Sept. 13, 1932. W. T. MAHLA 1,876,711

PIPE TESTING MACHINE

Filed June 19, 1930 2 Sheets-Sheet 1

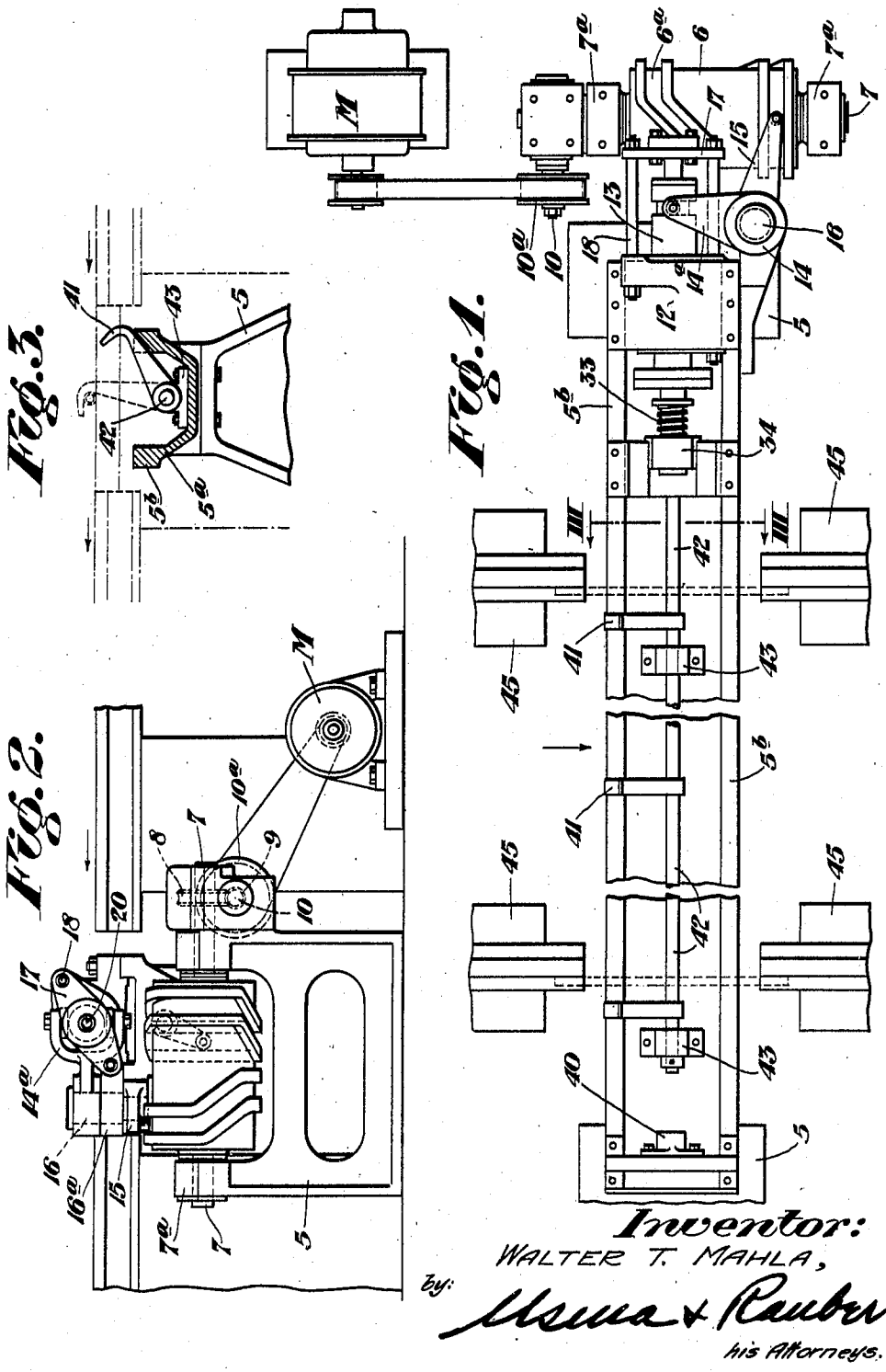


Fig. 1.

Fig. 3.

Fig. 2.

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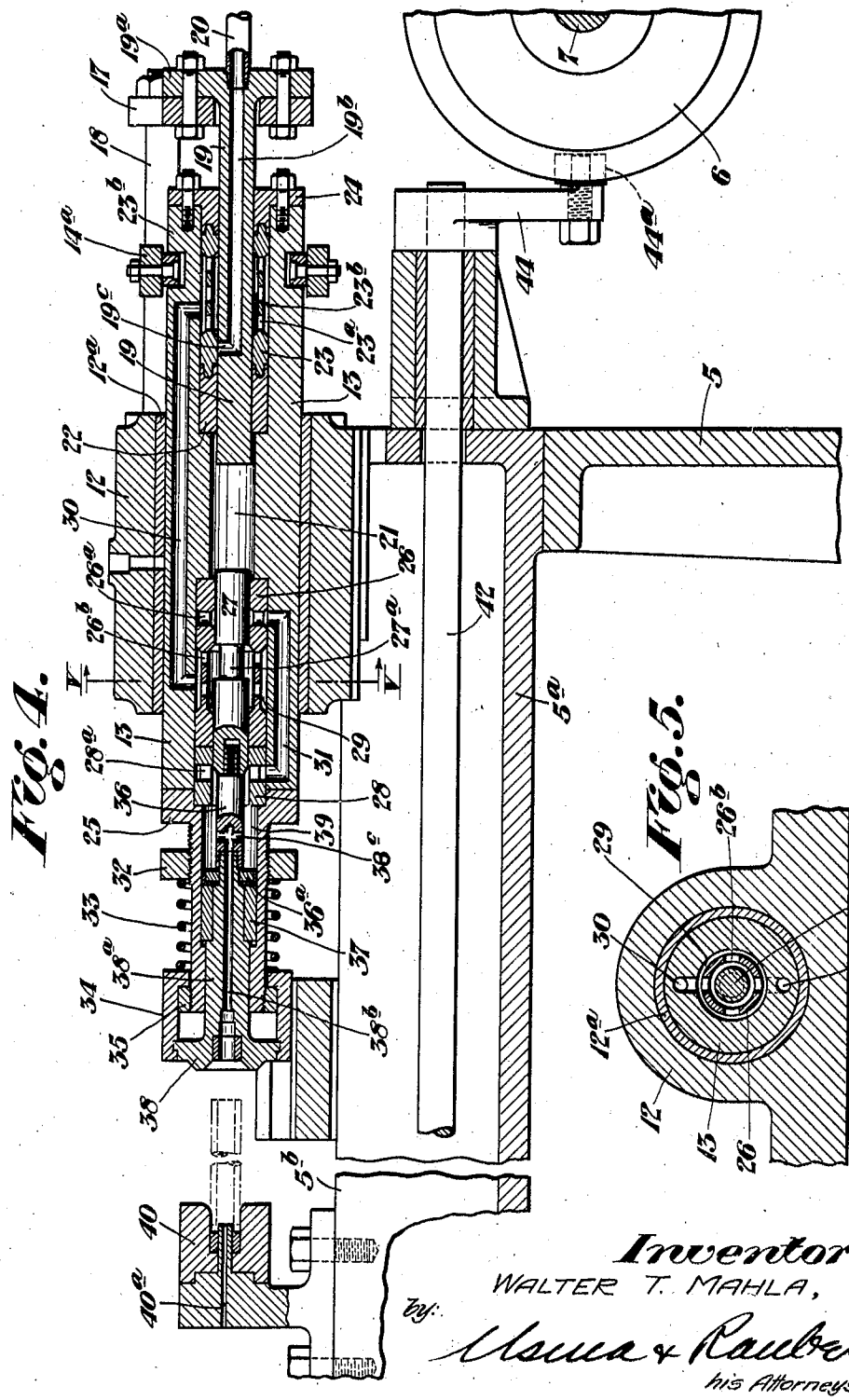


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

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PIPE TESTING MACHINE

Application filed June 19, 1930. Serial No. 462,278.

This invention relates to testing machines for conduit pipe of that type wherein hydrostatic or like fluid pressure is built up in the pipe to ascertain if there are any leaking welds or joints, and the primary object in view is to provide a pipe testing machine which will operate automatically and more rapidly than known machines of this class, to thereby reduce costs of labor and at the same time materially increase production.

Numerous other objects and advantages will become apparent in view of the following description and claims taken in conjunction with the drawings, wherein:

Figure 1 is a top plan of the improved machine, broken through and moved together to conserve space in the drawings.

Figure 2 is an end elevation.

Figure 3 is a sectional view taken on the line III—III of Figure 1.

Figure 4 is an enlarged transverse vertical sectional view of an automatically operating valve assembly for controlling admission of fluid pressure into the pipe to be tested.

Figure 5 is a sectional view taken on the line V—V of Figure 4.

The numeral 5 generally designates the supporting pedestals or castings of the machine and 5*a* the longitudinal bed-plate or frame which is formed with side rails 5*b*.

The complete cycle of operations of the machine is controlled by a cam 6, here shown as of the drum or barrel type and formed with a track or groove 6*a*, said cam being rotatably mounted at the one extremity of the machine on a shaft 7, which is suitably journaled in bearing brackets 7*a*. The shaft 7 has secured thereon a worm gear 8 in mesh with a worm 9, see Figure 2, which is secured on a jack-shaft 10, the latter in turn having secured thereon a pulley 10*a*, the drive being applied to said pulley from a motor M.

The bed-plate or frame 5*a* is provided with a bearing housing 12 and bearings 12*a*, in which is mounted for longitudinal sliding movement a plunger 13, said plunger being reciprocated by the cam 6 through the medium of cam levers 14 and 15, which are suitably secured on a pin or stub shaft 16 having bearing in a bracket 16*a*, the one extremity of lever 14 being formed with a yoke or fork 14*a* which engages the one extremity of plunger 13.

A feature of the present invention is the provision of an autmatically operating valve assembly, shown in detail in Fig. 4, which controls the admission of fluid or hydrostatic pressure into the pipe to be tested and which assembly is mounted in the plunger 13 and will now be described.

A cross-head 17 is secured in stable position with respect to the housing 12 and spaced a suitable distance therefrom by bars 18, and secured to said cross-head is a pin 19 headed at one end as at 19*a*, and provided with a longitudinal bore 19*b* which terminates at one extremity in a right-angular outlet 19*c* and at its opposite extremity in a nipple portion to which the water or like fluid pressure line 20 is attached. The interior of the plunger 13 is cored out or formed with a longitudinal bore 21 which is shouldered and houses the valve assemblies at its opposite extremities. The assembly on the right, as viewed in Fig. 4, comprises a sleeve 22, cage 23 formed with ports 23*a* opening into a chamber 23*b*, and a cap 24, the latter being secured to the end of the plunger 13 to retain the parts in assembled position, and the pin 19 is then inserted through the foregoing assembly and secured to the cross-head 17 in relatively stationary position.

The opposite extremity of the plunger 13, or the extremity thereof on the left as viewed in Fig. 4, has detachably secured thereto a flanged cap or housing 25 which when removed permits the remaining parts of the valve assembly to be applied in position in said plunger. These parts as shown comprise a cage or sleeve 26 formed with ports 26*a* and 26*b*, a valve stem or pin 27 formed with reduced portion or neck 27*a*, and an annular sleeve 28 or analogous member provided with a port 28*a*. In assembling, the cage or sleeve 26 and sleeve 28 may be applied on the stem 27 and the parts inserted in the one extremity of the plunger 13, as will be readily understood from the drawings, a chamber 29 being provided around the central portion of cage 26.

A longitudinal passage or bore 30 is formed in the wall of the plunger 13, said passage communicating at one extremity with the chamber 23*b* and at its opposite extremity with the chamber 29 when the plunger is in extended position or the position shown in Fig. 4. A further passage or bore 31 is formed in the wall of the plunger 13 at the left extremity of said plunger, said passage communicating at one extremity with the ports 28*a* and at its opposite extremity with the port 26*a* when the plunger is in the position shown.

The cap or housing 25 has adjustably threaded thereon a collar 32, against which a spring 33 abuts, and next to the spring is a slidable stop head 34, which is interiorly flanged and held in assembled relation by a collar 35 which is threaded on the end of cap 25.

The interior of the cap 25 is cored out to receive an assembly comprising a pin 36, washer 36*a*, bushing or sleeve 37 and plunger head 38, the latter being formed with a stem 38*a*, which is formed with a longitudinal bore 38*b* communicating with ports 38*c* formed in said pin 36 and through said ports with a chamber 39 which is provided around the pin at this point.

The plunger head 38 receives the one end of the pipe to be tested and is therefore provided with an interior bushing or gland to prevent leakage of high pressure water or fluid at this point. It will also be understood that suitable glands may be provided adjacent the valve cages 23 and 26 and at other points where it may be necessary to prevent leakage.

The opposite end of the pipe to be tested is inserted in a backstop 40, which may be of the conventional design, having a small bore 40*a* through its center, to permit escape of air and fluid, said bore being of a diameter small enough to cause a back pressure sufficient to test the pipe.

To prevent buckling of the pipe undergoing test, hold-down arms 41, note Fig. 3, are provided, said arms being secured on a shaft 42, which is mounted in bearing brackets 43 secured to the bed-plate 5*a*. These arms 41 are also operated from the cam 6, a crank-lever 44 being secured on the one extremity of shaft 42 and provided with a cam roller 44*a* engaging in the groove 6*a* of said cam.

The operation of the machine, briefly stated, when used for testing conduit pipe, is as follows:—

The pipe, as it comes from the threading machines, is usually disposed in a single layer on a platform or table, a fragment of which is shown at 45, Fig. 1, for the purposes of illustration, and inspected for scrap, after which the pipe may be fed into the machine manually, each pipe being placed lengthwise between the backstop 40 and plunger head 38. High pressure fluid or water is admitted into passage or bore 19*b* of pin 19, which is held stationary at all times. As cam 6 revolves, it reciprocates plunger 13 through the medium of levers 14 and 15. As plunger 13 moves forward, it successively uncovers outlet 19*c* and permits the water to pass into chamber 23*b* through passage 30 and into chamber 29, and also advances plunger head 38, valve stem 27 and valve cage 26, until head 38 engages the pipe to be tested. When the head 38 engages the pipe, the head 38 and stem 27 are held stationary while the plunger 13 and cage 26 continue to advance, uncovering port 26*a* and permitting water under pressure to pass through passage 31 into chamber 39 and thence through port 38*c* and bore 38*b* into the pipe undergoing test. The cam 6 is timed so that the plunger is held in its forward position a sufficient length of time for the proper pressure to build up in the pipe, after which the plunger 13 moves back and permits removal of the pipe and replacement thereof by the succeeding pipe to be tested. As the plunger moves back, the spring 33 causes the valve stem 27 to move to closed position and thereby shut off the water until the next forward stroke of the plunger.

It will be noted that if there is no pipe in position for test, the plunger head 38 and valve stem 27 remain stationary with respect to the plunger 13, so that the valve remains closed and prevents flow of fluid or water under pressure.

The many advantages afforded by the improved automatic testing machine over the hand valve method of testing pipe will be readily apparent. The machine operates steadily and in timed relation so that its output can be accurately determined in view of the stock on hand and a definite and regular speed may be set in view of other operations and the shop output in general. All that is required is a man to feed the pipe to the machine, the remaining part of the operation being automatic, in contradistinction to the hand valve method where two men were required to make the test.

What is claimed as new is:

1. In a hydrostatic testing mechanism of the class specified, a plunger, means for reciprocating said plunger, a head member and valve slidably mounted for limited movement in said plunger, said plunger and said head being reciprocated as a unit to engage the said head with the pipe to be tested, said head having a passage therethrough terminating in a socket adapted to fit over and communicate with one end of the pipe to be tested, said head having a stop, a spring mounted on said plunger and engaged between said head and said stop on said plunger so as to normally hold said head and valve in extended position, said plunger having a plurality of passages, one of said passages

extending to said valve and another of said passages extending from said valve to said passage in said head, means for supplying water under pressure to said one of said passages in said plunger, and said valve being adapted to establish communication between said passages in said plunger and said head to admit water under pressure to the pipe being tested when said plunger is moved forwardly relative to said valve, and said head and said valve being adapted to automatically move to closed position when said head and valve are moved to their forwardmost position relative to said plunger by said spring.

2. In a hydrostatic testing mechanism of the class specified, a plunger, power operated cam means for reciprocating said plunger, a head member and valve unit slidably mounted in said plunger, said plunger and said head being reciprocated as a unit to engage said head with the pipe to be tested, said head and valve being adapted to be held stationary when engaged with said pipe while said plunger is adapted to continue its movement for a limited travel, said head having a passage therethrough terminating in a socket adapted to fit over and communicate with one end of the pipe to be tested, resilient means for normally holding said head and valve in extended position, said plunger having a plurality of passages, one of said passages extending to said valve and another of said passages extending from said valve to said passage in said head, means for supplying water under pressure to said one of said passages and said valve being adapted to establish communication between said passages in said plunger and said head to admit water under pressure to the pipe being tested when said plunger is moved forwardly relative to said valve and said head, and said valve being adapted to automatically move to closed position when said head and valve are moved to their forwardmost position relative to said plunger by said resilient means.

3. In a hydrostatic testing mechanism of the class specified, a plunger, power operated cam for reciprocating said plunger, a head member and valve slidably mounted for limited movement in said plunger, said plunger and said head being reciprocated as a unit to engage said head with the pipe to be tested, said head and valve being adapted to be held stationary when engaged with said pipe while said plunger is adapted to continue its movement for a limited travel, said head having a passage therethrough terminating in a socket adapted to fit over and communicate with one end of the pipe to be tested, resilient means for normally holding said head and valve in extended position, said plunger having a plurality of passages, one of said passages extending to said valve and another of said passages extending from said valve to said passage in said head, valve controlled means for supplying fluid under pressure to said one of said passages and said first named valve being adapted to establish communication between said passages in said plunger and said head to admit fluid under pressure to the pipe being tested when said plunger is moved forwardly relative to said valve and said head and said valve being adapted to automatically move to closed position when said head and valve are moved to their forwardmost position relative to said plunger by said resilient means.

In testimony whereof, I have hereunto set my hand.

WALTER T. MAHLA.