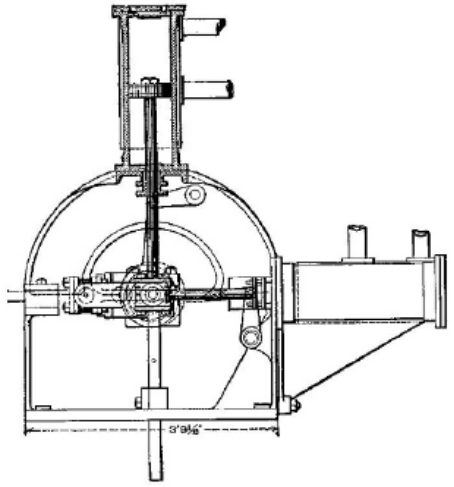


Fig. 408.

Figs 407 and 408 show two cylinders, one vertical and the other horizontal, and it is obvious, that we may trace out the paths of motion, as given above, by drawing the center lines to represent the axial lines of the pistons. The objection to this class of engine is the excessive friction and wear of the crank-pins.

NOTES: THE ORIGINAL DRAWINGS WERE GIVEN TO ME BY Mr. BRIAN CARGILL FROM THE UK. THE DRAWINGS AND ARTICLE WERE UNDER TITLE "THE DAVIS DIRECTLY CONNECTED ENGINE" AUTHOR AND DRAFTER UNKOWN

TITLE
AN EXPERIMENTAL 2 CYLINDER DIRECT CONNECTED STEAM ENGINE (B=32mm S=96mm)

DRAWING CONTENTS
ORIGINAL DRAWINGS

PROJECT No 09D-23-00

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JDWDS

DATE APRIL 2021

SHEET: A OF A

MODEL SCALE: 1:6.35

DWG SCALE: 1:1 @A3 OR AS SHOWN

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A3 No: 09D-23-00-SHT-A

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