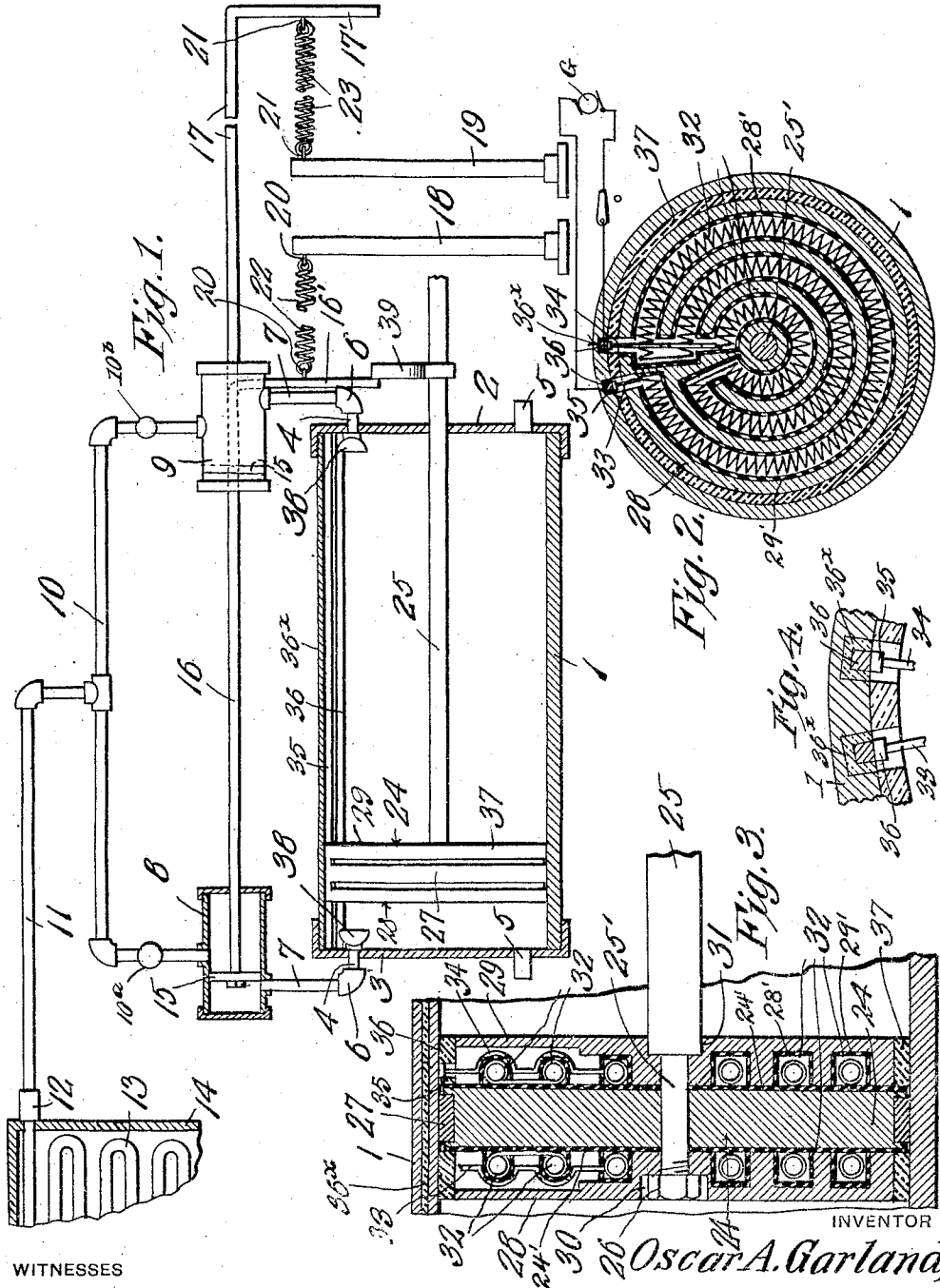


1,290,966.

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WITNESSES

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STEAM-ENGINE.

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To all whom it may concern:

Be it known that I, OSCAR A. GARLAND, a citizen of the United States, residing at Hot Springs, in the county of Garland and State of Arkansas, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

The present invention has reference to steam engines; and, the invention relates, more particularly, to a novel steam feeding and generating means.

It has heretofore been the custom to generate steam in a separate and distinct boiler and then inject the same, at proper time intervals, into the working cylinder of the engine; furthermore, it is common to generate steam by directing a spray of water on to highly heated surfaces; however, in each instance, the generation of the steam occurs outside of the engine working cylinder and is then conveyed thereto. Obviously, by this method a fair percentage of the steam is lost by condensation, also, a considerable amount of heat is lost, due to radiation.

The invention has for its principal object to provide novel means whereby the steam is intermittently and instantaneously generated by directing a spray of water onto highly heated generating surfaces arranged in the working cylinder of the engine.

Still further, the invention also aims to provide a novel means whereby the spray of water will be intermittently injected into the working cylinder of the engine, by means of properly timed water injecting pumps.

The invention consists, furthermore, in the novel arrangements and combinations of the parts of the construction, as well as in the details of the same, all of which will be more fully described in the following specification, and then finally embodied in the clauses of the claims, which are appended to this specification and which form an essential part of the same.

The invention is clearly illustrated in the accompanying drawings in which:

Figure 1, is a side elevation partly in section of my improved feeding means applied to a steam engine, the working cylinder of

the engine being diagrammatically illustrated.

Fig. 2, is a longitudinal section in elevation through the piston head showing the arrangement of the heating elements and

Fig. 3, is a transverse section in detail through the piston head.

Fig. 4 is an enlarged detail section of a portion of the mechanism shown in Fig. 2, illustrating more particularly the arrangement of the contact bars.

Similar characters of reference are employed in all of the above described views to indicate corresponding parts.

Referring now to the several figures of the said drawings, I have shown by way of illustration, my improved steam feeding means as applied to the conventional form of reciprocating steam engine, the working cylinder of which is designated by the numeral 1, the ends thereof being screw threaded, in order that cylinder heads 2 and 3 may be turned into engagement therewith, each of the said cylinder heads having suitable openings formed therein whereby water inlet or delivery pipes 4 and steam exhausting ports 5 may communicate with the interior of the cylinder. The water delivery pipes 4 are provided with elbows 6, the remaining ends of which carry pipes 7, the upper extremities of the said pipes being received within outlet openings formed in the walls of a pair of water pumps 8 and 9. The water pumps, in turn, are supplied with water by means of branch piping 10, the same having connected therewith a main feed pipe 11, which pipe is connected to a suitable water feed by the coupling 12. The water feed is preferably in form of a coil, a fragment of which is designated by the numeral 13, this coil being housed by a casing 14 which may be and preferably is a portion of the conventional water heating furnace. Thus, it will be obvious, that the water, previous to its introduction into the pumps 8 and 9, will be heated, the purpose of which will be subsequently apparent.

Reciprocatory piston heads 15 are arranged within the pumps 8 and 9 and have

connected thereto, piston rods, 16 and 17, the outer ends of the said rods being bent at substantially right-angles to the body portion thereof to provide fingers 16' and 17' respectively. Standards 18 and 19 are arranged upon a suitable base and have engaged with their upper extremities, by means of eyelets 20 and 21, contractile coiled springs 22 and 23, the remaining ends of which are engaged with similar eyelets carried upon the fingers 16' and 17', of the piston rods. Hence, the piston heads 15 of the pumps 8 and 9 will be normally maintained in a retracted position.

15 The piston head 24 of the steam engine has the usual piston rod 25 secured thereto, the adjacent end thereof being reduced as at 25', which reduced portion passes through the piston head 24, and is secured thereto by a locking nut 26, the same being turned into engagement with the screw threaded extremity of the reduced portion 25'. As will be noted, the reduced portion 25' is of a length greater than the width of the piston head 24, the purpose of which will be hereinafter explained. An annular insulating packing strip 27 is carried upon the peripheral surface of the piston head. Arranged adjacent the opposite faces of the piston head 24 are disk like members 28 and 29 which have arranged concentrically thereof, countersunk openings 30 and 31, whereby the said disk may be arranged upon the reduced portion 25' and consequently moved in unison with the piston head. A plurality of electrical resistances 32 are embedded within the said disks 28 and 29, and are supplied with contact arms indicated by the numerals 33 and 34, the outer ends of the said arms carrying thereupon heads 35, which are adapted to be engaged with a plurality of contact bars 36, these bars being embedded within the walls of the steam engine working cylinder, and arranged longitudinally thereof. By this arrangement, it will be evident that the necessary supply of electrical current to the various resistances 32 will be at all times supplied. The contact bars 36 may be energized by suitable electrical conductors which are connected therewith and which include a suitable source of electrical energy G. To prevent short circuiting of the heads 35, peripherally arranged insulating strips 37 are arranged about the disks 28 and 29 and have formed therein openings corresponding to the heads 35 as arranged upon the contact arms 34, thereby permitting an uninterrupted passage of current to the resistances 32.

60 The members 28 and 29 are provided with grooves 28' formed therein for receiving the resistance hereinbefore referred to. The resistance is insulated from the members 28 and 29 by insulating lining 29' which of

course may be mica or else some other suitable insulating material which will not interfere with the transmission of heat to the members 28 and 29. The resistance on each side of the piston 24 is insulated from the piston head 24 by insulating disks 24' which may be also formed of such material as mica for accomplishing this purpose.

The bars 36 are also embedded in dielectric mountings 36', clearly shown in Fig. 4, to prevent shortcircuiting thereof through the metallic body of the cylinder 1.

In order that the water from the delivery pipes 4 may be discharged into the working cylinder in form of a spray, spraying nozzles 38 are arranged upon the inner ends thereof, causing the water to be evenly projected onto the disks 28 and 29, which may be termed the steam generating plates.

An arm 39 is fixedly mounted upon the piston rod 25 and upon reciprocatory movement of that member, will intermittently engage the fingers 16' and 17' of the pump piston rods and thereby actuate their respective piston heads.

It has been pointed that one object of this invention is to generate the steam directly within the cylinder, thus preventing an unusual loss of heat, due to radiation and for this reason the resistance coils are inserted in the piston head. By this construction, the heat radiated from the piston head will be received within the cylinder for quickly vaporizing the water which is injected in a spray form into the cylinder. If the heated elements were carried by the cylinder heads, although these cylinder heads would be heated so as to vaporize the water injected thereagainst, it is obvious that considerable of the heat would radiate outwardly from the cylinder head and would be lost, without accomplishing any function whatever. Therefore, it has been deemed advisable and necessary to include the heating element in the piston head so as to cause the heat radiating from the piston head to have effect upon the water injected into the cylinder prior to the radiating of heat from the cylinders when the same is in operation.

The operation of the construction may be reviewed as follows:

Water from the supply pipe 11 is conveyed by way of the branch piping 10 to the pumps 8 and 9. Previous to the starting of the engine, the resistances 32 are energized, thereby causing the steam generating plates 28 and 29 to become highly heated by the heat generated by the resistance 32, whereupon, the engine is started. Upon rearward movement of the piston head 24, the arm 39 carried upon the piston rod 25 will engage the finger 17' of the pump piston rod 17, causing the same to be moved against the tension of the contractile spring

23 and moving the piston head 15 of the pump 9 to the opposite end thereof. Such movement of the piston head 15 will cause the heated water as contained by the pump 5 to be forced therefrom into the outlet pipe 7 and thence, by way of the inlet pipe 4 into the working cylinder 1 of the steam engine, where it will be converted into a spray and projected onto the steam generating plate 29 as carried upon the approaching piston head 24. The water thus projected against the generating plate 29, in the form of a spray will be instantly converted into steam, and will consequently, act upon the piston head 15 24 to impart a return or working stroke thereto. When the piston 24 is at the limit of movement in one direction the arm 39 will disengage the finger 17' of the piston rod 17 and thereby permit the same to be returned to normal position by action of the retractile spring 23. During the return of the piston rod 17, and the piston head 15 connected thereto to their normal position, an additional supply of water will be drawn 25 into the pump 9. When the piston 24 has completed the first working stroke, and commences the return stroke, the formerly active but now spent steam will exhaust through the port 5 at the right side of Fig. 1. For the purpose of opening and closing 30 the ports 5 at the proper times, a suitable valve chest and slide-valve mechanism will in practice be provided. This showing is however omitted from the drawings, since it is thought the manner of attaining to this 35 function is well understood. At the time that the piston 24 nears the completion of the first stroke the arm 39 will engage the finger 16' of the pump piston rod 16, causing the piston head 15 thereof to discharge 40 the water contained by the pump 8 through the outlet pipe 7 into the delivery pipe 4 and discharge in the form of a spray from the nozzle 38 onto the generating plate 28, carried upon the adjacent face of the approaching piston head 24. The water spray upon 45 contact with the generating plate 28 will be instantly converted into steam and will impart a second working stroke to the piston head 24, which as it reaches the end thereof will receive onto the generating plate 29 that water contained by the pump 9 which was previously drawn therein. The dead steam is at the same time exhausted through 50 the exhaust port 5 as explained above. Suitable back check-valves 10^a and 10^b may be provided in the pipes leading to the pumps 8 and 9.

It will be understood, that the amount of 60 water and, hence the amount of steam generated, depends entirely upon the rate of speed at which the engine is run and also, upon the size of the water pumps 8 and 9 and the heat generating plates 28 and 29.

While I have herein illustrated and de- 65 scribed with a considerable degree of particularity, the constructional details of the device embodying my invention, it is to be understood that the invention is not limited to the particular form and arrangement of 70 the several parts, which may be modified within a wide range without departing from the essence of the invention, the construction shown, and the description based thereon, being intended to be taken in an illustrative 75 rather than limiting sense.

I claim:

1. The combination with a steam engine, of a plurality of steam generating plates carried by the piston, electrical resistances 80 embedded within said plates and provided with contact arms, a plurality of contact bars embedded within the wall of the working cylinder and adapted to be engaged by said contact arms whereby the said resistances will be energized, and means communicating with the engine and actuated thereby for intermittently injecting a spray of water into the working cylinder onto the 85 generating plates. 90
2. The combination with a steam engine, of a plurality of steam generating plates carried by the pistons, electrical resistances embedded within said generating plates and having contact arms connected thereto, 95 a plurality of contact bars arranged within the cylinder wall adapted to be engaged by the contact arms whereby to energize said resistances and heat the generating plates, peripherally disposed means for insulating 100 said generating plates from the contact bars, pumps arranged in proximity to the opposite ends of the working cylinder, a water supply connected to said pumps, pistons working within said pumps, said pistons being connected with piston rods, the outer 105 ends of which are intermittently engaged by the engine piston rods whereby a spray of water will be intermittently injected into the working cylinder onto the generating plates, 110 and resilient means connected with the pump piston rod for returning the same to normal position.
3. The combination with a steam engine, of a plurality of heat generating plates carried by the pistons, electrical resistances embedded in said plates, means for supplying said resistances with electrical energy, thus causing the resistances to be heated for heating said plates, and means communicating 120 with the engine and actuated thereby for intermittently injecting a spray of water into the cylinder onto the said plates.
4. In a device of the class described, the combination of a cylinder, a piston having 125 a heat generating plate, electrical resistances embedded in said plate, means for supplying said resistances with electrical en-

ergy, thus causing the resistances to be heated for heating said plate, and means for injecting water into said cylinder and onto said plate, thus causing said heated plate
5 to vaporize the water.

5. In a device of the class described, the combination of a cylinder, a piston reciprocally mounted with said cylinder, means for electrically heating said piston, and means

for injecting a spray of water onto said piston thus creating steam within said cylinder for driving said piston. 10

In testimony whereof I affix my signature in presence of two witnesses.

OSCAR A. GARLAND.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."