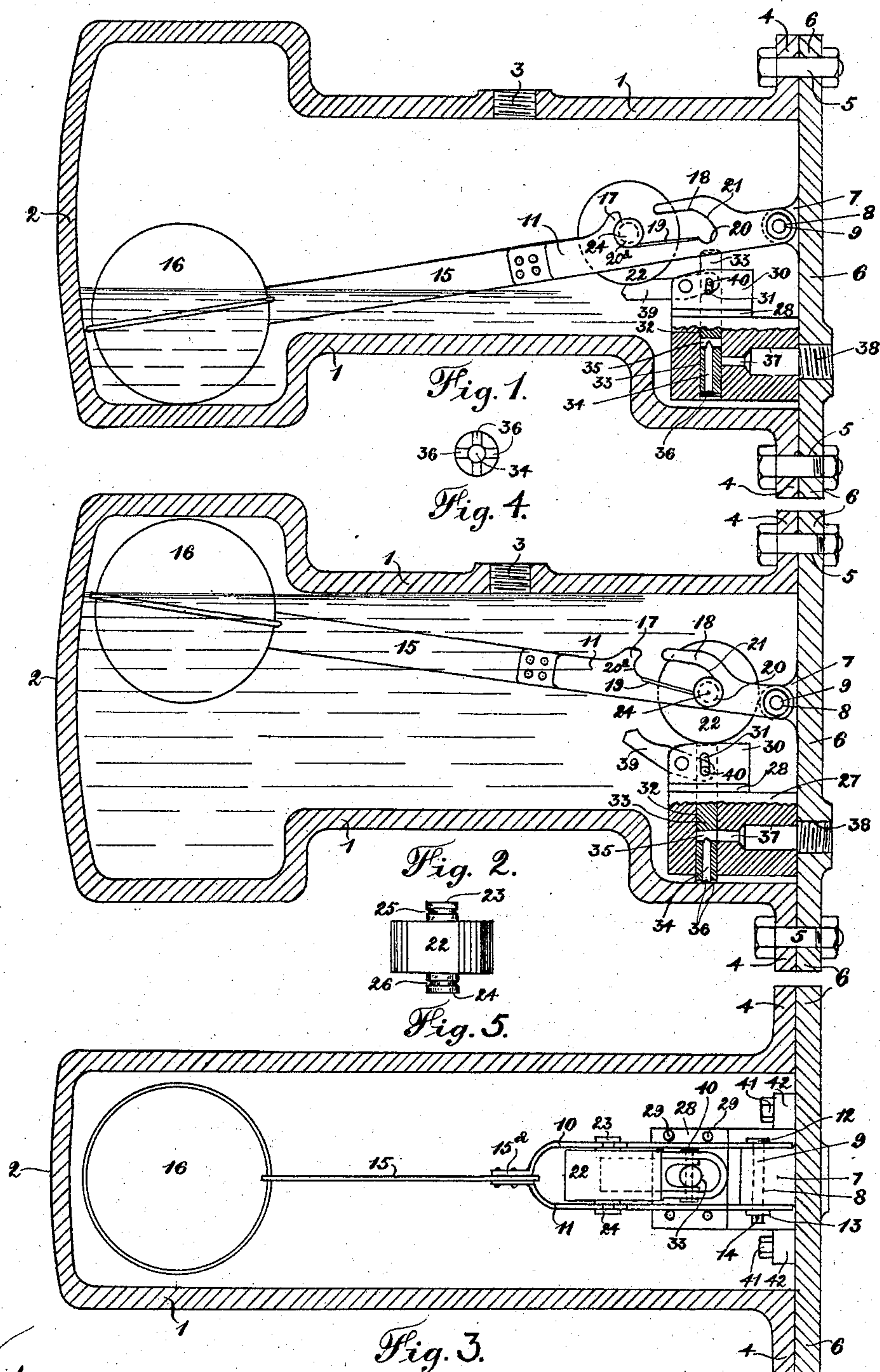


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P. FRASER.
STEAM TRAP.

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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 782,331, dated February 14, 1905.

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To all whom it may concern:

Be it known that I, PETER FRASER, a subject of the King of England, residing at Germiston, in the Colony of the Transvaal, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to steam-traps or apparatus for collecting and separating water from steam. It is also applicable for separating other liquids from gaseous fluids.

The present improvements have special reference to a steam-trap of the construction described and illustrated in a patent granted to me on the 30th of August, 1904, under No. 768,595.

A steam-trap or apparatus embodying the improvements constituting the subject-matter of the present application may be used for accumulating the water of condensation from steam-pipes and for automatically discharging the same when a given quantity has been collected, while at the same time preventing the escape of the steam, or it may be employed in connection with air-receivers of air-compressing plants for removing any grease, water, or other liquid.

My improved trap is positively operated, and the valve is at all times in equilibrium—that is to say, it is not subjected to any greater pressure on one part than on another—and the trap can be used for either high or low pressures without necessitating any change in the area of the valve or valve-seating, as is necessary with many constructions of steam-traps as at present manufactured.

The objects of the present improvements are to increase the efficiency of the apparatus and to eliminate the deficiencies and remove the imperfections which I have found by experiment exist in the trap as described and illustrated in my prior patent.

In my prior patent previously referred to the valve which operates to discharge the water or other liquid is arranged in a vertical hole formed in a boss or projection on the cover of the receiver. In the front of the boss is formed a recess which communicates with or intercepts the vertical hole in which said valve is arranged. This recess places

the outlet port or passage provided in the valve for the water or other liquid in communication with the interior of the receiver, so that when the valve is operated to place said port or passage in communication with another port or passage in the boss or projection the water or other liquid is free to flow out of the receiver. By this construction the face of the valve is placed under or subjected to the pressure of the air or steam, which pressure is transmitted through the water or other liquid in the receiver. I find that the pressure thus exerted on the valve makes it sluggish in its movements, and consequently it necessitates the use of a heavier weight for opening and closing the valve than would be necessary were the pressure removed. I have also found that the construction of the rolling weight shown and described in my prior patent does not give the best results, and I have also modified and improved the construction of the apparatus at this point, so that the action is more smooth and efficient. I have also improved the construction of the lever which carries the rolling weight and also the lever which operates the valve.

I will now proceed to describe my invention in detail by aid of the accompanying sheet of drawings, wherein—

Figure 1 represents a longitudinal part-sectional elevation of the apparatus, showing the parts in the positions they assume when the valve is closed. Fig. 2 is a like view illustrating the parts in the positions they assume when the valve is open to discharge the water or other liquid. Fig. 3 is a part-sectional plan. Fig. 4 is a view of the valve as seen from the under side, and Fig. 5 is a plan of the rolling weight.

1 represents the drum or vessel which serves as the receiver for the water or other liquid separated from the steam or other gaseous fluid. This vessel 1 may be constructed of the shape shown or of any other suitable shape. As illustrated, it is made larger both top and bottom at one end to allow for the rise and fall of the float. The vessel 1 may, as shown, be cast or otherwise constructed, with the cover 2 closing it at one end. The

vessel 1 is arranged at the lowest level of the steam pipe or pipes, so that the water of condensation will drain into it. In the top of the vessel 1 is formed a hole, shown provided with a screw-thread 3, into which the end of the steam-pipe or a branch pipe therefrom may be screwed. The other end of the vessel 1 is preferably constructed with an external flange 4, provided with a number of bolt-holes 5.

6 is a cover for closing the vessel 1 at the other end. This cover 6 may, as shown, be bolted to the flange 4 or be fixed to the vessel in any other suitable manner. On the cover 6, inside the vessel 1, is cast or otherwise formed a projection 7. Through the projection 7 is formed a horizontal hole 8, in which is located a pin 9, which forms a pivot for the float-lever. The float-lever is bifurcated or forked for a portion of its length, the outer extremities of the prongs 10 11 of the fork or bifurcation projecting to either side of the projection 7 and being formed with holes to receive the pivot-pin 9. The pivot-pin 9 is held in position between the head 12 and the washer 13.

14 is a hole for the reception of a split pin or key to keep the washer 13 in position. The parts 10 11 forming the bifurcated portion of the lever may be riveted, as seen at 15^a, to the part 15 or be constructed in one piece therewith, as may be preferred. The outer end of the lever has attached to it a spherical float 16.

The parts 10 11 of the float-lever are, as in my previous patent, formed with two horns or projections 17 18 and with a straight edge 19 and a recess 20. The straight edge 19 is preferably beveled off on one side to form a knife-edge and slightly inclined downward in the direction of the recess 20. The horn or projection 18 is preferably produced for some distance in a forward direction and curved on the inside, as indicated at 21, so that it throws the rolling weight forward onto the straight edge 19 when the lever falls.

The weight 22, which runs in the bifurcation, is, as shown in Fig. 5, of cylindrical form and provided with two trunnions 23 24, in which are formed grooves 25 26. The weight 22 runs backward and forward on the knife-edges 19 of the parts 10 11 between the horns or projections 17 18.

To the cover 6, beneath the lug 7, is fitted a rectangular piece of metal 27, which forms a housing or body for the valve. This housing 27 may be fixed to the cover 6 by means of set-screws 41, screwed through flanges or lateral projections 42, formed on the housing 27 at one end. On the top of this body 27 is arranged a bracket which forms a guide for the valve. This bracket comprises a base part 28, formed with holes 29 for fixing it by means of set-screws or the like to the body 27, and an upright portion 30 of U shape in horizontal section. In the sides of the vertical U-shape portion 30 are formed vertical slots 31.

In the body 27 is formed a vertical hole 32,

in which is arranged the valve 33. In the lower end of the valve 33 is formed a vertical hole 34, which at its upper end communicates with a hole 35, formed transversely of the valve. In the lower extremity of the valve 33 are formed grooves 36, (see Fig. 4,) which allow the liquid to pass through the valve 33 when it is resting on the bottom of the receiver 1.

37 is the outlet formed in the valve-housing 27 for the liquid, which outlet 37 communicates with a hole 38, shown provided with an internal screw-thread for the reception of a pipe to carry away the liquid passing through the valve 33.

In the vertical sides 30 of the bracket, in front of the valve 33, is pivoted a small lever 39. One arm of the lever 39 is bifurcated and pivotally connected to the upper extremity of the valve 33, the pin or pivot 40, forming the connection between the lever and the valve, working in the slots 31 in the vertical sides of the bracket. The other arm of the lever 39, which projects beyond the bracket, is preferably curved to correspond to the curvature of the rolling weight 22.

The action of the trap is as follows: Starting with the parts in the positions illustrated in Fig. 1, or with the valve 33 closed, it will be noticed that the float 16 is resting on the bottom of the receiver 1. The float-lever is inclined in a downward direction. The rolling weight 22 takes up a position in the bifurcation at the bottom of the straight edges 19, in which position the grooves 25 26 in the trunnions 23 24 rest in the recesses 20^a under the horns or projections 17. In this position the weight 22 is riding on the front arm of the lever 39 and depressing it and by raising the inner arm lifts the valve 33 in its housing or casing 27, and so closes it to the outlet 37. As the water or other liquid continues to flow into the receiver 1 the float 16 rises with the water-level until it reaches a point at which the weight 22 rolls down the straight edges 19 on the trunnions 23 24 and drops into the recesses 20, formed by the other horn or projection 18. The rolling weight 22 is shown in this position in Fig. 2. As it falls into the recesses 20 it engages the top of the valve 33 and depresses it in the housing 27 and brings the transverse hole or port 35 into coincidence with the liquid-outlet passage 37. When the valve 33 is depressed, the lower extremity rests on the bottom of the receiver 1. In this position the liquid passes along the transverse grooves 36 in the bottom of the valve 33 and up the vertical hole 34 into the transverse hole 35, whence it passes along the outlet 37. The parts are so adjusted that when the rolling weight 22 is in the recesses 20 it rests upon and is supported by the vertical sides 30 of the bracket. The depression and opening of the valve 33 to the outlet 37, lowers the inner arm of the lever 39 and raises the other arm to the position shown in Fig. 2.

The water or other liquid now flows through the valve and outlet-passage 37, assisted by the pressure of the steam or other gaseous fluid, and as the water or other liquid is discharged the float 16 and lever 15 fall. As the lever 15 falls and the weight 22 continues to be supported by the bracket 30, the curved inner edges 21, formed by the horns or projections 18, push the weight 22 forward onto the straight edges 19. The float 16 and lever 15 continue to fall until the straight edges 19 are inclined sufficiently for the weight 22 to roll down the straight edges into the recesses 20^a, formed by the other projections 17, or back into the position in which it is shown in Fig. 1. During this movement of the weight 22 it engages the free arm of the lever 39 and lowers it, which raises the other arm, and with it the valve 33, into the position shown in Fig. 1 to close the valve 33. This cycle of operations is repeated each time the float rises to a certain point in the receiver as the water or other liquid accumulates therein.

What I claim as my invention, and desire to protect by Letters Patent, is—

1. In a steam-trap or apparatus for separating liquids from gaseous fluids, in combination, a receiver for the water or other liquid, a pivoted lever fitted with a float arranged in said receiver, a valve body or housing having a vertical hole, a valve located in said vertical hole formed with a vertical port or passage from the lower end in communication with a transverse hole or port in said valve, a weight mounted on the lever and means which operate when the float and lever fall to cause the weight to close the valve, and when the float and lever rise to depress and open the valve substantially as described.

2. In a steam-trap or apparatus for separating liquids from gaseous fluids, in combination, a receiver for the liquid, a lever pivoted at one extremity inside said receiver, and provided with a float at the other extremity a valve body or housing having an outlet in communication with the exterior of the receiver, a valve arranged in said housing adapted to move vertically therein and having a vertical hole open at the bottom to the interior of the receiver, said vertical hole communicating with a transverse hole in the valve, a rolling weight mounted on the float-lever adapted to operate the valve, a lever pivotally attached at one extremity to the upper end of the valve which is operated by the weight to raise and close the valve when the float falls, substantially as described.

3. In a steam-trap or apparatus for separating liquids from gaseous fluids, in combination, a receiver for the liquid, a float-lever arranged in said receiver carrying a rolling weight adapted to operate the valve a valve body or housing having a hole which forms the outlet for the liquid and a vertical hole in which the valve is arranged, a valve arranged

in said vertical hole formed with a vertical hole at the lower end and with transverse grooves in the lower extremity through which the liquid may pass to the vertical hole and with a transverse hole with which the vertical hole communicates, a lever pivotally attached at one end to the upper end of the valve which lever is operated by the rolling weight when the float-lever falls to raise and close the valve, substantially as described.

4. In a steam-trap or apparatus for separating liquids from gaseous fluids, in combination, a receiver for the liquid, a lever pivoted at one end and carrying a float at the other end said lever being forked or bifurcated at the pivoted end and the two prongs or branches being constructed with two horns and a straight edge and recess between said horns, a rolling weight adapted to operate the valve said weight being arranged to move backward and forward in the bifurcation between the horns or projections a valve arranged in the receiver below the float-lever and means operated by the rolling weight to raise and close the valve when the float and lever fall, substantially as described.

5. In a steam-trap or apparatus for separating liquids from gaseous fluids, in combination, a receiver for the liquid, a float-lever pivoted in said receiver carrying a rolling weight adapted to operate the valve, a valve housing or body arranged in said receiver below the pivoted end of said float-lever, a valve arranged in said housing, a bracket fixed on the top of the valve-housing formed of two vertical sides in which the upper extremity of the valve works, a lever pivoted in said bracket and pivotally attached at one end to the upper end of the valve, substantially as described.

6. In a steam-trap or apparatus for separating liquids from gaseous fluids, in combination, the receiver enlarged at one end to accommodate the float and fitted with a detachable cover at the other end, a lug on said detachable cover, a bifurcated lever pivoted to said lug and fitted with a float at the other end, horns or projections formed at either side of the bifurcation providing a straight edge and recess between said horns, a rolling weight of cylindrical form constructed with trunnions adapted to move backward and forward on the straight edge between the horns, a valve housing or casing formed with a vertical hole and an outlet in communication therewith, a valve arranged in said vertical hole having a vertical hole open at its lower extremity and with grooves communicating with said vertical hole and placing it in communication with the receiver and with a transverse hole communicating with the vertical hole at the upper end, a bracket fixed on the valve-housing surrounding the upper end of the valve, a bifurcated lever pivoted in said bracket one arm of which is pivotally attached to the

upper end of the valve said bracket being constructed with slots in which the pivot-pin forming the connection between the lever and valve is free to slide vertically, the parts being so
5 arranged that when the float and lever rise the weight rolls down the straight edges into the recesses at the rear of said straight edges and engages the upper end of the valve and by depressing it opens it to the outlet, and when
10 the float and lever fall the weight moves out of the recesses down the straight edges and

engages the outer arm of the valve-lever which raises and closes the valve substantially as described.

In testimony whereof I have signed my name 15 to this specification in the presence of two subscribing witnesses.

PETER FRASER.

Witnesses:

CHAS. OVENDALE,
R. OVENDALE.