

Oct. 15, 1935.

J. J. BOAX ET AL

2,017,393

PIPE TESTING MACHINE

Filed April 16, 1934

6 Sheets-Sheet 1

FIG. 1.

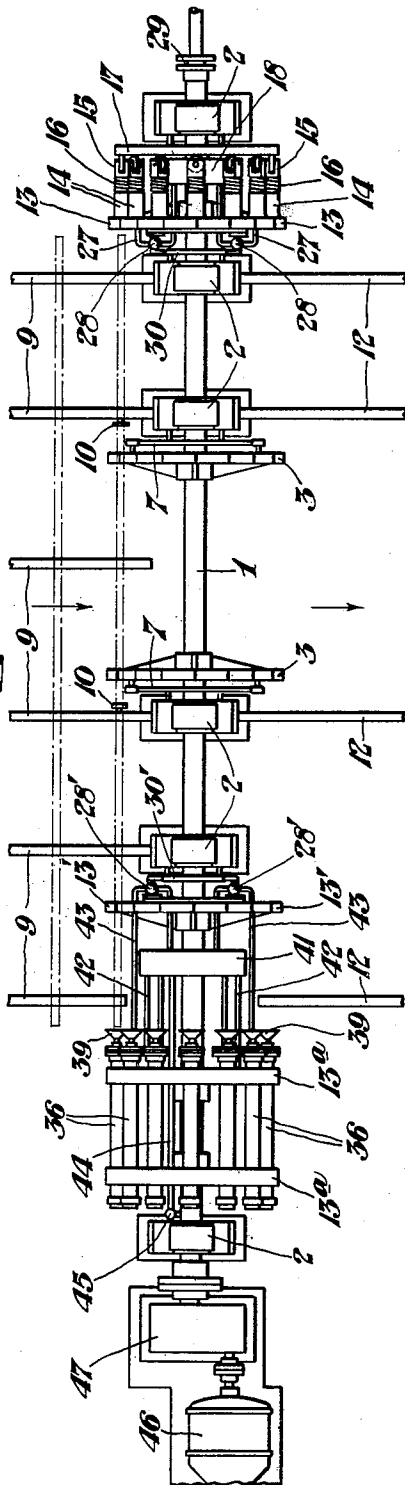
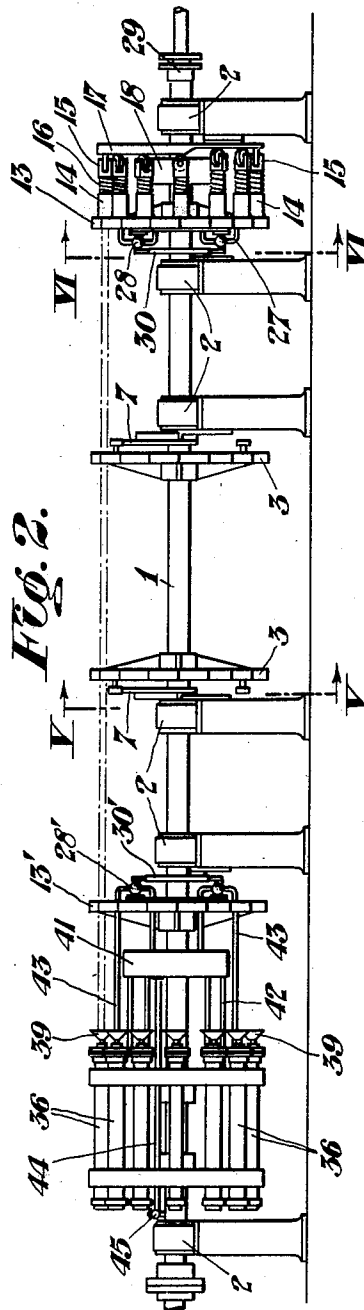


FIG. 2.



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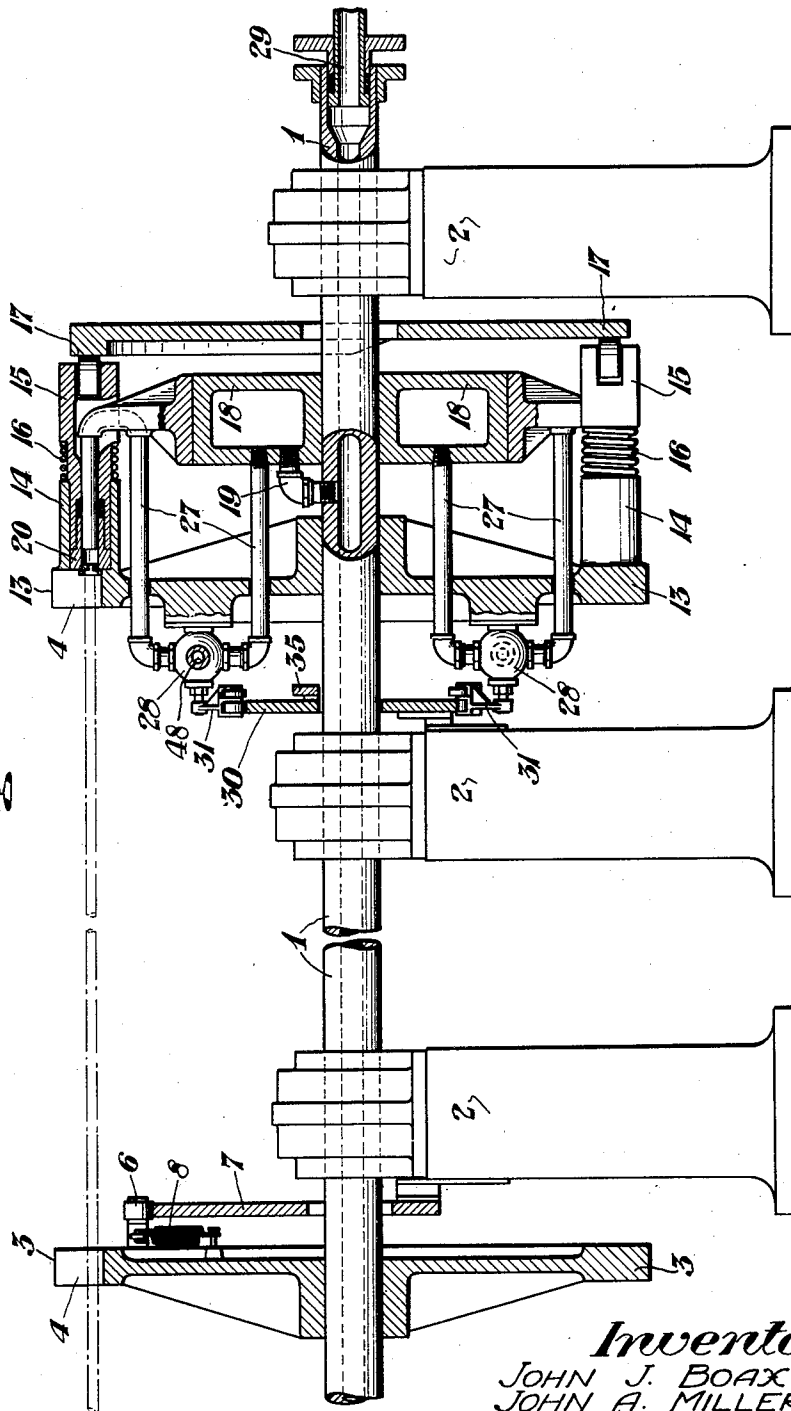
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Fig. 3.



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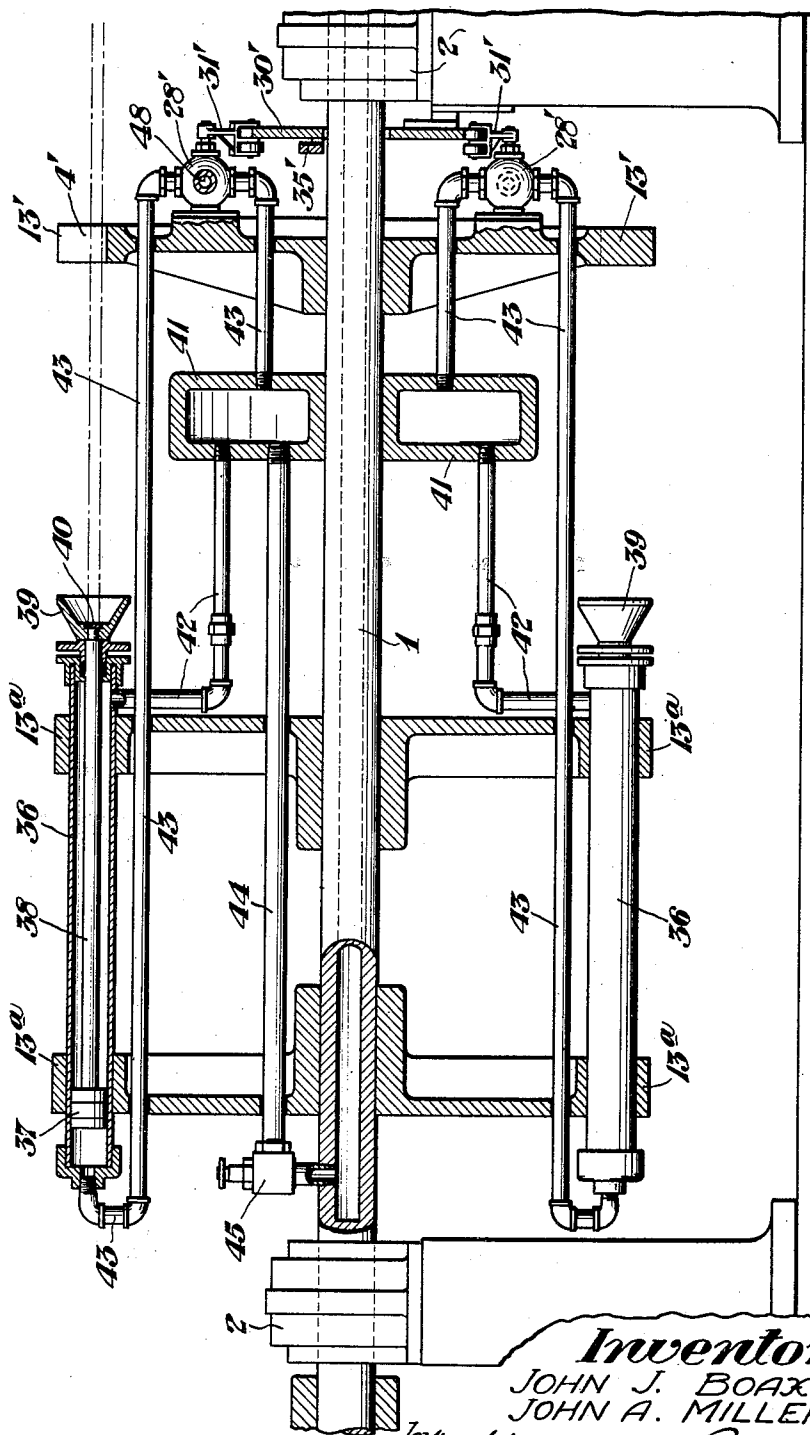
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Fig. 4.



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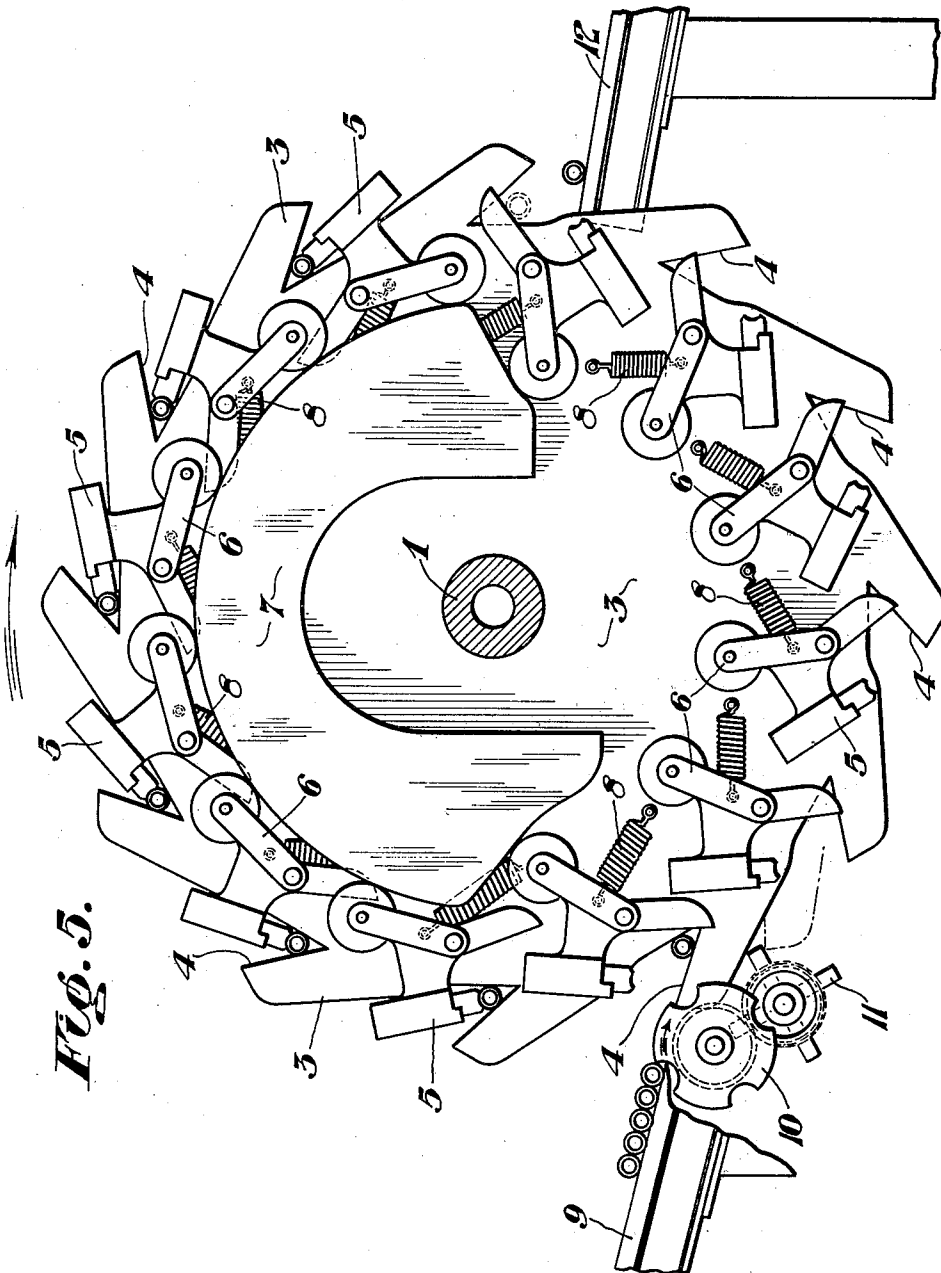


Fig. 5.

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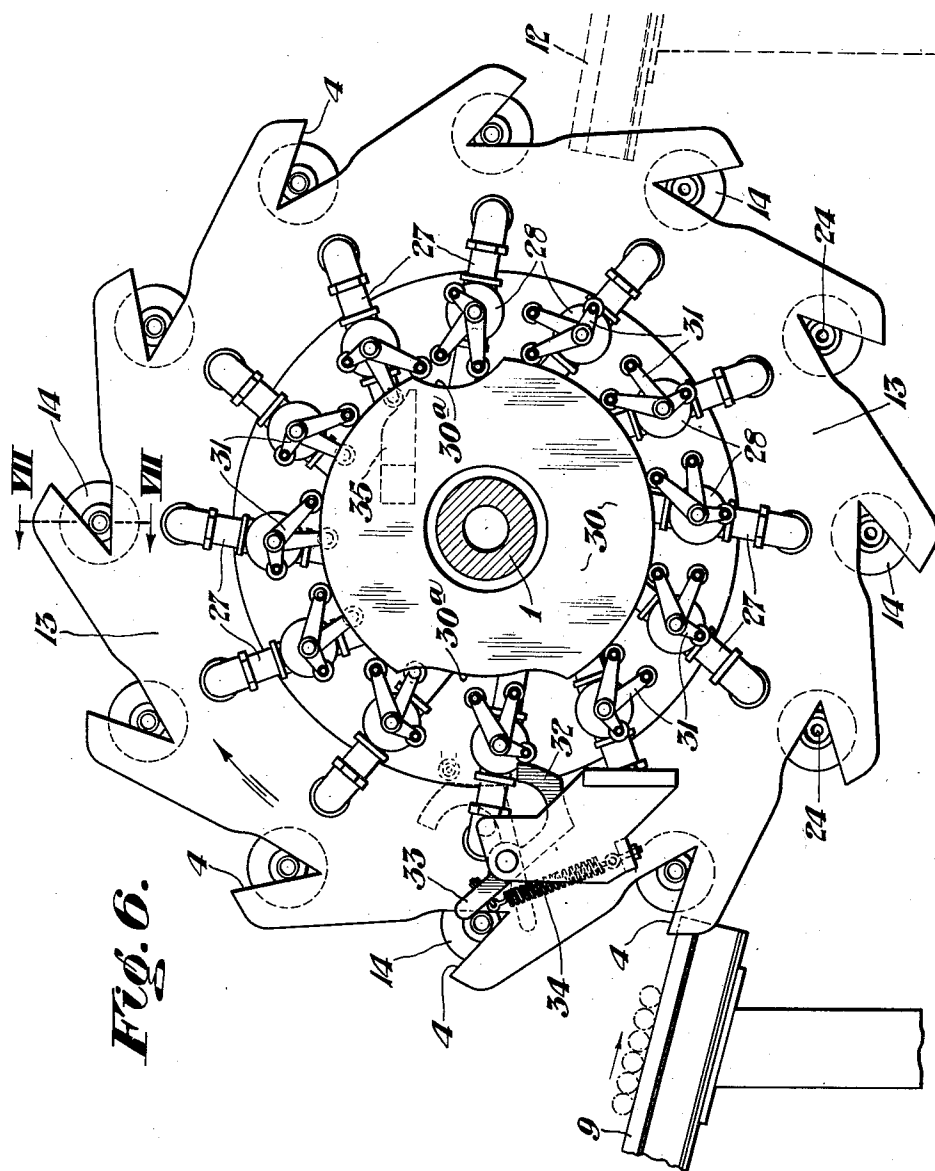


Fig. 6.

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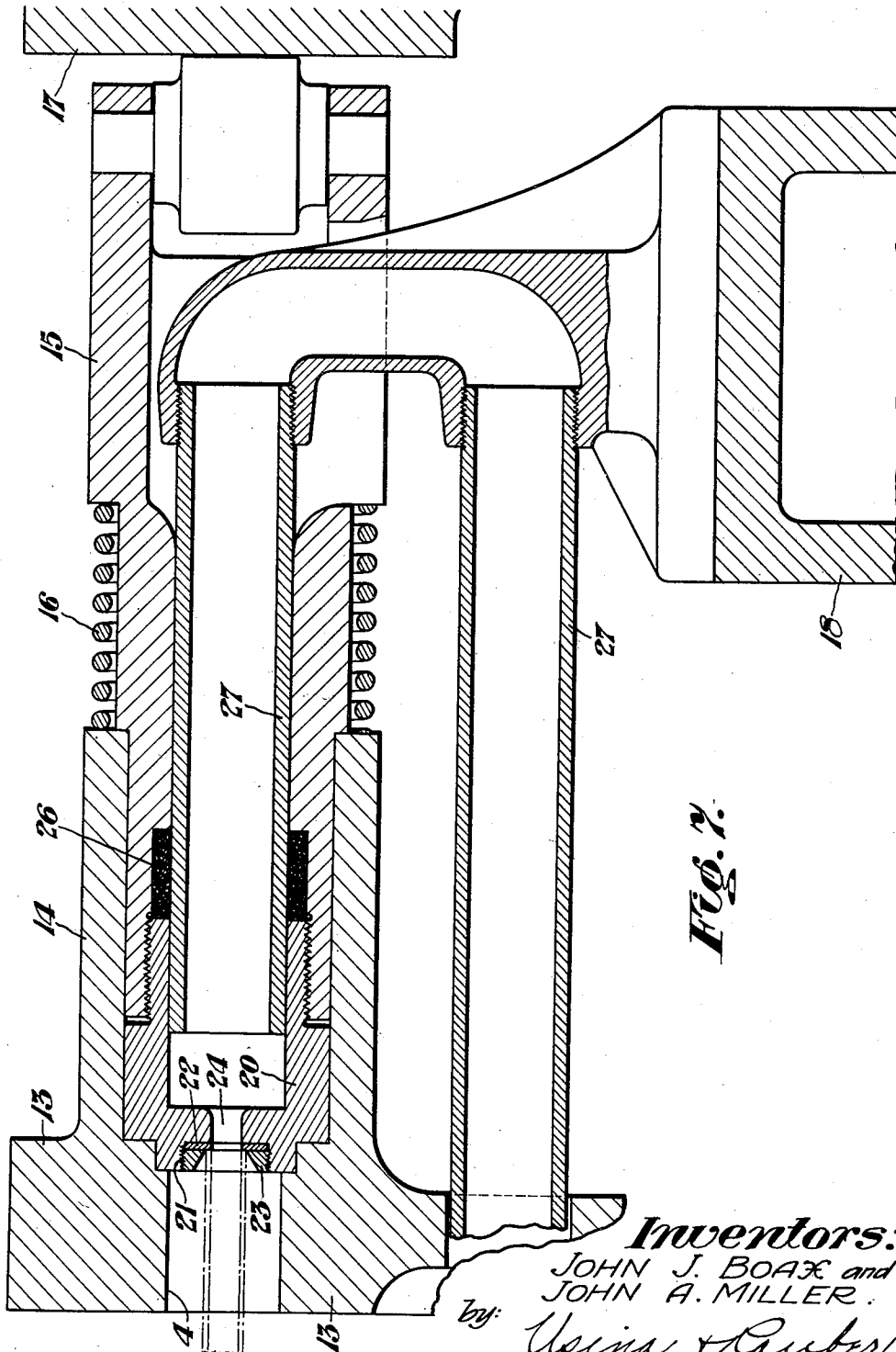
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PIPE TESTING MACHINE

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,017,393

PIPE TESTING MACHINE

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Application April 16, 1934, Serial No. 720,868

3 Claims. (Cl. 73—51)

This invention is an improved pipe testing machine, one of the objects being to automatically test pipes with hydraulic pressures. Other objects may be inferred.

Referring to the drawings:

Figure 1 is a top view of a pipe testing machine embodying the features of the invention.

Figure 2 is a side view.

Figures 3 and 4 are sectional views showing details of the opposite ends of this machine.

Figures 5 and 6 are views taken from Figure 2 at the lines V—V and VI—VI.

Figure 7 is an enlargement from Figure 3.

A hollow horizontal shaft 1 revolves in bearings mounted by pedestals 2 and has keyed to it two or more rotary carriers 3 peripherally provided with pockets 4 arranged in lateral alinement for the horizontal carriage of the pipes to be tested. Clamps 5 are pivoted on these carriers adjacent the pockets 4 and are swung into engagement with pipes therein by levers 6. Segmental cams 7 are fixed in the paths of these levers 6 to swing the clamps into pipe-engaging positions. Springs 8 swing the clamps away from the pipes when the levers 6 are free from the cams 7.

The pipes to be tested are fed to the rotary carriers 3 by declined skids 9 provided with feeding wheels 10 driven by star wheels 11 which are turned when contacted by the peripheral serrations of the carriers 3 formed by the pockets 4 of the latter. Rotation of the shaft 1 causes the carriers 3 to revolve, this in turn causing the feeding wheels 10 to singly feed the pipes to the pockets 4, the cams 7 being proportioned so that they then swing and hold the levers 6 which move the clamps 5 into engagement with the pipes until declining skids 12, on the other side of the machine, are reached, when the levers become free from these cams so that the springs 8 can effect release of the pipes which then roll down these last skids.

Rotary mounts 13 and 13' are fixed to the extreme ends of the shaft 1. It may now be appreciated that the machine includes spaced rotary mounts arranged in axial alinement and rotary carriers arranged between these mounts in axial alinement therewith and constructed for the horizontal carriage of the pipes to be tested.

Now an important feature of the invention is that one of these mounts carries means for sealing the ends of pipes carried by these carriers while the other mount carries means for injecting fluid under pressure into the opposite ends of the pipes while also sealing the same. A further

feature is that various means are provided for controlling the just described means whereby the latter's operations are automatically effected during the time the pipes are traveling from the skids 9 to the skids 12.

Continuing, the rotary mount 13 includes bored bosses 14 arranged in alinement with the pipe carrying pockets 4 of the carriers 3. These bosses mount reciprocable heads 15 which are moved in one direction by springs 16 and in the other by a cam 17 fixed adjacent thereto. These heads may be positively moved by the cams alone if so desired.

An annular chamber 18 is fixed to the shaft 1 and communicates with the latter's interior by way of a pipe 19.

The reciprocable heads 15 are hollow and removably mount parts or caps 20 in which are recesses 21. Gaskets 22 are arranged in these recesses and pipe-receiving elements 23 are removably retained in these recesses and serve to clamp the gaskets 22 to the parts 20. The elements 23 may be screwed into the recesses 21 for this purpose. The recesses 21 communicate with the interior of the heads 15 by way of bores 24 and the gaskets 22 are centrally open so as not to close these bores. The elements 23 have outwardly flared bores whose smaller diameters just fit the pipes being tested, while the gaskets 22 and the bores 24 are of diameters substantially the same as the inside diameters of these pipes.

Features of this particular construction are that the gaskets are firmly clamped in place so as not to be easily deformed, and the parts 20 may be removed and substituted by others constructed to fit other sizes of pipes.

The parts 20 may be screw-threaded into the heads 15 and the latter may be constructed to provide annular spaces 25 therebetween into which metallic packings 26 may be placed.

Equal-lengthed pipes 27 open into the annular chamber 18 and individually extend horizontally into the hollow heads 15. It is for the purpose of slidably sealing the space between these heads and pipes that the metallic packing 26 is provided. Valves 28 are individually interposed in the pipes 27. When fluid under testing pressure is admitted to the hollow shaft 1 by way of a connection 29, it will flow into the chamber 18 and through the pipes 27, these valves 28 controlling this flow.

A circular cam 30 is fixed adjacent the rotative path of the valves 28, the latter being provided with three-armed levers 31 arranged to open and close them. The cam 30 includes de-

pressions 30^a which permit the ends of these three-armed levers 31 to swing when operating the valves, this cam otherwise positively holding the valves in either open or closed positions. A cam segment 32 can be swung into the path of another one of the arms of these levers 31 by a lever 33 which is moved by the pipes being moved by the carriers 3. A spring 34 normally holds this cam 32 in an inoperative position. When the cam 32 is swung by the lever 33, it cooperates with one of the arms of the levers 31 and the cam 30 to throw the valves to open positions, the cam 30 holding the valves in this position until another arm of the levers 31 is engaged by a second fixed cam 35 which cooperates therewith and with the cam 30 to close the valves. The remaining surface of the cam 30 then cooperates with the levers 31 to hold the valves in closed positions.

Horizontal cylinders 36 are carried by the mount 13^a in alignment with the pipes being moved by the carriers 3. Double acting pistons 37 are arranged in these cylinders and are connected by piston rods 38 to outwardly flared pipe guides 39. Gaskets 40 are arranged in the centers of these guides in a manner similar to those previously described, excepting that these are not open. This arrangement provides rams which function to push the pipes being moved by the carriers 3 against the heads 15 while at the same time sealing their ends. The clamps 5 permit the pipes to slip longitudinally.

A second annular chamber 41 is fixed to the shaft 1 adjacent the cylinders 36, and pipes 42 individually connect this chamber with the ends of the cylinders 36 which are adjacent the pipes carried by the carriers 3. Other pipes 43 connect this chamber 41 with the opposite ends of the cylinders 36.

Valves 28' are individually interposed in these other pipes 43 for the purpose of controlling the admission of fluid from the chamber 41 to the remote ends of the cylinders 36, this chamber 41 communicating with the hollow shaft 1 by way of a pipe 44 and an adjustable pressure reducing valve 45. The valves 28' are associated with a fixed cam 30', are provided with three-armed operating levers 31', and are generally similarly arranged as are those previously described. Therefore, these parts are given the same numbers as were the others, excepting that they are primed for identification purposes.

Any means may be provided for turning the shaft 1, the drawings showing a motor 46 driving through a gear box 47.

The operation of the machine will now be described.

Assume that fluid, under a testing pressure considered proper for the size and character of the pipes being tested, has been admitted to the hollow shaft 1 by way of the connection 29. There will be no fluid discharging through the heads 15 as yet because all of the valves 28 will be closed. As pipes are fed down the skids 9 and singly laid into the pockets 4 of the carriers 3 by the wheels 10, operation proper of the machine will commence.

As the first of the pipes being moved by the carriers 3 strikes the lever 33', one of the valves 28' will be opened so that fluid is admitted from the chamber 41 to the proper one of the cylinders 36. This drives the guide 39 forwardly so that it engages this pipe and pushes it longitudinally against the proper one of the heads 15, the latter

being now reciprocated and held forwardly by the cam 17. This cam is constructed so that this latter operation is effected prior to opening of the valve 28'.

The adjustable valve 45 is regulated so that the pressure in the chamber 39 is just sufficient to effect proper sealing of the pipe without causing it to buckle. This regulation is, of course, affected according to the relative sizes and characters of the pipes being tested.

The first pipe is now firmly clamped, the gasket 40 in the guide 39 effectively sealing one of its ends while its other end is firmly sealed against the gasket 22 where it has been centered by the member 23. The lever 33 is so positioned that about this time it is tripped by the pipe, this throwing the cam 32 against that one of the three-armed levers 31 which is associated with the valve effecting communication to the head now engaged by the pipe end. This causes the valve to open so that the testing fluid is admitted to the pipe.

The pipe is now maintained under pressure for a definite time which is regulated by the speed with which the shaft 1 is rotating.

The next operation to occur is the closing of the valve 28 by cooperation of the cam 35 and the levers 31. This releases the pressure in the pipe so that it is now safe to remove it from the machine. Therefore, the cam 30' is arranged to now contact the lever system 31' of the valve 28'. This releases the pressure behind the piston 37 so that the pressure existing in the chamber 41 can return it to its starting position. The piston is originally able to advance upon opening of the valve 42 for the reason that the piston rod 38 is sufficiently large to effect a pressure differential. It is to be noted that the valves 28 and 28' are three-way valves having discharge openings 48 and 48', whereby the pressure reliefs mentioned may be accommodated.

Also, the cam 17 is constructed so that it effects rearward reciprocation of the head at about this time, and the cams 7 are constructed to now relieve the levers 6 so that the pipe is unclamped and is entirely free to roll down the declined skids 12 and away from the machine.

With the foregoing operation of the machine understood as regards its operation on one pipe, its complete operation is also understood. The various valves are successively opened and closed; in the manner described, and the various clamps are successively clamped and unclamped to perform their intended function. Everything is automatic, and the machine requires the attention of only one man to watch for leakers.

One feature not particularly noted before is the advantages resulting from the use of a plurality of heads arranged radially about a central chamber and connected thereto by equal-lengthed pipes. This results in the application of absolutely equal pressures to all the pipes. One of the drawbacks of most gang pipe testing machines has been the inability to apply equal pressures to all the pipes in a gang.

A further feature to be noted is the fact that none of the levers 31 will be operated by the lever 33 if no pipes are carried by the carriers 3, and that only that one of these levers will be operated which controls the valve of a head actually registering with a pipe.

Although a specific example of the invention is disclosed in accordance with the patent statutes, it is not intended that the scope of the inven-

tion be limited thereto, except as defined by the following claims.

We claim:

1. A pipe testing machine including the combination of spaced rotary mounts arranged in axial alinement, rotary carriers arranged between said mounts in axial alinement therewith and constructed for the horizontal carriage of the pipes to be tested, bored reciprocable heads arranged on one of said mounts for registration with pipes carried by said carriers, means including individual valves for said heads for supplying the latter with fluid under testing pressure, reciprocable rams arranged on the other of said mounts for registration with said pipes, fluid motors individually operatively associated with said rams, means including individual valves for said motors for supplying the latter with operating fluid, means for successively opening the second named valves as said pipes are moved past a predetermined position by said carriers, means for thereafter successively opening the first named valves, means for successively reciprocating said heads towards said pipes prior to the opening of the first named valves, means for successively closing the first named valves as said pipes are moved past a second predetermined point by said carriers, means for thereafter successively closing the second named valves, and means for successively reciprocating said heads away from said pipes after the first named valves are closed.

2. A pipe testing machine including the combination of a hollow horizontal shaft, circular carriers arranged on said shaft and constructed to peripherally carry the pipes to be tested in horizontal positions, a circular mount arranged on said shaft so as to be adjacent the ends of pipes carried by said carriers, an annular chamber fixed on said shaft and communicating with its interior, hollow heads reciprocably carried by said mount for registration with said pipes to be

tested and having fluid injectors and seals for the ends of the latter, pipes opening into said chamber and individually extending horizontally into said hollow heads, means for slidably sealing the space between said heads and said pipes, a fixed circular cam arranged adjacent said heads, means for reciprocatively associating said heads with said cam, valves individually interposed in said pipes, a second circular fixed cam, means for operatively associating said valves with said second cam and means for closing the other ends of said pipes to be tested during the periods said heads are reciprocated toward the first named ends of said pipes to be tested.

3. A pipe testing machine including the combination of a hollow horizontal shaft, circular carriers arranged on said shaft and constructed to peripherally carry the pipes to be tested in horizontal positions, a circular mount arranged on said shaft so as to be adjacent the ends of pipes carried by said carriers, an annular chamber fixed on said shaft, cylinders carried by said mount in alinement with said pipes, double-acting pistons in said cylinders, rams operated by said pistons, pipes individually connecting said chamber with the ends of said cylinders adjacent said pipes to be tested, other pipes individually connecting said chamber with the opposite ends of said cylinders, valves individually interposed in said other pipes, a fixed circular cam, means for operatively associating said valves with said cam, means including a pressure reducing valve for connecting said chamber with the interior of said shaft and means which cooperate with the other ends of said pipes to be tested when the latter are thrust theretowards by action of said rams for introducing testing fluid to said pipes to be tested, said rams functioning to close the first named ends of said pipes to be tested.

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