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AUTOMATIC SAMPLER

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The present invention relates to apparatus for automatically obtaining a sample from a flowing stream, and is of particular value in the transportation of crude petroleum from the wells.

It is an object of the invention to provide an automatic sampler wherein separation of constituents of the fluid to be sampled is avoided so that the removed sample is truly representative of the fluid passing through the conduit.

A further object of the invention is to provide an apparatus which will take a small sample of fluid truly representative thereof at intervals of time.

A further object is the provision of an automatic sampler in which the sample removed from the flowing stream is proportional to the quantity flowing in the conduit from which the sample is taken.

A further object is the provision of an apparatus which will automatically remove a truly representative sample from a flowing stream and wherein the quantity so removed may be adjusted or predetermined.

Still another object is the provision of an automatic sampler which is of simple construction and is easy to repair and maintain in working order.

According to the present invention I provide in a conduit carrying a moving stream of fluid, a device which is operated by the stream generally in proportion to the quantity flowing therein, and which intermittently operates a valve mechanism which is adjusted to permit escape from the conduit of a relatively small sample of the flowing fluid. Preferably, the conduit carrying the fluid to be sampled is vertical and the point of escape of the sample of fluid therefrom is substantially at the center of the flow so that the sample taken will be truly representative of the fluid in the conduit. The valve through which the sample is taken preferably is operated with a snap action, and the duration of opening may be easily adjusted so that a relatively minute sample is removed in proportion to the quantity flowing in the conduit past the valve.

The invention will be described in greater detail in connection with the accompanying drawing wherein there is disclosed a preferred modification of the invention by way of example, and in which

Figure 1 represents a vertical section taken through a conduit with the automatic sampling means shown in position,

Figure 2 is a transverse section taken on line II—II of Figure 1 showing part of the operating mechanism,

Figure 3 is a view with parts broken away taken in the direction of the arrows III of Figure 2, and

Figure 4 is an elevation of a detail.

Referring to the drawing, there is shown a casing 1 having end flanges 2 and 3 whereby the casing may be interposed in a pipe line, and the bore 4 is adapted to form a continuation of the pipe line, the casing preferably being interposed in the pipe line in vertical position. Inside the casing 1 a shoulder 5 is provided to which a motive power unit of known construction for operating the sampler is secured. The preferred motive power unit comprises a flanged tube or working chamber 6 having a cylindrical liner 7 therein, and connected to a flanged gear case support 8 by three screws 9, the assembly being secured to the shoulder 5 by three screws 10. Radial spokes 11 integral with the tube 6 support a hub 12 in which is suitably journaled one end of the rotor shaft 13, carrying a rotor 14. The rotor 14 comprises a cup shaped shell 15 having suitable helical or inclined vanes 16 on its outer surface and is secured to shaft 13 in any suitable manner. A central deflector 17 is supported by the spokes 11 and hub 12 to relieve the fluid pressure on the rotor. The gear case support 8 comprises radial straightening vanes 18 supporting a gear case 19 thereon in which is located suitable reduction gears, and which are driven by rotor shaft 13 through a suitable coupling member 20, and a shaft 23 on the opposite side of the gear case driven by the reduction gearing carries a cam 24 of generally involute form having a high edge 25 and secured thereto by nut 26.

Below the gear case the casing 1 has a threaded bore 31 therein which receives an externally threaded hollow bearing member 32 having a flange 33 engaging the machined surface 34 of the casing. A rocker shaft 35 extends through the bore in bearing member 32 and has journals 36 and bearing 37 in the hollow bushing. A rocker arm 38 is rigidly secured to the inner end of shaft 35 to oscillate therewith, and the outer end of shaft 35 is bifurcated to receive a rocker spring lever 39 which may be held in place by a cotter pin 40 passing through a transverse hole in the shaft and spring lever. The opposite end of spring lever 39 is bored to receive a bolt 41 having a transverse pivot pin 42 therein which rests against the upper surface of spring lever 39. An L-shaped abutment 43 is secured to the casing by screws or other suitable means, and the upper end of a spring 44 on bolt 41 engages the abutment 43. The lower end of spring 44 engages a washer 45 on bolt 41 which is held in position thereon by lock nuts 46. A cover 47 encloses the rocker shaft spring assembly and is held in fluid tight relation by bolts 48, a suitable gasket 49 being interposed to prevent leakage. It will be apparent that spring 44 biases shaft 35 clockwise as viewed in Figure 3, and thus holds the upper end of arm 38 against cam 24.

Rocker arm 38 carries a trigger mechanism comprising a bifurcated trigger piece 51 which