

The HIGH PRESSURE
LOCOMOTIVE WASHER

A METCALFE PATENT

The MOST EFFICIENT *and* MOST
ECONOMICAL LOCOMOTIVE
CLEANING SYSTEM

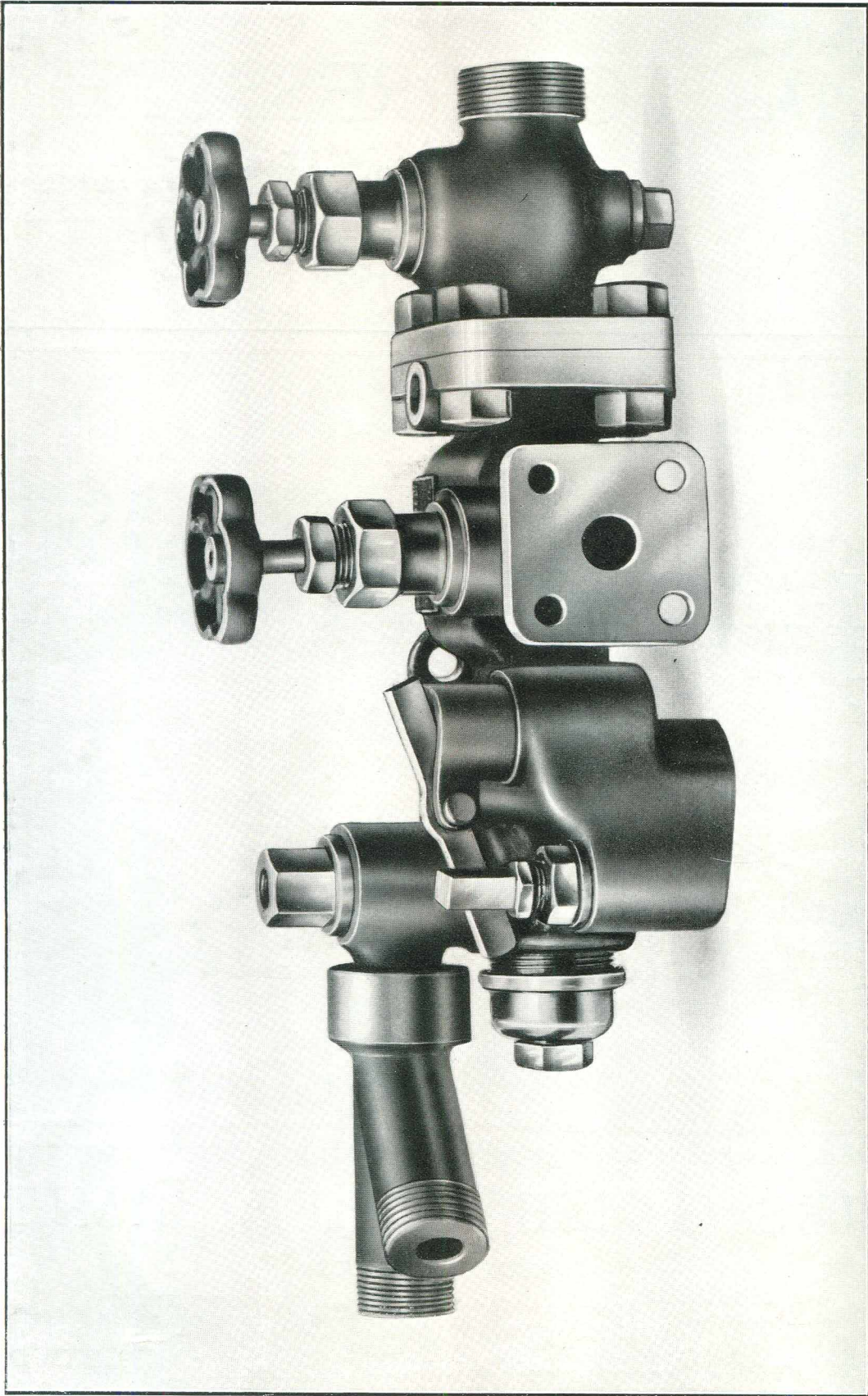
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INJECTOR WORKS

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WASHING INJECTOR

The High Pressure Locomotive Washer

A METCALFE PATENT

HE necessity for reducing the heavy cost of locomotive washing has led to a great deal of experiment with the object of finding some system which will enable real economies to be made in the running shed without impairing efficiency.

In the past when economy was essential in the cleaning shed it was obtained either by reducing the work put into each engine, or in some cases by drastically curtailing the number of engines dealt with, and this resulted in rapid deterioration of those engines which were not working the more important services.

The ordinary method of wiping down locomotives by hand has given satisfactory results as regards cleanliness, but the relatively large number of man-hours spent even on moderate-sized engines, has led to unreasonably high cleaning costs. It is this fact which is compelling the railway companies to seek some other method of cleaning, which, although its initial cost may be greater than that of the simple materials used in hand wiping, will yet enable considerable economies to be made without sacrifice of efficiency.

The result of a great many careful experiments which have been made over a long period, agree in showing that there is nothing so efficient for cleaning a dirty, oily surface, as a jet of water at high temperature and pressure. Trials made with high-pressure cold water jets, such as are widely used in motor car service stations, have shown that high-pressure alone is not sufficient to remove the clinging, oily deposits met with in locomotive practice.

The use of cold water, too, is apt to produce a streaky, rusty finish on bright metal parts unless a comparatively large proportion of relatively expensive oil is mixed with the jet.

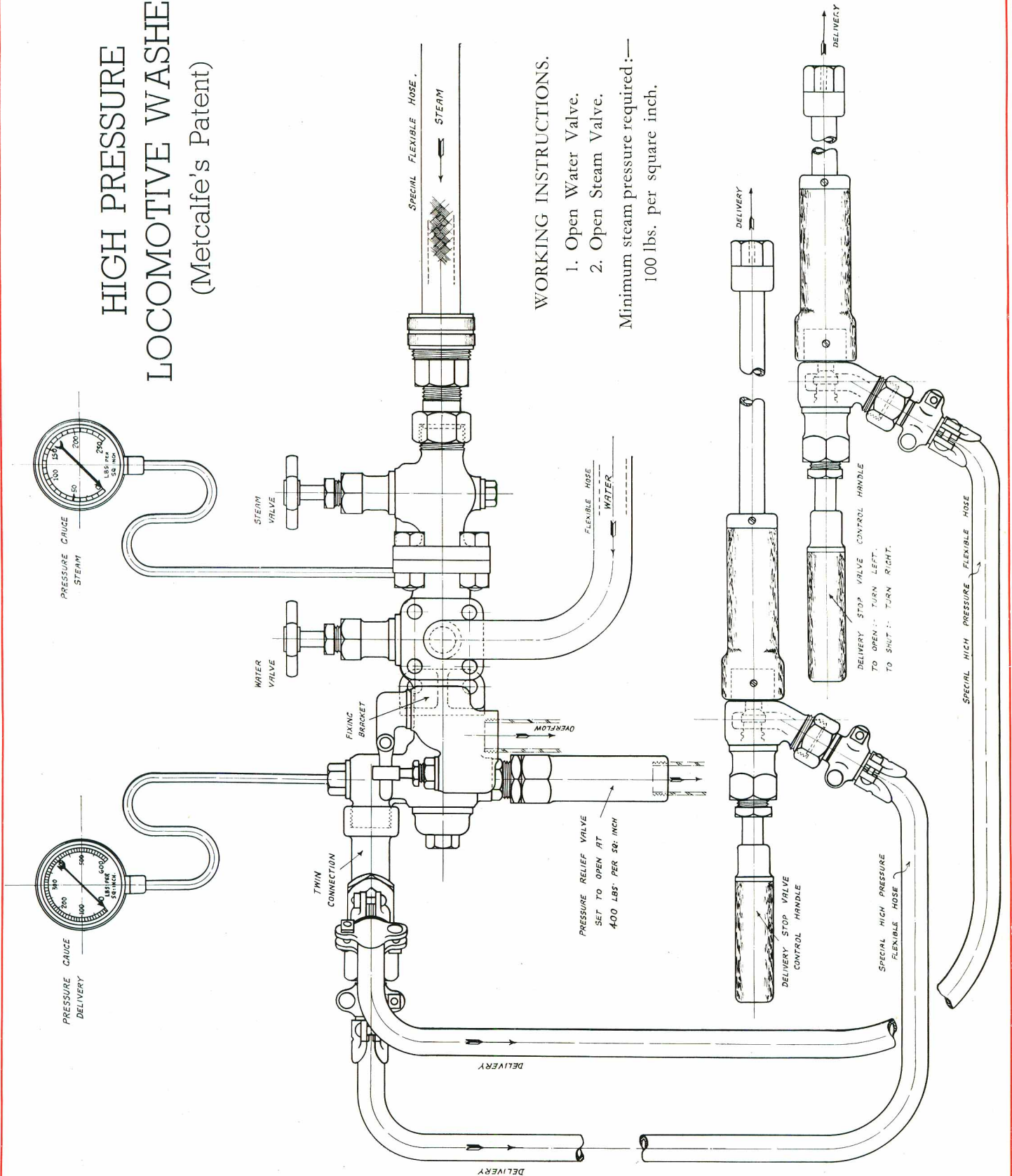
High temperature unaccompanied by high pressure is also ineffective, since under these circumstances the jet has insufficient energy to move the unwanted matter. For this reason low-pressure steam has not proved satisfactory as a cleaning medium, and it is certain that steam jets at the high pressure necessary for locomotive cleaning would cause unbearable discomfort to the operator, even if the cost of such steam were not prohibitive.

The Davies and Metcalfe system of locomotive washing, has, therefore, been designed to supply a jet of hot water at very high pressure, so that the highest standards of cleaning may be achieved. It consists of a very light and compact injector worked by live steam at about 100 lb. per square inch, and delivering a jet of hot water at very high pressure, temperatures up to 212 degrees Fahrenheit, and pressures up to 400 lb. per square inch being obtainable.

FIG. 3

HIGH PRESSURE LOCOMOTIVE WASHER

(Metcalf's Patent)



WORKING INSTRUCTIONS.

1. Open Water Valve.
 2. Open Steam Valve.
- Minimum steam pressure required:—
100 lbs. per square inch.

It will thus be seen that the Davies and Metcalfe locomotive washer provides a very simple and efficient cleaning system. It can be operated by a single non-skilled man, and produces excellent results in a very short time. If desired, provision can be made for introducing a little oil into the jet after all the dirt has been removed, and in this way an almost new appearance can be given to the locomotive.

In conclusion it may be said that no other apparatus offers the same flexibility, low installation, operating and maintenance costs as the high-pressure injector, which may fairly claim to possess outstanding advantages over any other system of locomotive cleaning.

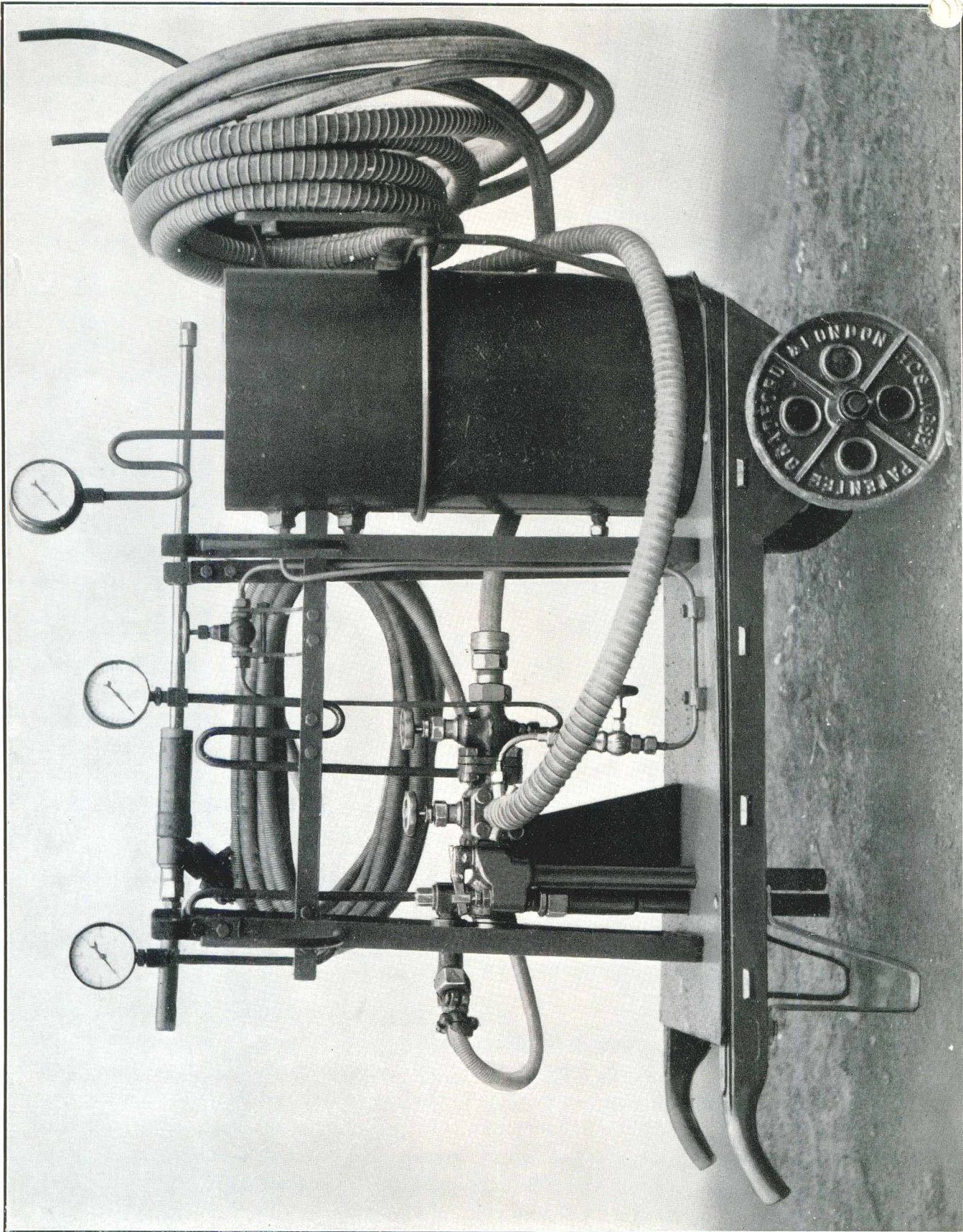
The drawing opposite (Fig. 3), shows the arrangement of the most popular type of Davies and Metcalfe's high-pressure locomotive washer. It will be seen that the apparatus supplied, consists of a small and light injector fitted with valves to control the supply of water and steam, and gauges to show the pressure of the supply steam and the high-pressure delivery water.

Three flexible pipes are supplied. One of these is a 30-foot length of armoured hose for the steam supply, and the remaining two are 50-foot lengths of specially reinforced wire-bound rubber hose, which lead the high pressure delivery water from the injector to the two spray guns, one for each operator. These hoses are constructed with a very large factor of safety, and there is thus no likelihood of bursting, and consequent injury to the operators. The washer can, of course, be supplied with only one gun.

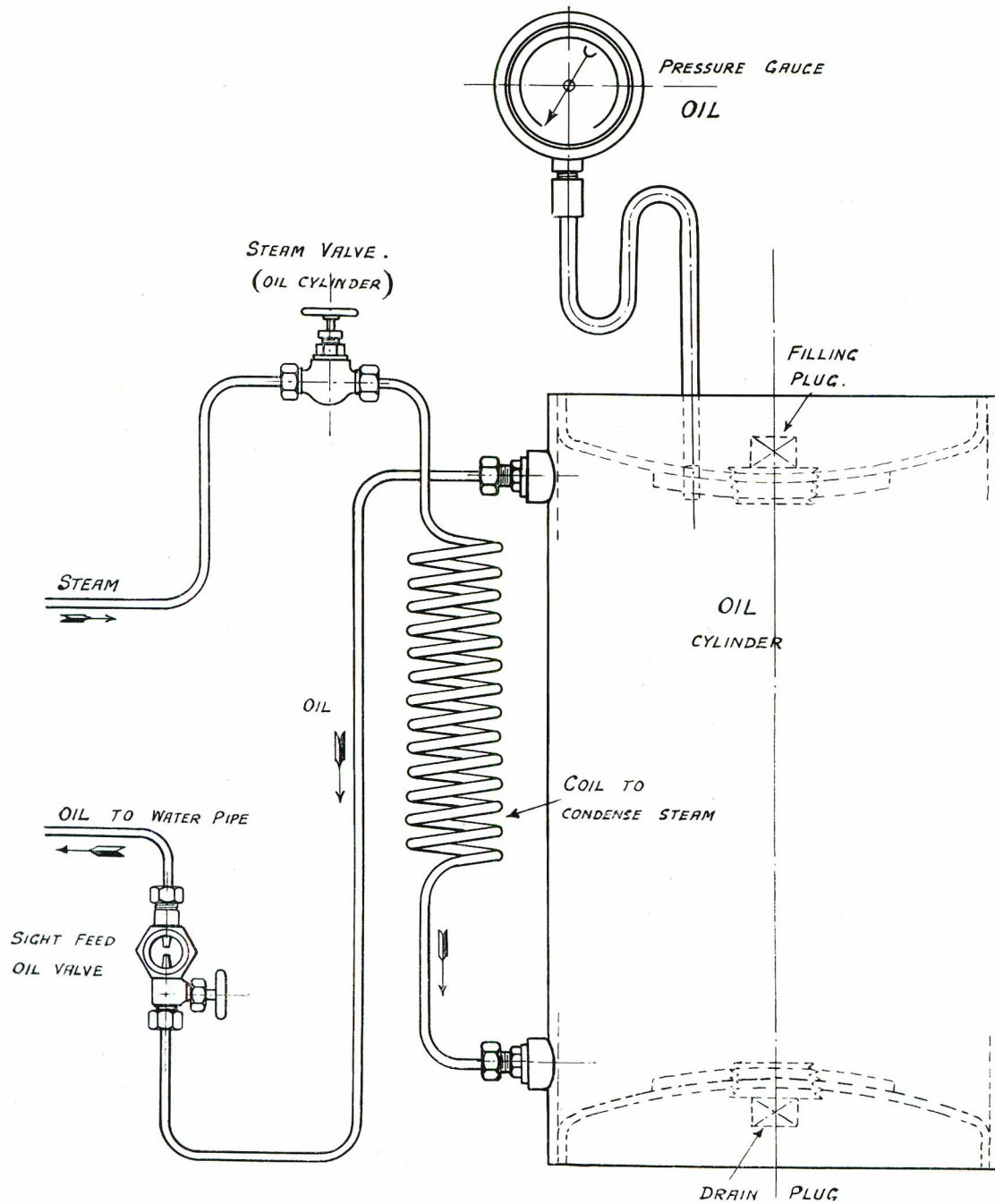
A special safety valve on the injector provides an additional measure of security. If ever the delivery pressure should rise above 400 lb. per square inch, this valve opens, and so prevents any pressure higher than this from being obtained in the delivery pipes or spray guns. It will be appreciated that this is a very useful feature. If the injector were set to deliver at 400 lb. per square inch with both guns in operation, and one gun were shut off without readjustment of the steam and water valves, the pressure in the delivery hoses would rise greatly were it not for the action of this valve.

These guns are made as light as possible, consistent with adequate strength. The amount of water delivered through the spray nozzle at the end of the gun is controlled by a screw-down valve, operated by an insulated twist grip handle. Since the quantity of water passing is at all times quite small, the reaction on the operator is not sufficient to cause strain or fatigue.

Under certain circumstances, for example, when it is desired to produce an exceptionally brilliant finish to the locomotive, it may be desired to introduce a certain amount of oil into the jet. The locomotive washing apparatus shown on page 6 allows this to be done in a very simple manner, and the amount of oil used is at all times under the direct control of the operator. In addition to the components described on page 10, the apparatus can be supplied with a portable oil cylinder, an oil pressure gauge, a steam valve and a sight feed oil valve, together with all associated pipes and connections, the whole outfit being mounted on a small handcart.

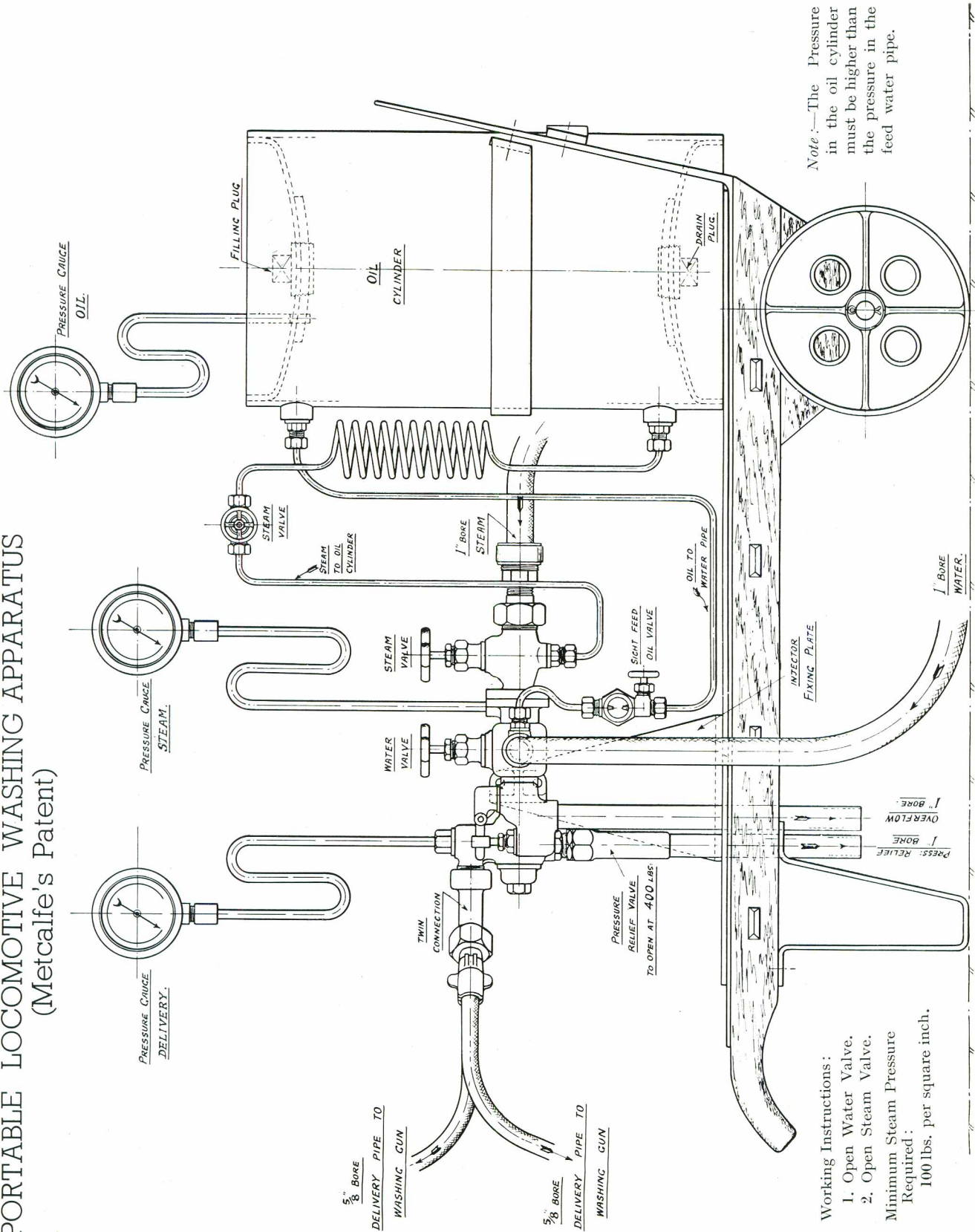


PORTABLE LOCOMOTIVE WASHER



The method of introducing oil into the jet is simple and effective, and ensures the maximum economy in working. When the oil cylinder steam valve is opened, steam condensed in the spiral feed pipe passes in until the pressure inside the oil cylinder, as indicated on the oil pressure gauge, is slightly greater than that of the injector feed water. When this condition has been reached, the sight-feed oil valve may be opened slightly and the drops of oil will be seen passing into the feed water. The amount of oil used is, therefore, directly under the control of the operator, and may be varied as required by adjustment of the sight-feed oil valve hand-wheel.

PORTABLE LOCOMOTIVE WASHING APPARATUS (Metcalfe's Patent)



Note:—The Pressure in the oil cylinder must be higher than the pressure in the feed water pipe.

Working Instructions:
 1. Open Water Valve.
 2. Open Steam Valve.
 Minimum Steam Pressure Required:
 100 lbs. per square inch.

TO WORK THE INJECTOR

- (1) See that the valves in each spray gun are completely shut down, *i.e.*, the twist grip handles are turned clockwise as far as they will go.
- (2) Open the injector water valve.
- (3) Open the injector steam valve. (The minimum steam pressure should not be less than 100 lbs. per square inch).

The injector will now start to work, and the special safety valve will open, allowing the delivery water to escape. The spray gun valves can now be opened, and two very powerful jets of hot water will be available. The water valve can now be adjusted until 400 lb. per square inch is shown on the delivery gauge with both guns at work. If one of the guns is now shut down, the pressure will tend to rise above 400 lb. per square inch, and the safety valve will again open.

When shutting off the injector, turn off the steam first, then the water. Always leave one spray gun open while shutting off, to avoid trapping any high pressure water in the delivery hose, but do not forget to close it afterwards.

STEAM AND WATER CONSUMPTION

Under average conditions of working the Davies and Metcalfe Locomotive Washer uses approximately 550 gallons of water and 700 lbs. of steam per hour with both guns in operation. In this space of time a main line locomotive can be completely cleaned.

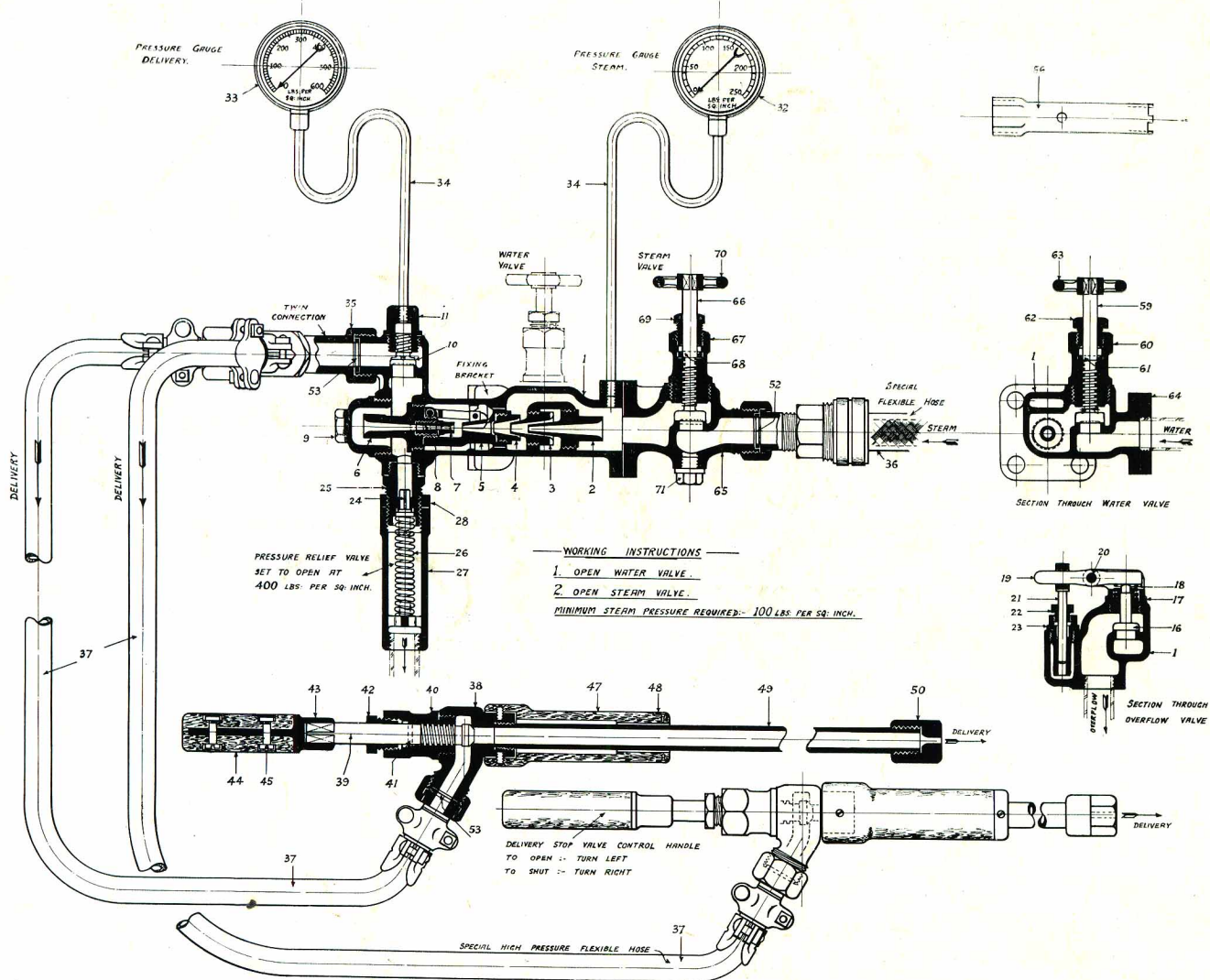
ADVANTAGES OF THE D. & M. SYSTEM OF LOCO. WASHING

The following are some of the many advantages of the Davies and Metcalfe High-pressure Locomotive Washer.

- (1) Delivers an extremely hot supply of water at very high pressure, thus ensuring the most efficient cleaning.
- (2) Ensures a great reduction in locomotive cleaning costs, due to the great saving in man-hours always found.
- (3) Can be operated by non-skilled labour.
- (4) The injector is perfectly automatic and restarting, and requires no attention once the water valve has been set for the usual working pressures.
- (5) Will work satisfactorily with low steam pressures.
- (6) Simple, compact and light.
- (7) No other system offers the same flexibility, low-operating costs, low maintenance and low installation costs as the high-pressure injector.

In addition to these advantages, it should be stated that the Davies and Metcalfe system has never been found in practice to cause any increase in "hot boxes."

HIGH PRESSURE LOCOMOTIVE WASHER (Metcalfe's Patent)



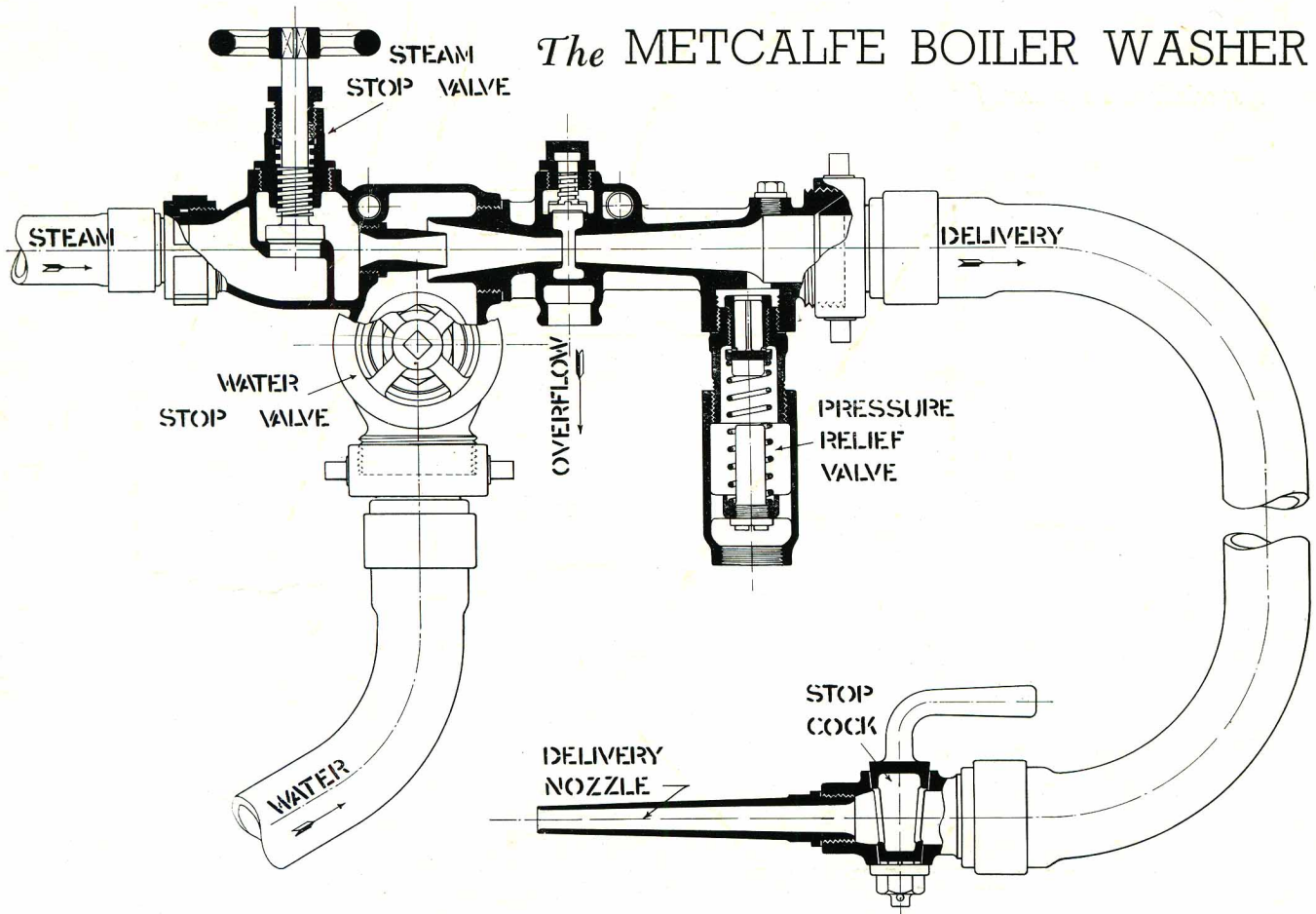
LIST OF PARTS AND CORRESPONDING NUMBERS

When ordering Spare Parts quote Ref. No. and Name of Part.

Ref. No.	Part	Ref. No.	Part	Ref. No.	Part
1	Injector Body.	25	Seating for ditto.	47	Handle.
2	Steam Nozzle.	26	Spring for ditto.	48	Ring.
3	Draft Tube.	27	Adjusting Nut.	49	Tube.
4	Vacuum Tube.	28	Locking Nut.	50	Nozzle.
5	Combining Nozzle.	32	Pressure Gauge—Steam.	52	Joint Washer.
6	Discharge Nozzle.	33	Pressure Gauge—Delivery.	53	Joint Washer.
7	Renewable End for ditto.	34	Connecting Pipe to gauges.	56	Box Key.
8	Set Screw for ditto.	35	Twin Connection to guns.	59	Water Valve.
9	Nozzle Cap Nut.	36	Flexible Hose and Connections—Steam.	60	Box Nut.
10	Back Pressure Valve.	37	Flexible Hose and Connections—Delivery.	61	Neck Ring.
11	Cap Nut for ditto.	38	Valve-seat for gun.	62	Gland.
16	Overflow Valve.	39	Valve Spindle.	63	Hand Wheel.
17	Fulcrum and Guide for ditto.	40	Box Nut.	64	Flange—Water.
18	Spring.	41	Neck Ring.	65	Body Steam Valve.
19	Lever.	42	Gland.	66	Steam Valve.
20	Lever Pin.	43	Holder for handle.	67	Box Nut.
21	Piston.	44	Handle.	68	Neck Ring.
22	Piston Gland.	45	Bolts.	69	Gland.
23	Cylinder.			70	Hand Wheel.
24	Pressure Relief Valve.			71	Plug.

Part Ref. 4 not now required — See C.O.S. memo 53/1251 of 29-6-53 File 27L

Ref. 4 now incorporated in Ref. 5. Page Ten
D&M drawing No. 8925.



This apparatus is extremely simple, having no moving parts. It consists of a special Water Ejector, fitted with self-contained steam and water valves, together with a portable washing out nozzle, fitted with stop cock, and a suitable length of delivery hose. A special safety valve is fitted on the delivery side as on the Locomotive Washer.

The Metcalfe Boiler Washer has been designed to supply a jet of hot water at a temperature of about 160 degrees Fahrenheit, and at a pressure of about 70 lbs. per square inch, and will work with a minimum boiler pressure of 100 lbs. per square inch. (A boiler pressure of 140 lbs. per square inch is recommended).

The advantages are :—

- (1) Inexpensive and can be worked with unskilled labour.
- (2) Hot water is always supplied for washing out, so that this can be commenced immediately after the boiler has been emptied.
- (3) The ejector can also be used for filling the boiler after washing out, and by regulating the water valve, water can be delivered to the boiler at practically boiling point, so avoiding the danger of chilling the plates and thus saving time.

We specialise in the manufacture of

LOCOMOTIVE FITTINGS

EXHAUST STEAM INJECTORS

Utilising exhaust steam, saving 10 per cent. fuel and water.

LIVE STEAM INJECTORS

All standard types for locomotives and stationary boilers.

HOT WATER INJECTORS

To work with feed water at any temperature up to 140 degrees Fahrenheit.

VACUUM BRAKE EJECTORS

Metcalf Patent Solid Nozzle type.

The simplest and most reliable.

WATER HEATERS AND EJECTORS

WATER GAUGE COCKS

All standard locomotive patterns.

TOP FEED CHECK VALVES

COMBINED STEAM AND DELIVERY VALVES

STEAM SANDING EQUIPMENT

AIR SANDING EQUIPMENT