

Hi chaps, as Mason class CH7 PDFs are nearing completion, I'm ready to release the 1883 Westinghouse fitout drawings on the Mason Bogie. This has been one big effort to sort out, as the DSP&P brake system was not the same as the D&RG of the same period, and as applied to the Mason is different again from other locos. A huge thanks to Phil Wiborg for his assistance and 1883 Westinghouse catalogue copies.

The brake system is correct as far as we can work it out. The only mystery component that remains is that vertical cylinder in front of the cab wall, below the running boards. On some Westinghouse systems, they call it a 'brake reducing valve', which is a little air tank in its own right, which gives an added kick to the loco brake line pressure if the air in the Aux tank is dropping (brakes starting to come off) during a long down hill, as would be found on the DSP. However this sort of replicates what the Aux brake stand does...supplies direct air to the loco brakes alone if the automatic air system is running out of pressure on a long downhill...could be two back-ups in the system for the Mason alone, because the Brake reducing valve is used on Pass locos, not freight locos.

Anyway, find attached the PDFs for the Mason Bogie brake system, 1883 Automatic air system as applied to DSP locos in late 1883. (dont use this on other NG locos!)

Drawings 16 and 17 cover the construction of the special 8" air compressor...a pump made specifically for NG locos and differs in design from the standard types we get to know later on.

Drawings 18, 19 20 and 21 are each made of 3 parts. Stick them together to see the whole drawings for each of 18,19,20,21.

drawing set 18 shows the complete brake system with all components in place.

drawings 19, 20 and 21 break down the contents of drawing 18 into specific systems, laid one on top of the next.

The air compressor is driven by steam from the throttle valve tube inside the cab...the steam line attached off the side with a globe valve...this same fitting was originally used to drive the Eames ejector in the cab for the 'as built' DSP Masons.

Steam runs from the cab to the compressor via an in-line lubricator (which adds oil to the steam as it goes into the compressor steam chamber), and the Governor. The Governor is connected to the main air tank line via a tiny copper tube. When the tank pressure drops, the governor opens and lets steam flow to the compressor...thus the crew only turn on the steam valve in the cab once, and from there the governor turns the compressor on and off as needed, and as measured by the tank pressure..this keeps the air tank pressure at operational pressure 100% of the time.

Air enters the 8" compressor from the forward facing side...via small holes above and below the outgoing compressed air line. Air leaves the air compressor from the same side and runs direct to the air tank on the back of the loco. Distance is important in or-

der for the hot air pressure to cool off a little (and contract a little) before going into the tank.

Note that the loco and train are automatic air, which means loss of air pressure in the brake line causes the brakes to come on...through the train and the loco.

Loss of brake line pressure occurs at the engineer's brake stand.

Each car and the loco has its own auxiliary air tank mounted under the car. On the loco this Aux tank is mounted under the cab below the engineer's seat is clearly visible in all the photos. These aux tanks on the loco and cars are charged up from the big tank on the rear of the loco only while brakes are off (and brake line pressure is up)

When brake line pressure drops via the brake stand, the tripple valve attached to each of the Aux tanks shuts off air supply to the aux tank, and opens another valve to the brake cylinders letting air flow out of the aux tank to the brake cylinders. Only the Aux tank under each car and loco turn on the brakes. Air pressure drives the brakes 'on', but only from the aux tank and only when the tripple valve allows that air to flow when main brake line pressure is down.

The Aux tank cannot recharge while the tripple valve is open to the brake cylinders...so on long long down grades, where the brakes are on for a long period, the Aux tanks may become exhausted ..and wont recharge unless the brake are off! For this reason the loco is fitted with an Aux brake stand near the front wall of the cab. This is a by pass brake stand which takes air directly from the main tank on the rear of the loco (which is always charged) straight to the loco's brake cylinders, bypassing the tripple valve and aux tank.....a brake backup system..but on the for the loco brakes only. Basically on the long downhill, the engineer can apply the aux brake to keep the loco brakes on, and the train in check for a couple of mins, while he turns off the train brake, allowing the tripple valves to open to let air pressure back into the Aux tanks under each car and recharge the system.

You'll note in this system there is only 1 air gauge, unlike other Westinghouse systems which had as many as 3. The air gauge is mounted on the cab front wall above and between the forward facing windows.

The air gauge on this system connected to the brake lines at the brake stand. It measured air pressure in the main train brake line only...one needle. It was a cool setup, because when brakes were off, it meant the air in the main tank was open to the brake lines, and thus a measure of the pressure in the brake line also happened to be a measure of the air pressure in the main tank. But when brakes are on, air is let out of the brake line, the gauge only measures the brake line pressure, and not tank pressure any more, because the tank pressure is not cut off at the brake stand.

I have included scans of the various fittings from the 1883 catalogue for you to help shape the parts. They are all strange looking castings!

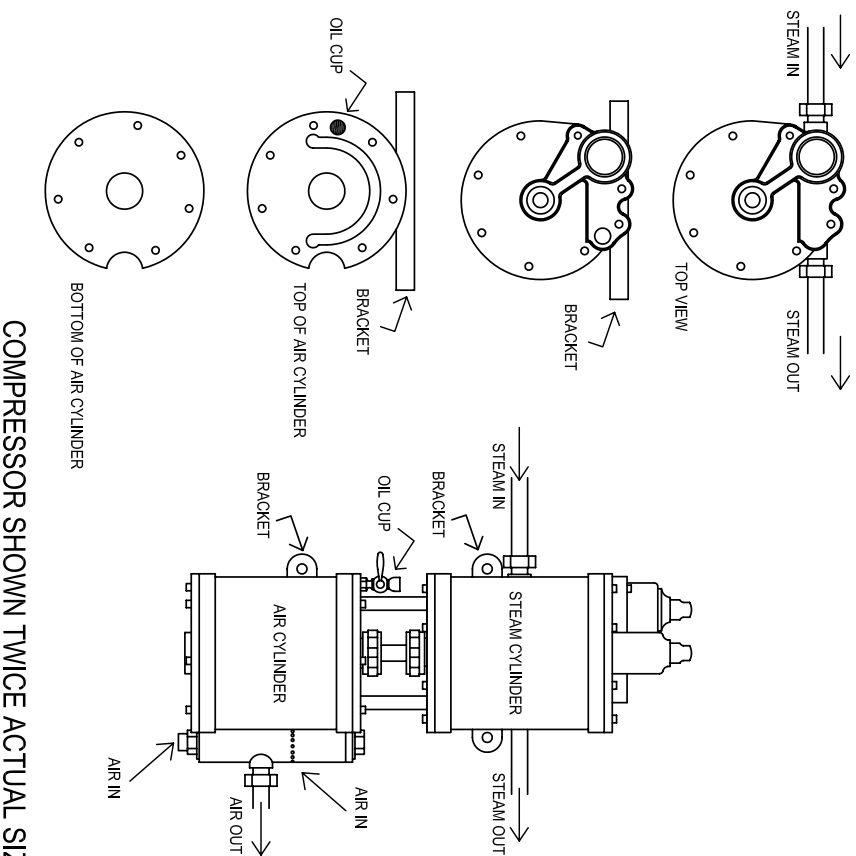
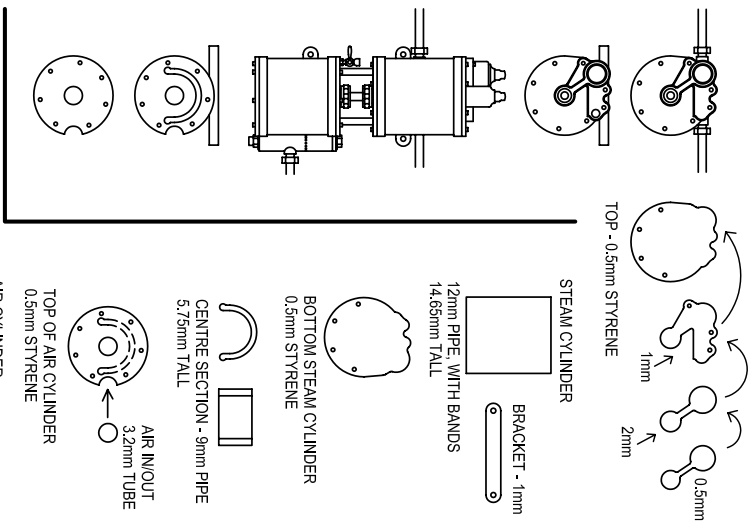
I've added some model pics, but I still need to replace the air compressor on this model, add the Aux brake stand and air gauge in the cab...all the rest of the pipes are correct. There is also a scan of a stop cock from the Westinghouse catalogue, this is the cock mounted under the running board toward the front of the loco, see in my model photos.

Thats about it.

Interesting system.

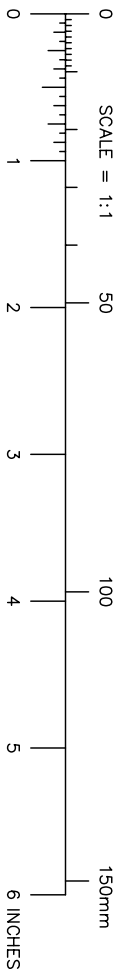
Please note that all of the brake system pipework runs under the engineer's side of the loco...BUT, the train air brake pipe (the red pipe) that runs to the rear air hose runs hard against the underside of the tender deck, down the centre line of the loco beside the tender bearing..it is out of sight. The pipe could have run either side of the tender truck bearing. If you look at your tender deck, the underside had all the joists running from the outer edge to a large beam 2/3 of the way inboard. Then there is a big open hollow space down the centre of the deck (which we use for the BBT frame to run through), this is where the red pipe runs.

COMPRESSOR AT 1:20.3 SCALE

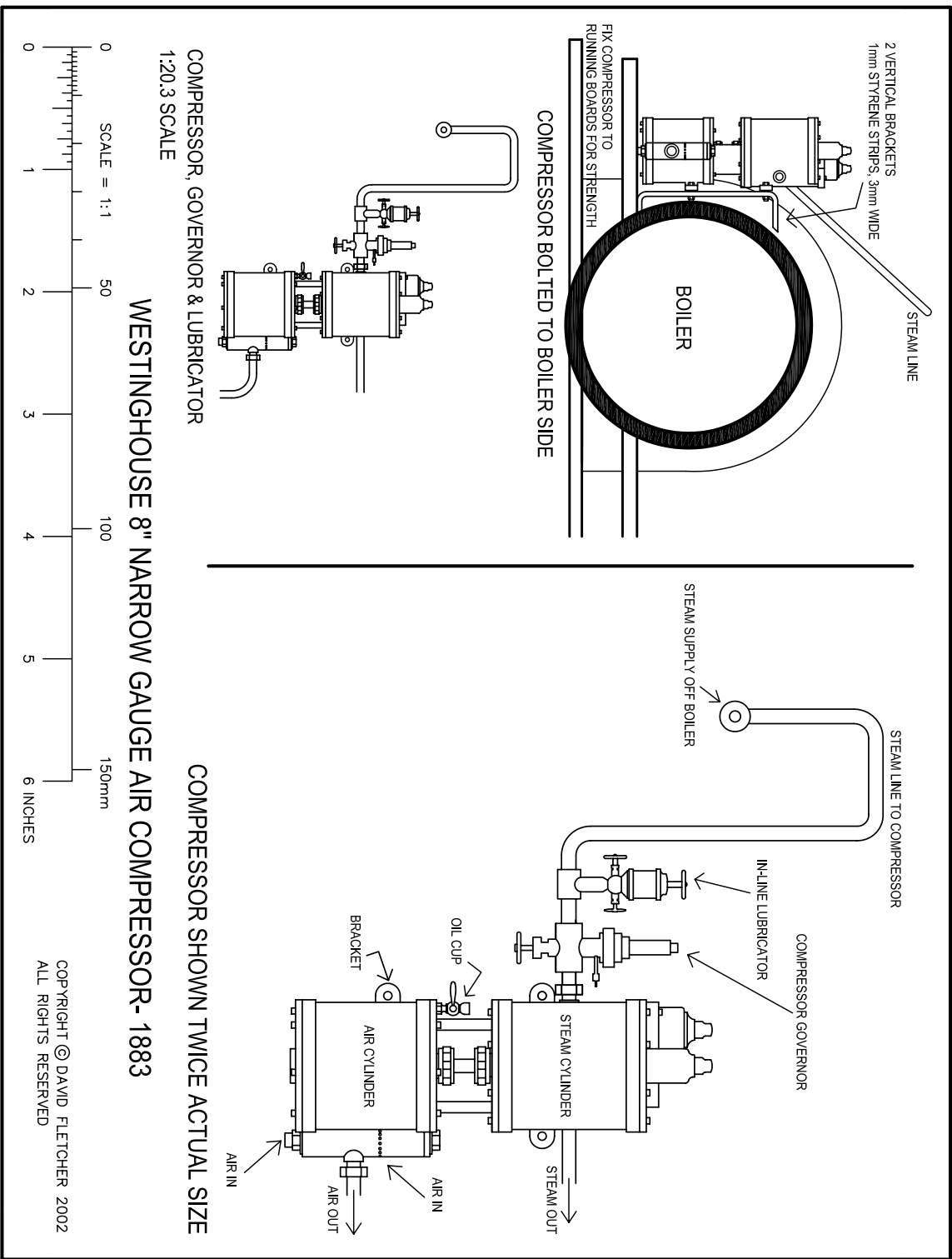


COMPRESSOR SHOWN TWICE ACTUAL SIZE

WESTINGHOUSE 8" NARROW GAUGE AIR COMPRESSOR - 1883








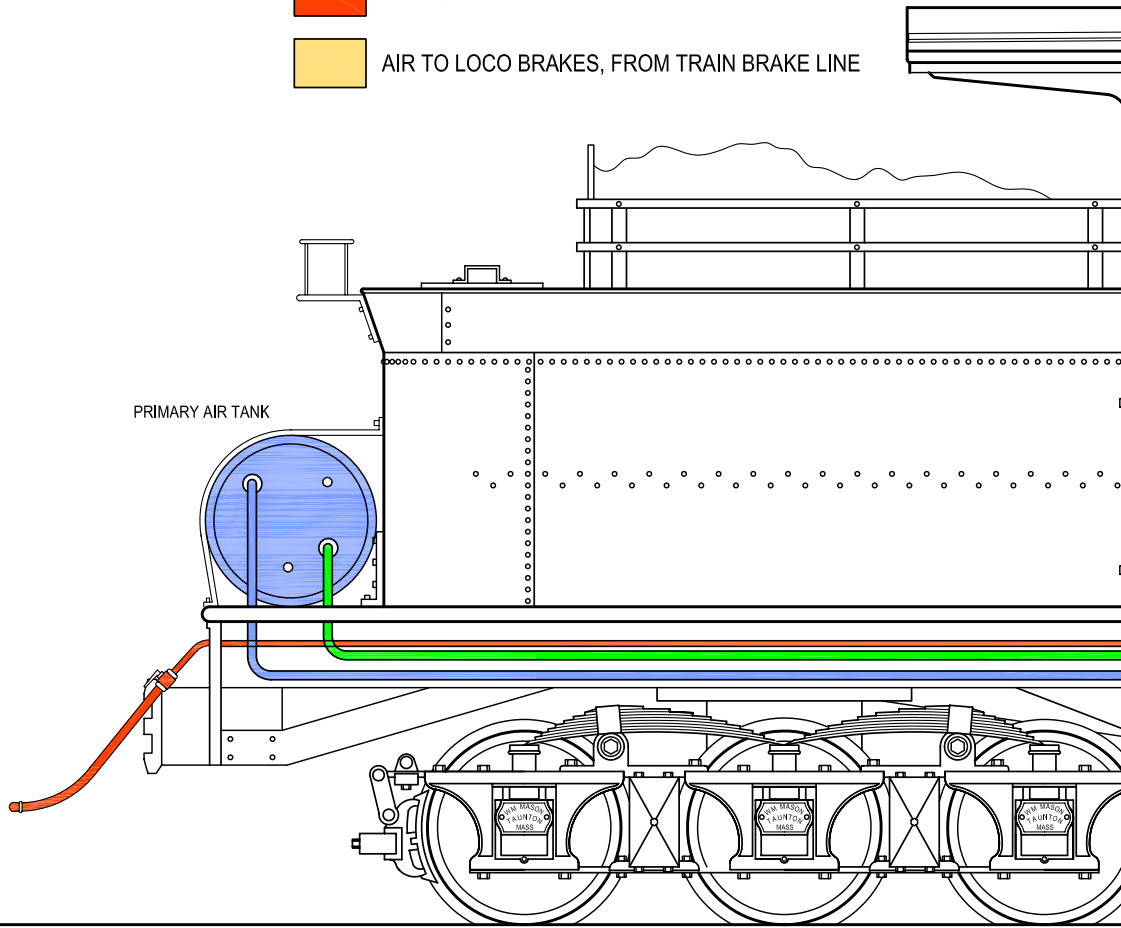
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# 1

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-  STEAM LINE TO AIR COMPRESSOR AND EXHAUST
-  COMPRESSED AIR FROM COMPRESSOR TO AIR TANK
-  AIR FROM AIR TANK TO BRAKE STANDS
-  AIR TO TRAIN BRAKE LINE
-  AIR TO LOCO BRAKES, FROM TRAIN BRAKE LINE



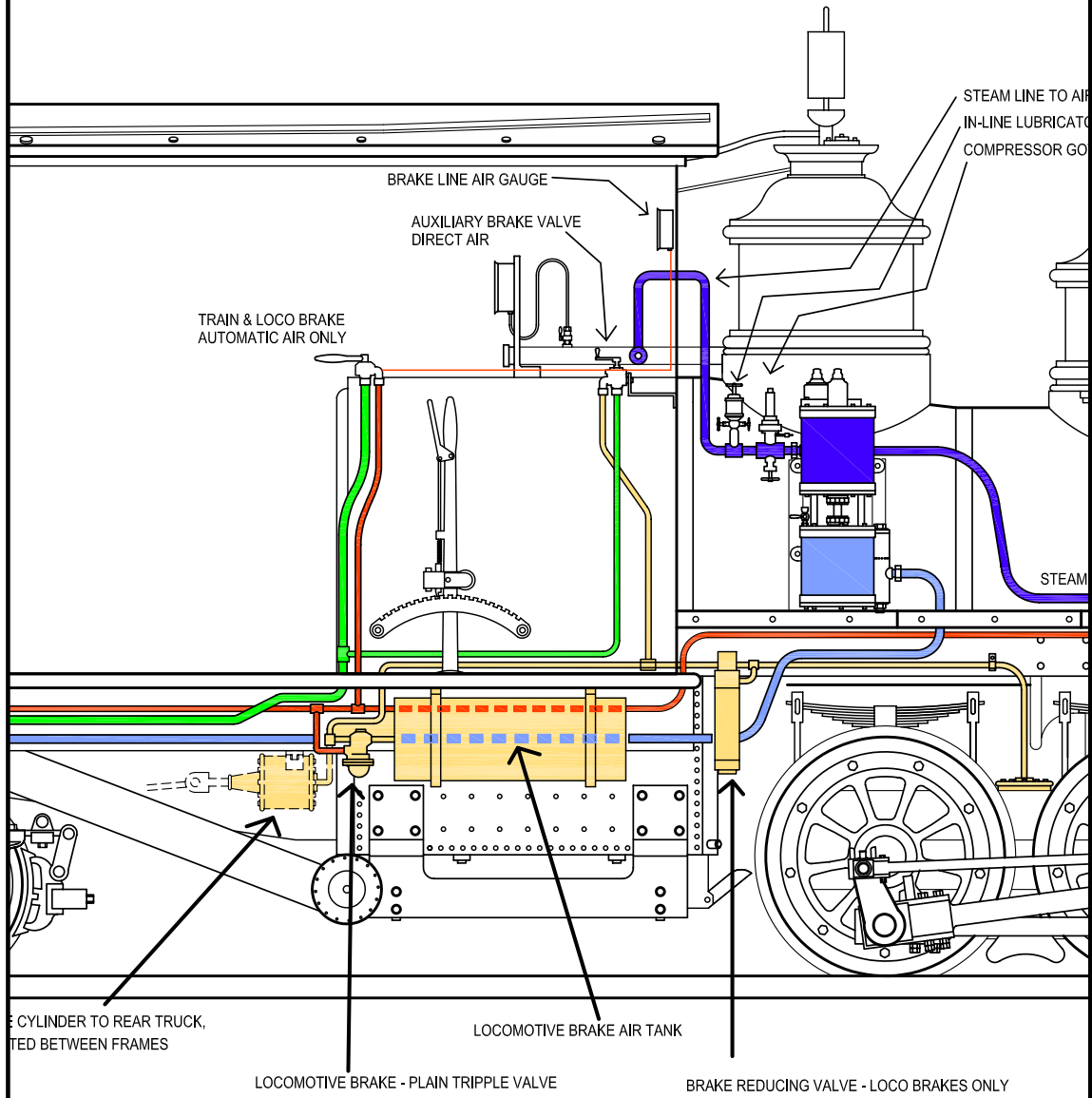
## DSP&P WESTINGHOUSE AIR BRAKE SYSTEM - 1

BRAKE  
MOUNT



1

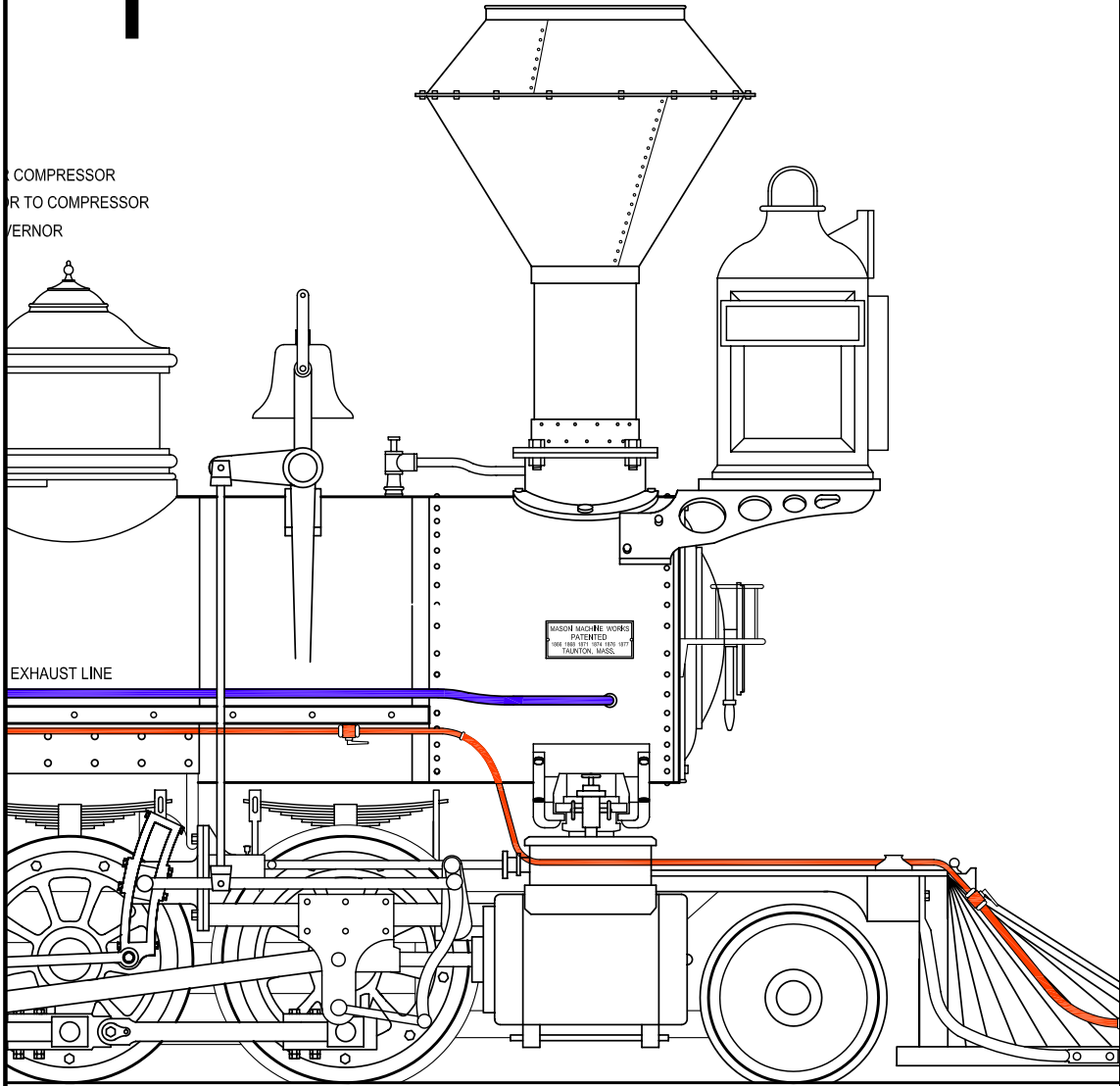
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## DSP&P WESTINGHOUSE AIR BRAKE SYSTEM - 1

1

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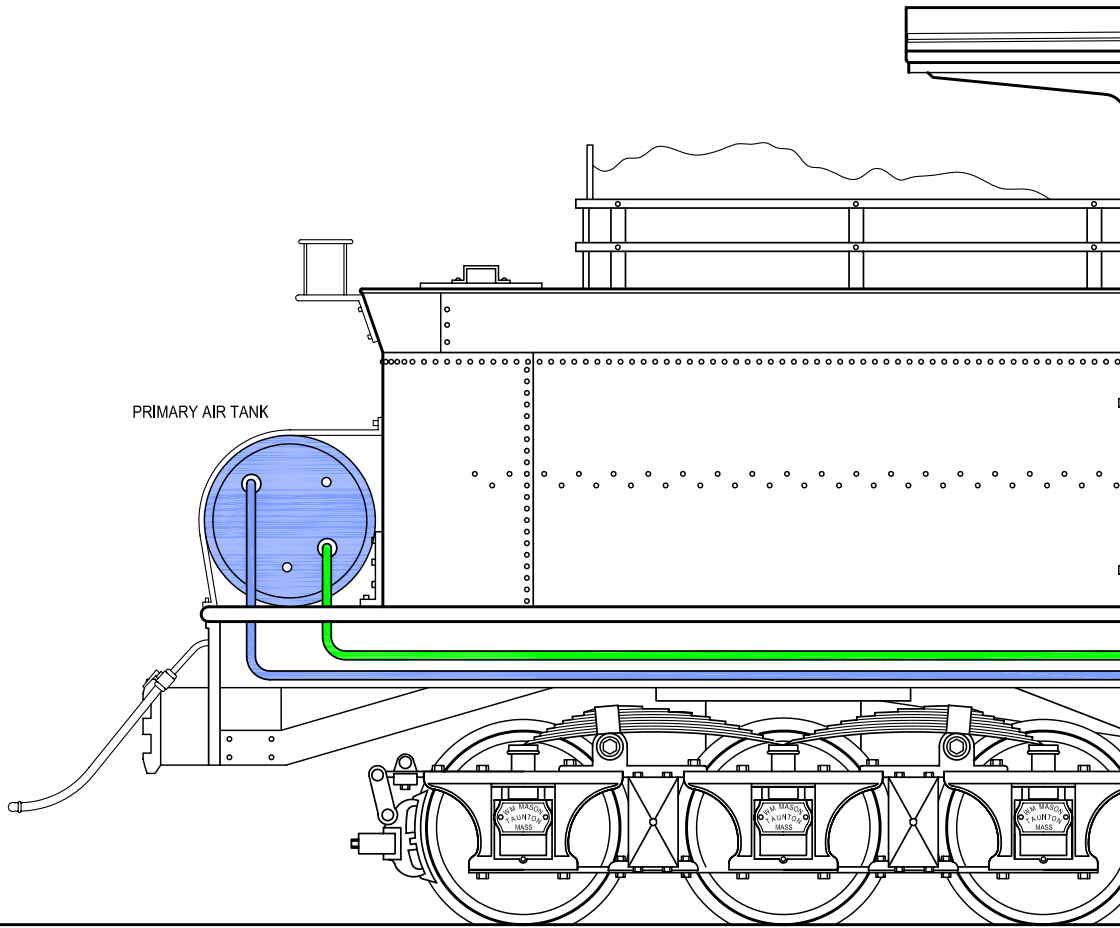
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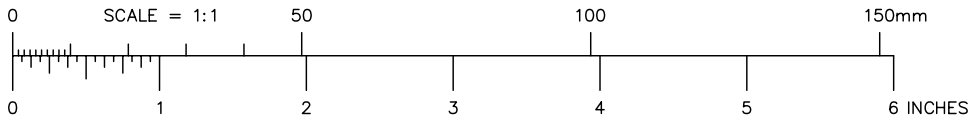
# 2

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-  STEAM LINE TO AIR COMPRESSOR AND EXHAUST
-  COMPRESSED AIR FROM COMPRESSOR TO AIR TANK
-  AIR FROM AIR TANK TO BRAKE STANDS

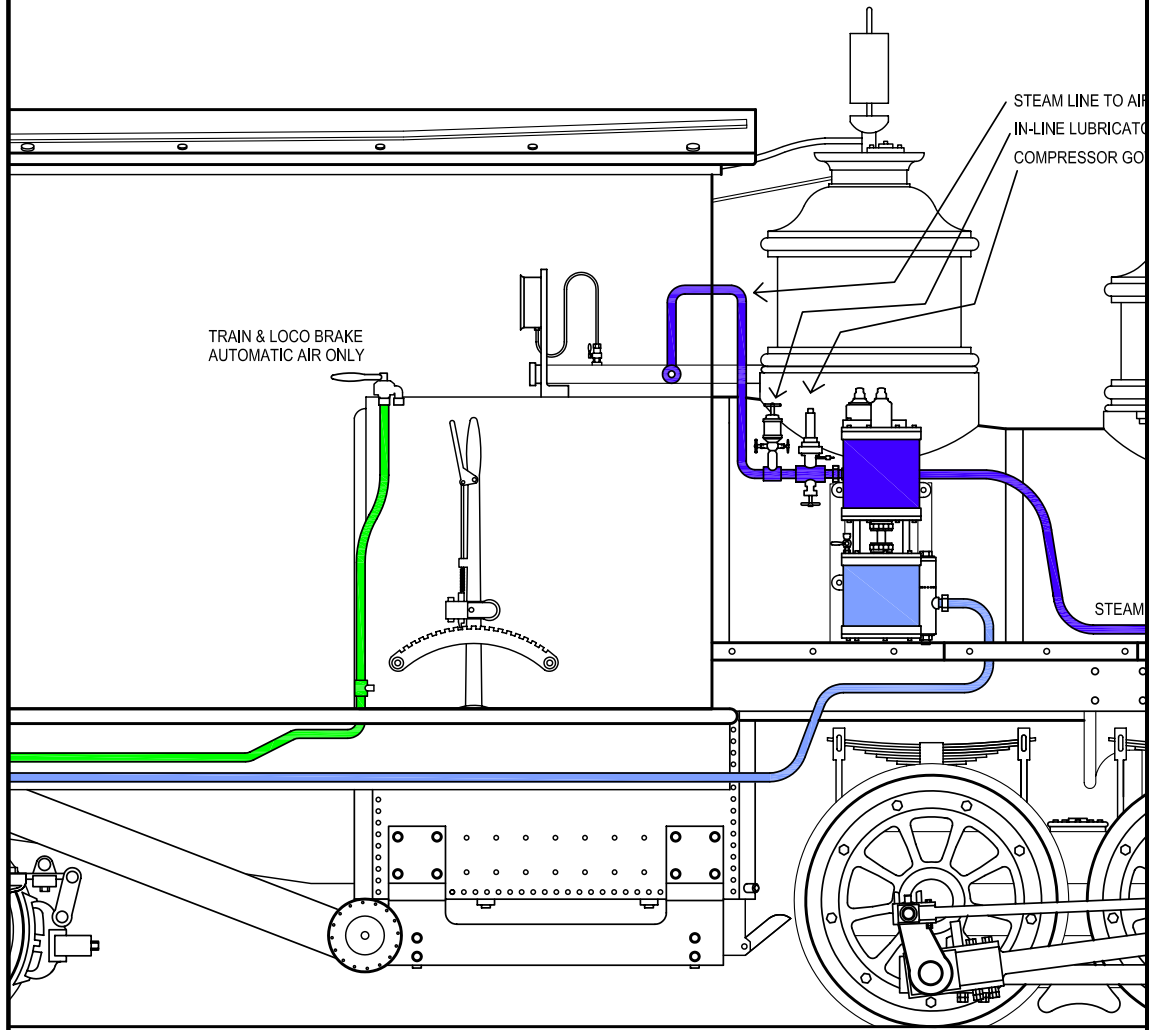


## COMPRESSED AIR TO BRAKE STAND



# 2

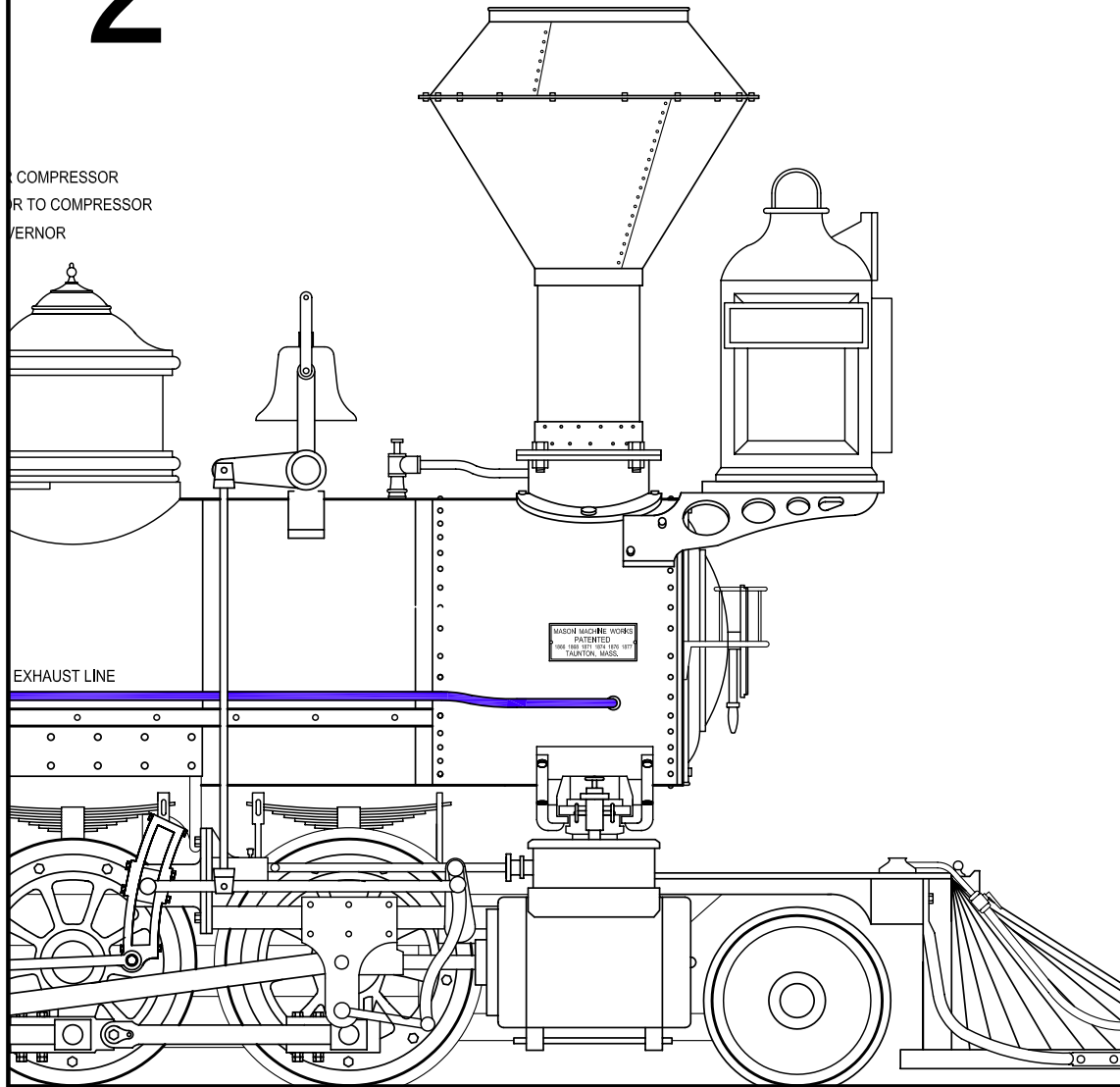
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COMPRESSED AIR TO BRAKE STAND

2

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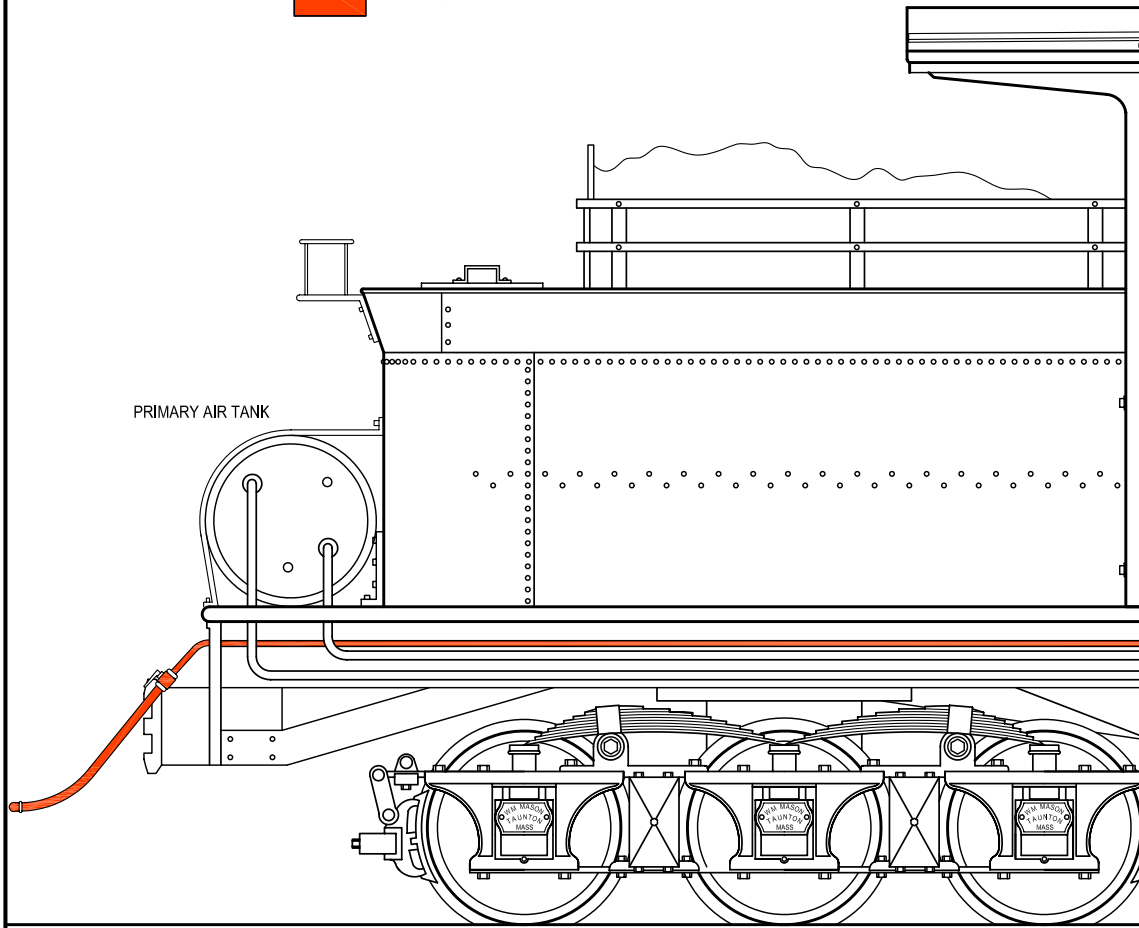


DSP&P WESTINGHOUSE AIR BRAKE SYSTEM - 2  
COMPRESSED AIR TO BRAKE STAND

# 3

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 AIR TO TRAIN BRAKE LINE

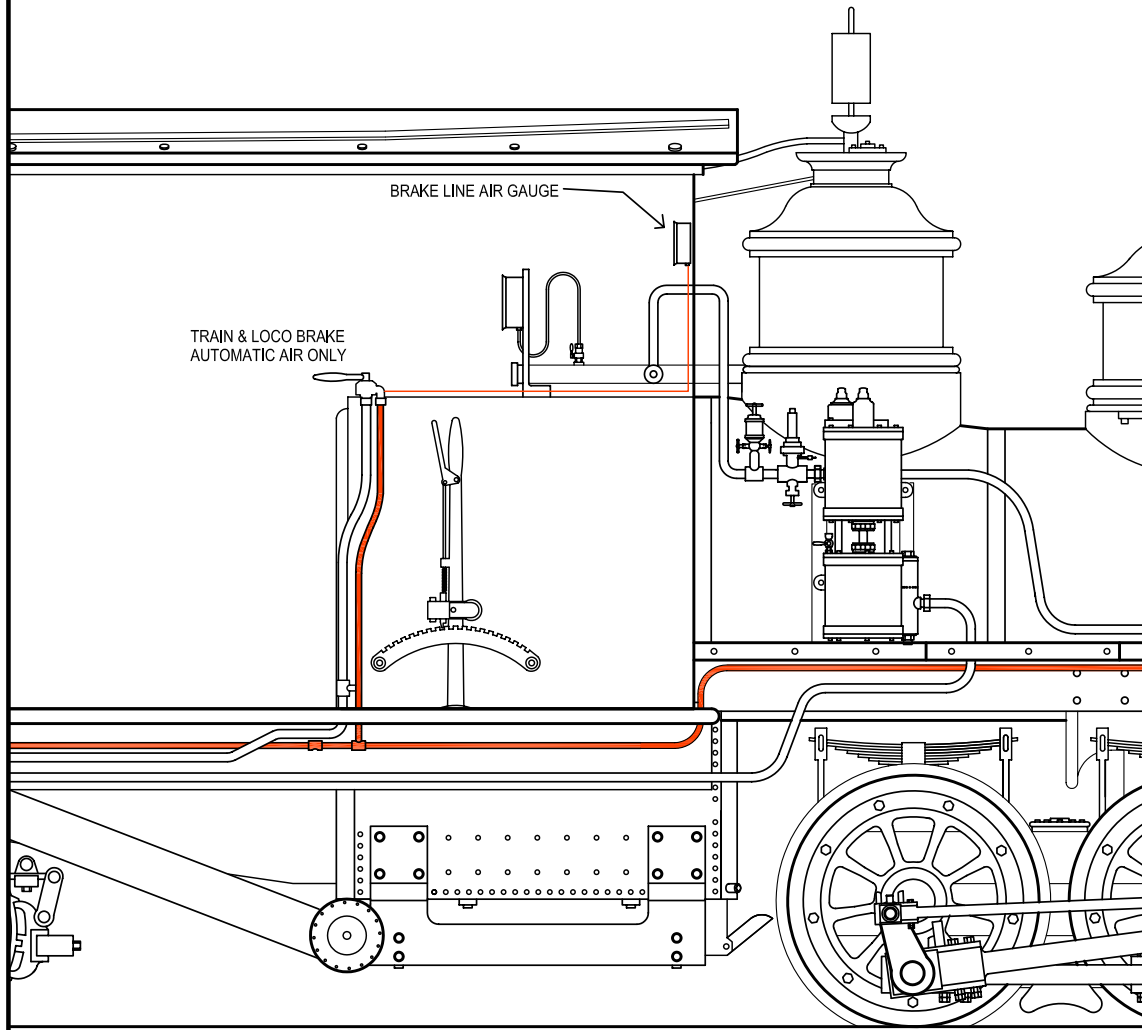


**BRAKE STAND TO TRAIN AIR LINE**



3

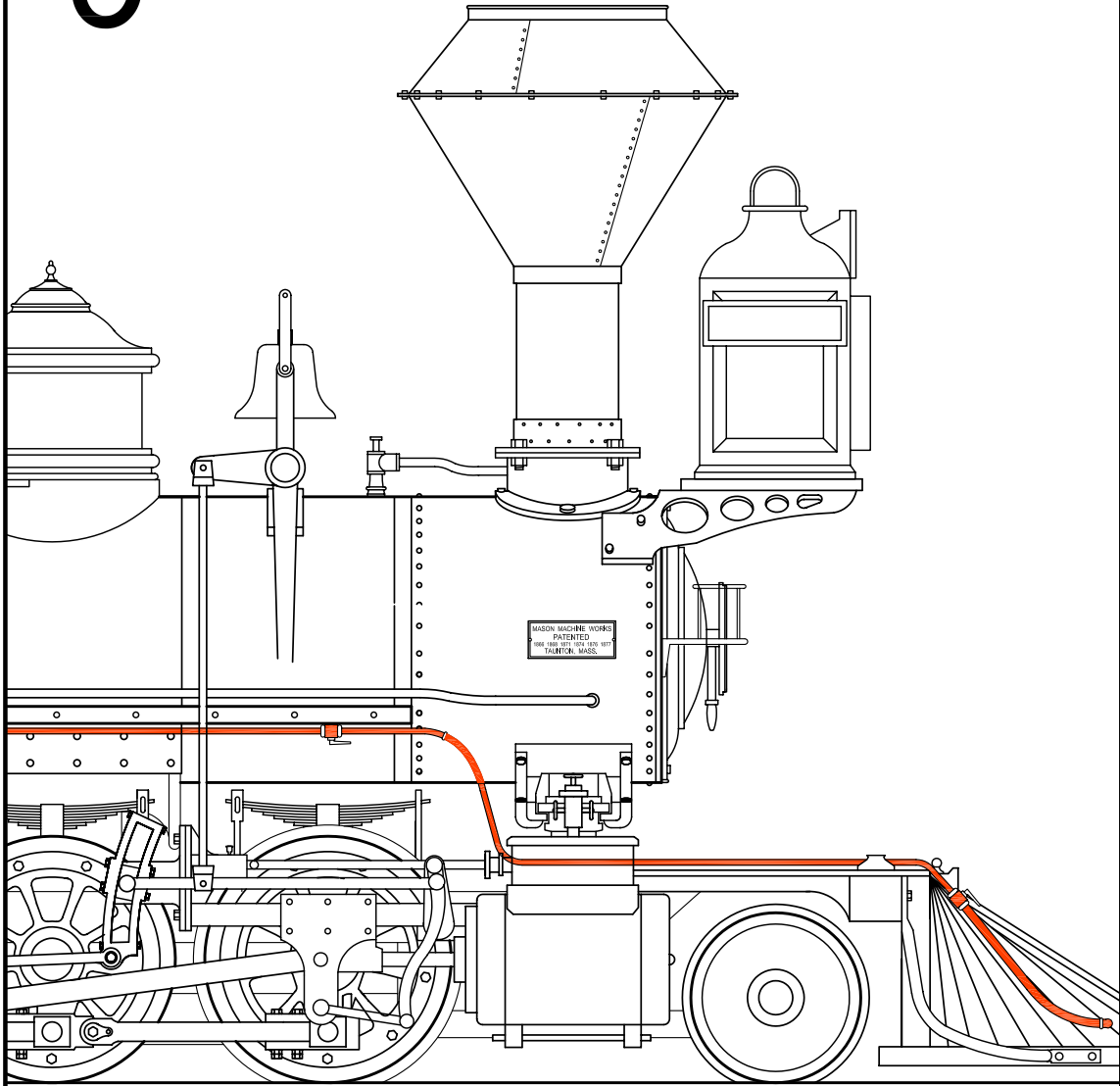
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BRAKE STAND TO TRAIN AIR LINE

3

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DSP&P WESTINGHOUSE AIR BRAKE SYSTEM - 3  
BRAKE STAND TO TRAIN AIR LINE

# 4

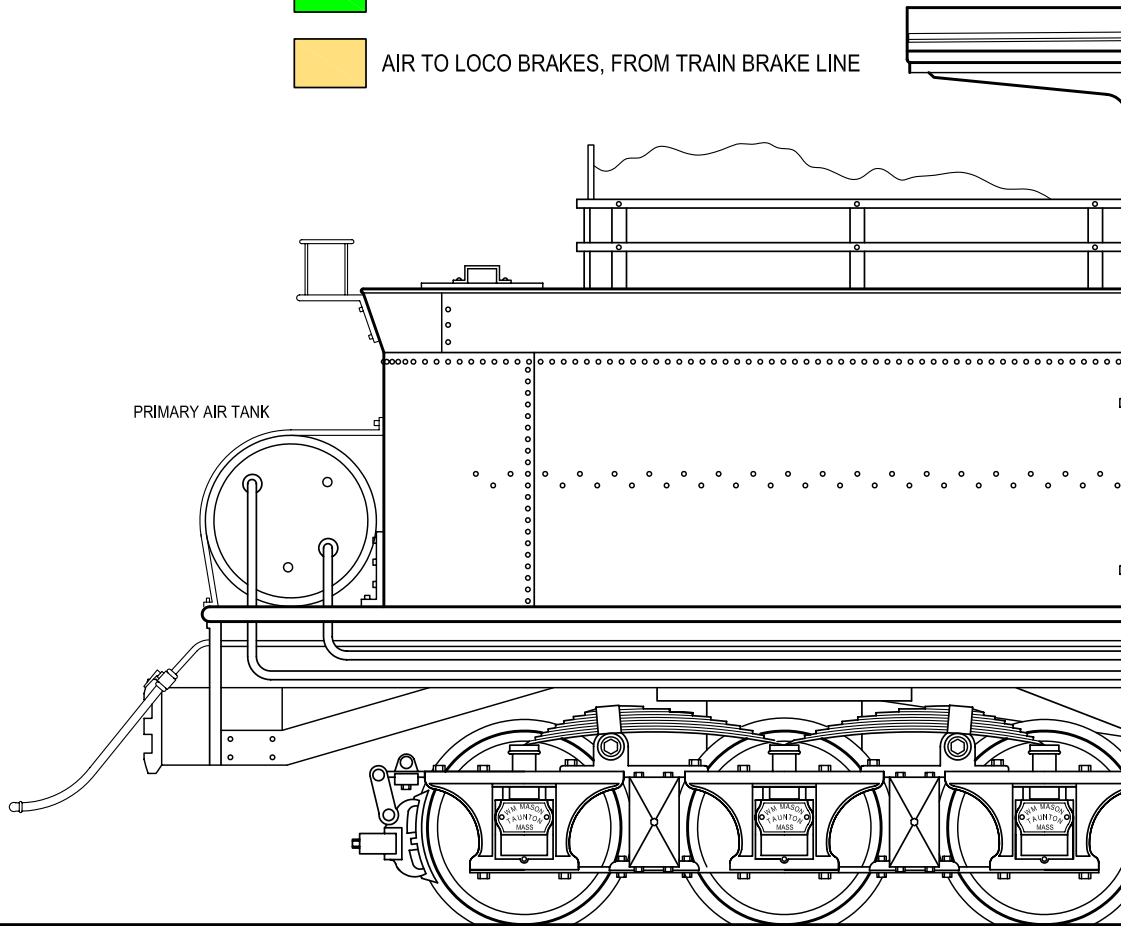
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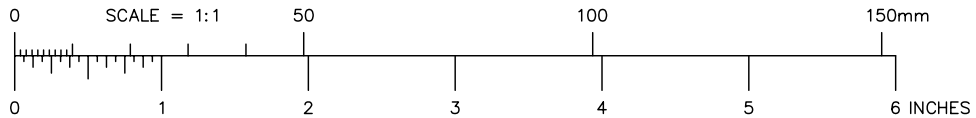
AIR FROM AIR TANK TO BRAKE STANDS



AIR TO LOCO BRAKES, FROM TRAIN BRAKE LINE

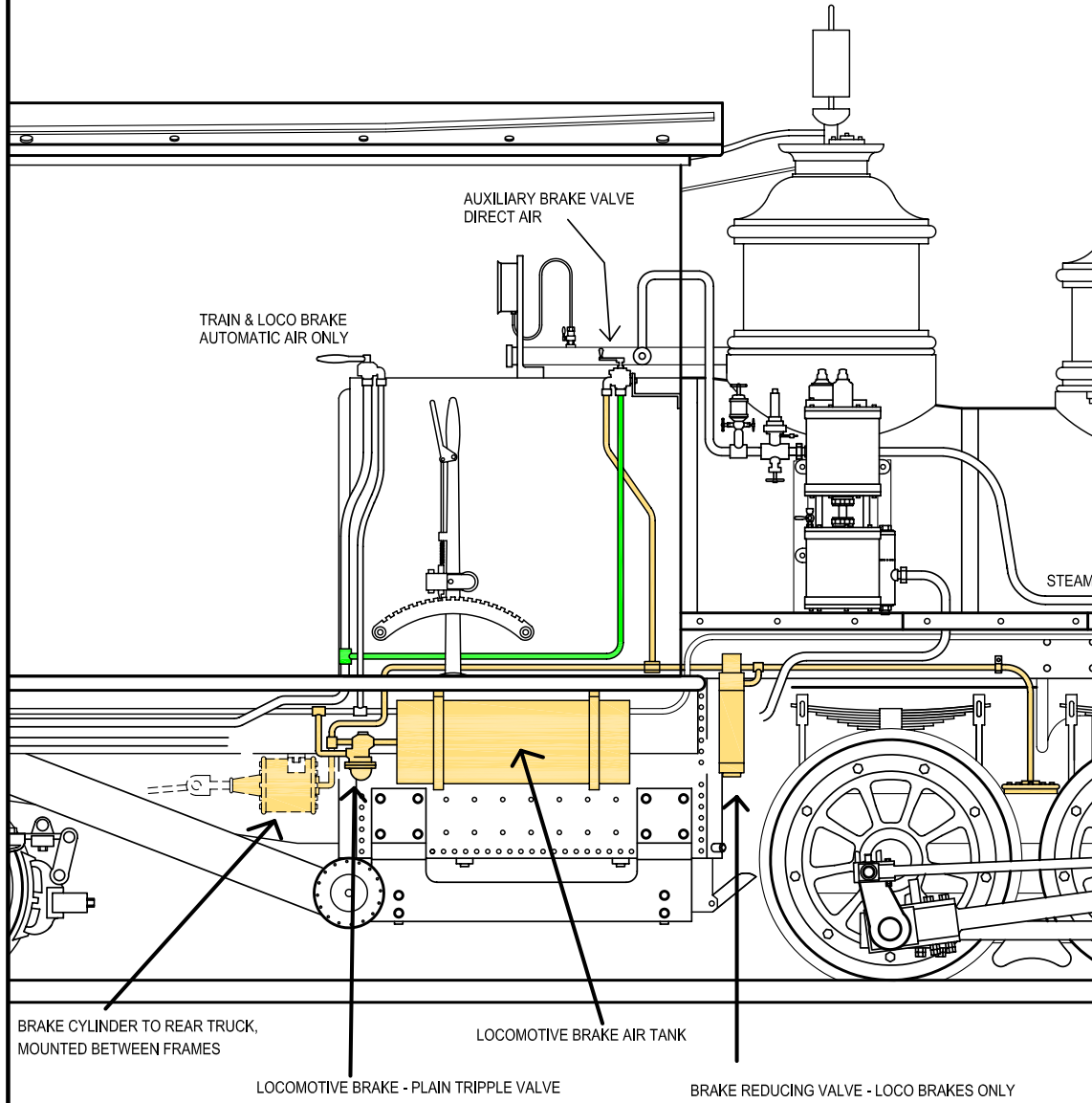


## LOCOMOTIVE BRAKES



4

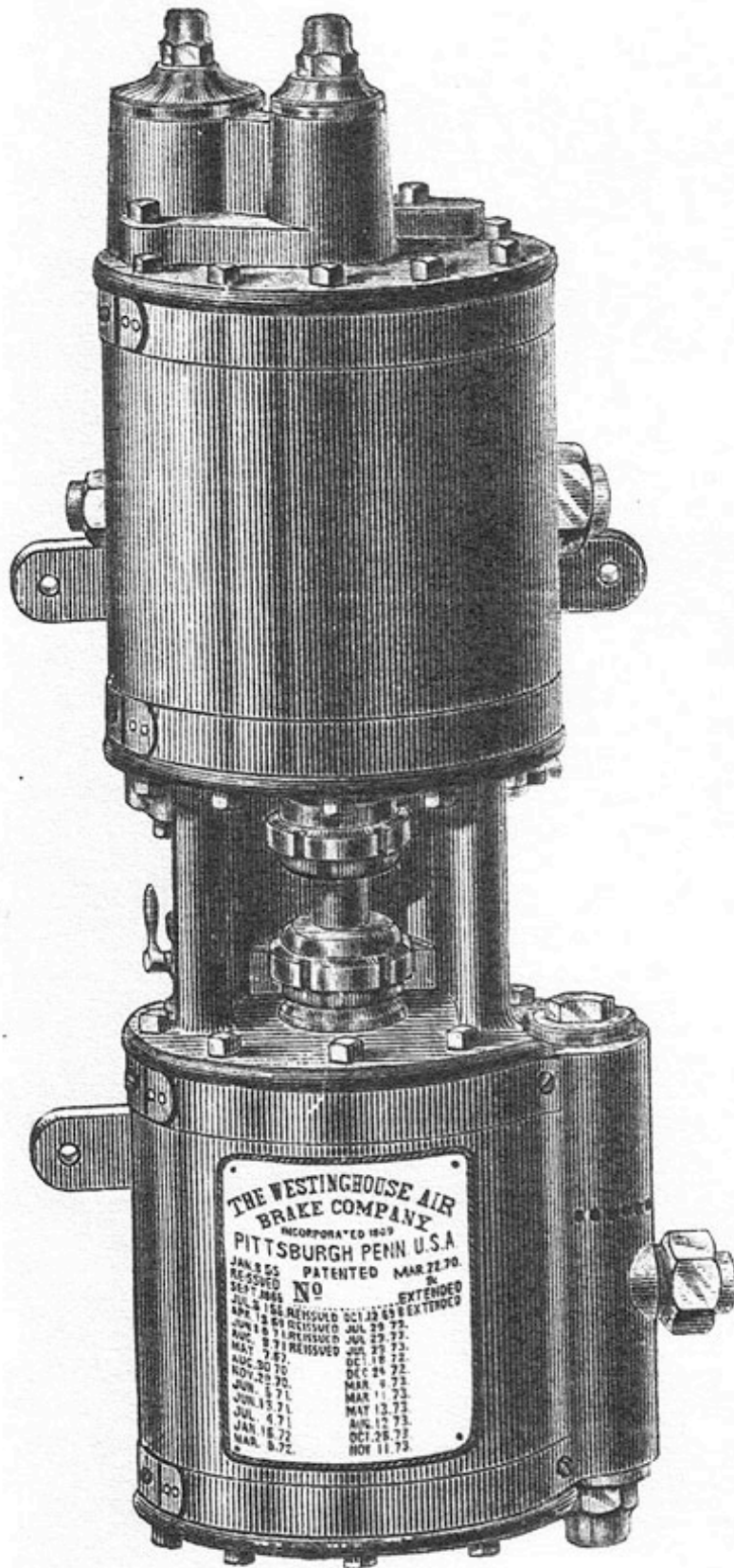
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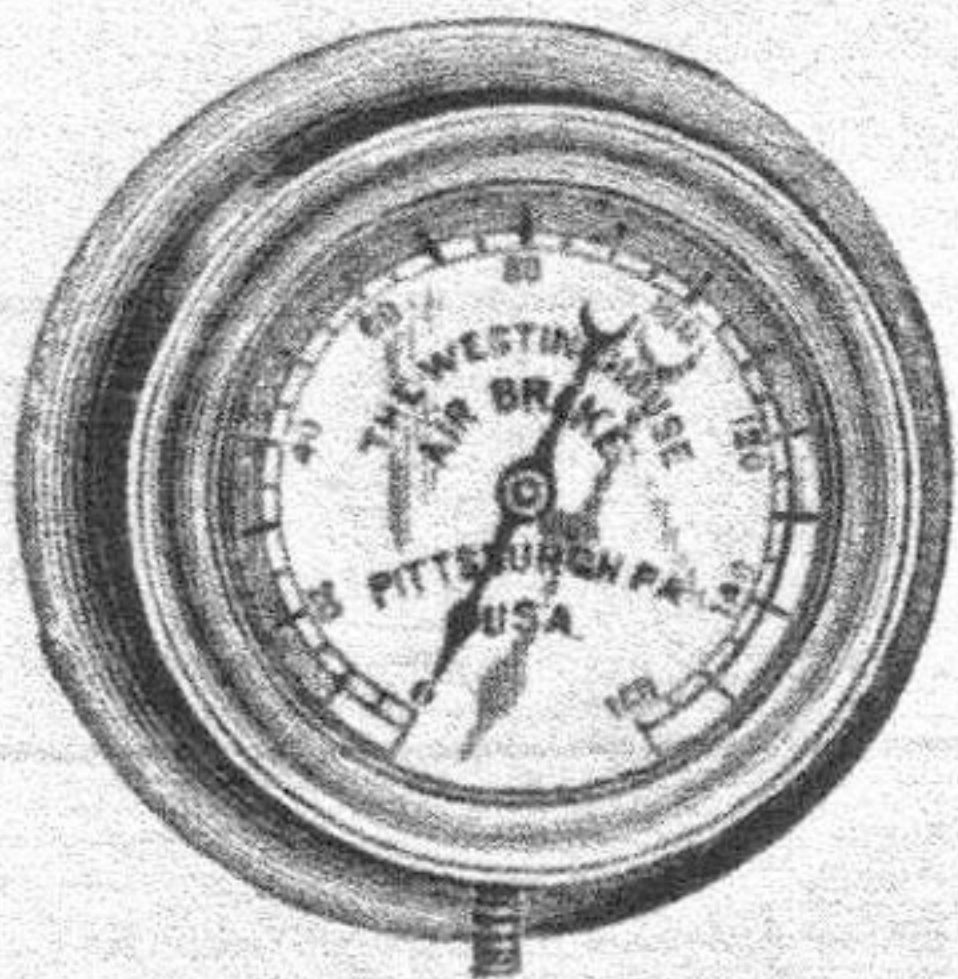
## LOCOMOTIVE BRAKES



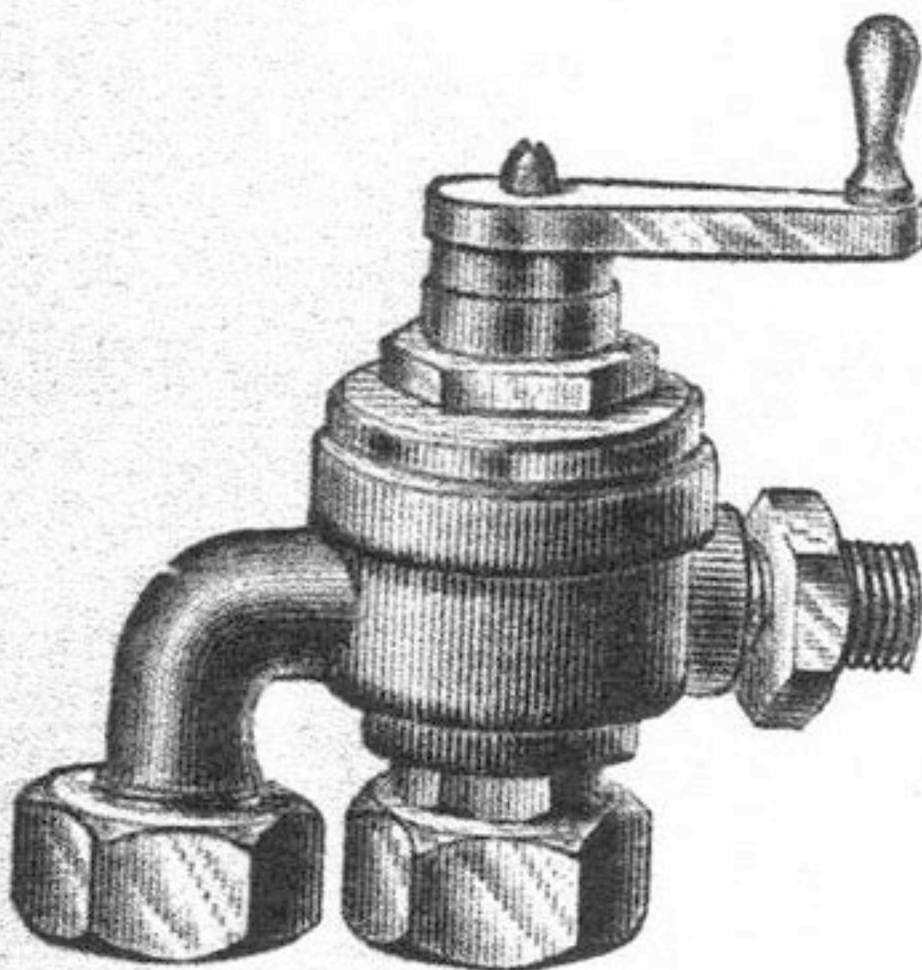




THE WESTINGHOUSE AIR  
 BRAKE COMPANY  
 INCORPORATED 1869  
 PITTSBURGH PENN U.S.A.  
 JAN 8 55 PATENTED MAR 22 70  
 REISSUED SEPT 1866 No. EXTENDED  
 JUL 5 56 REISSUED OCT 22 69 EXTENDED  
 APR 18 69 REISSUED JUL 25 72  
 JUN 18 71 REISSUED JUL 25 73  
 MAY 8 71 REISSUED JUL 25 73  
 MAY 7 67 REISSUED OCT 18 72  
 AUG 20 70 REISSUED DEC 24 72  
 NOV 20 70 REISSUED MAR 6 73  
 JUN 5 71 REISSUED MAR 11 73  
 JUN 15 71 REISSUED MAY 13 73  
 JUL 4 71 REISSUED AUG 15 73  
 JAN 18 72 REISSUED OCT 28 73  
 MAR 8 72 REISSUED NOV 11 73



14



33

# DETAILS OF AUXILIARY BRAKE-VALVE.

PLATE A20.

Auxiliary Brake-Valve Complete, No. 33, Plate A5.

No.

1. Valve-case.
2. Upper Cap.
3. Graduating Handle.
4. Bottom Cap.
5. Reservoir-pipe Union.
6. Brake-pipe Union.
7. Bracket-nut.

No.

8. Spring-guide.
9. Piston.
10. Upper Spring.
11. Piston Packing-ring.
12. Central Valve.
13. Lower Spring.

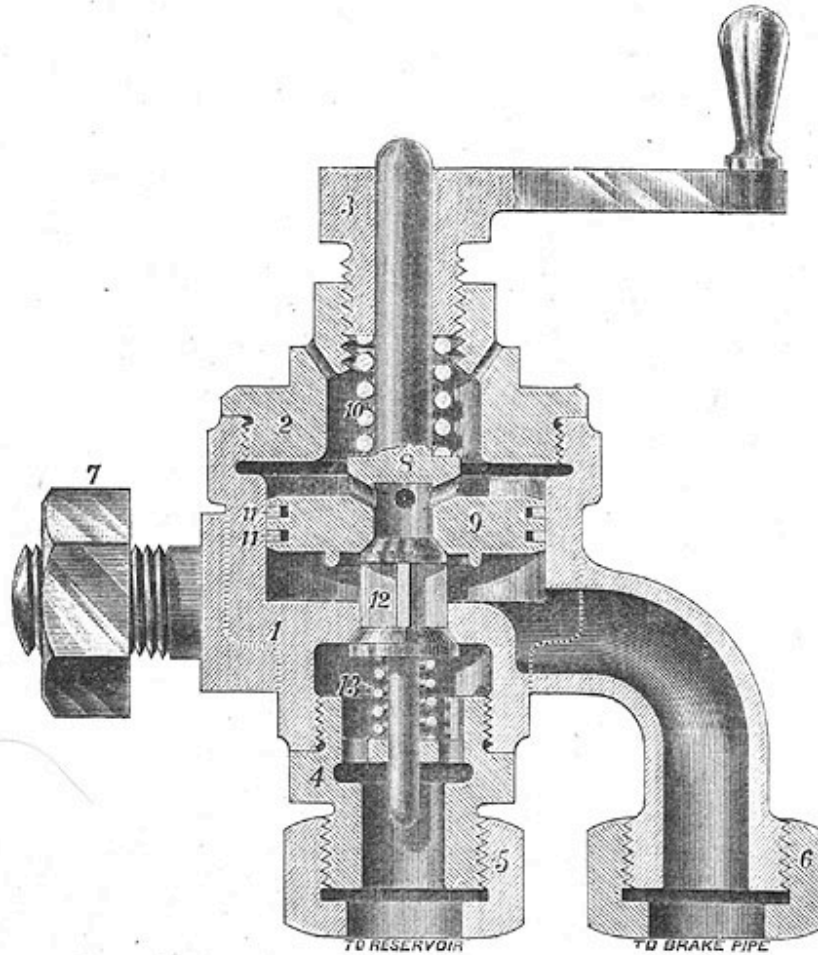
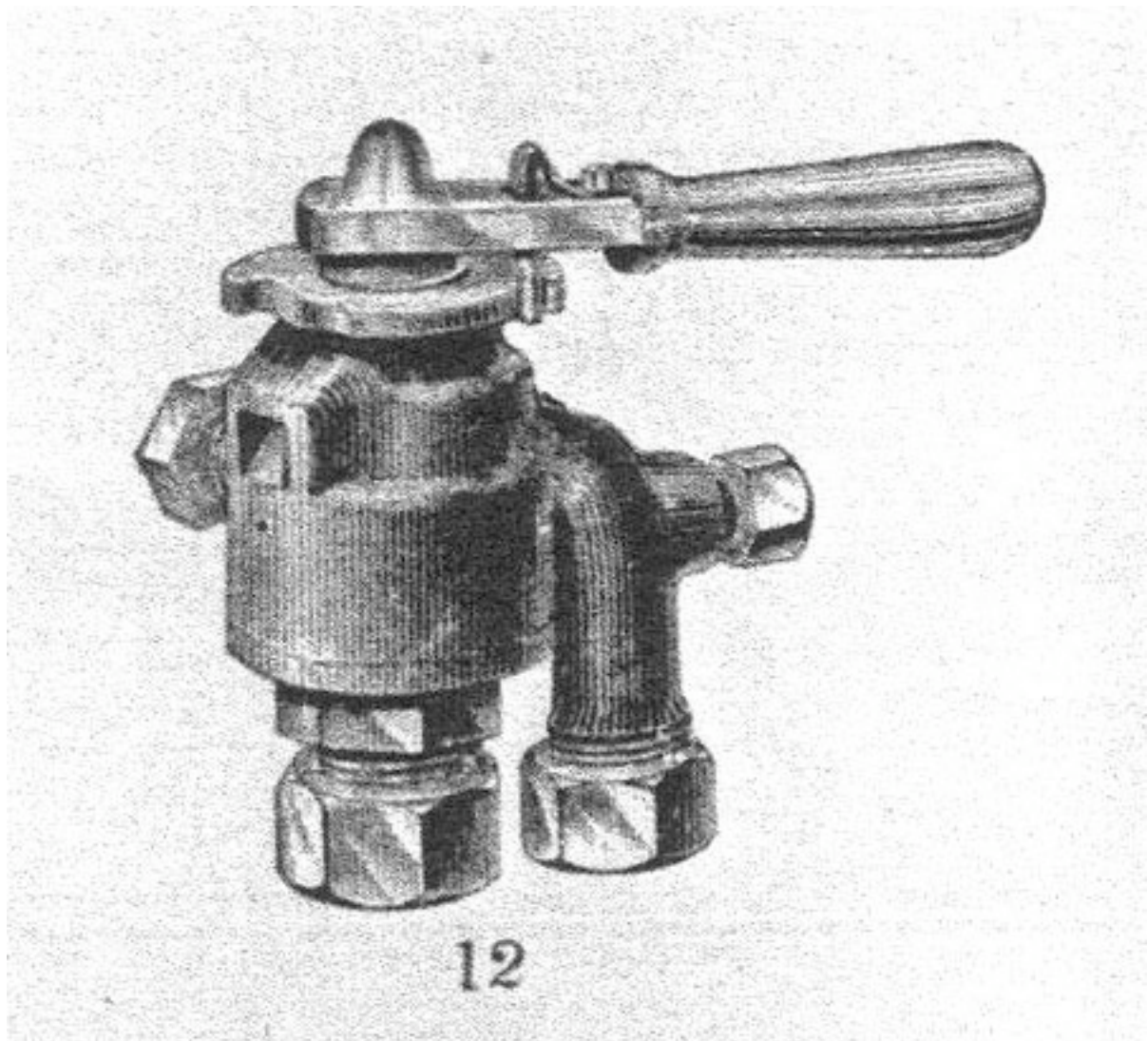


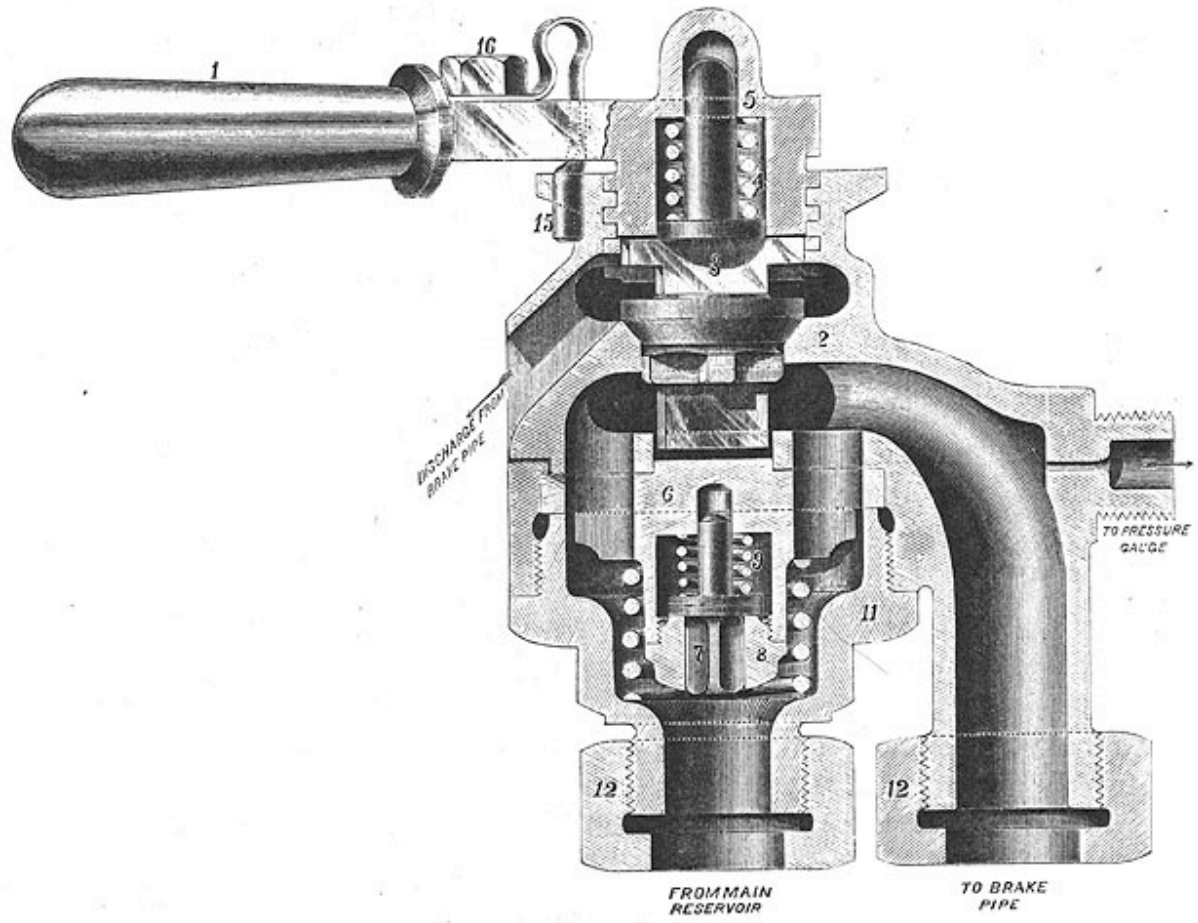
PLATE A20.

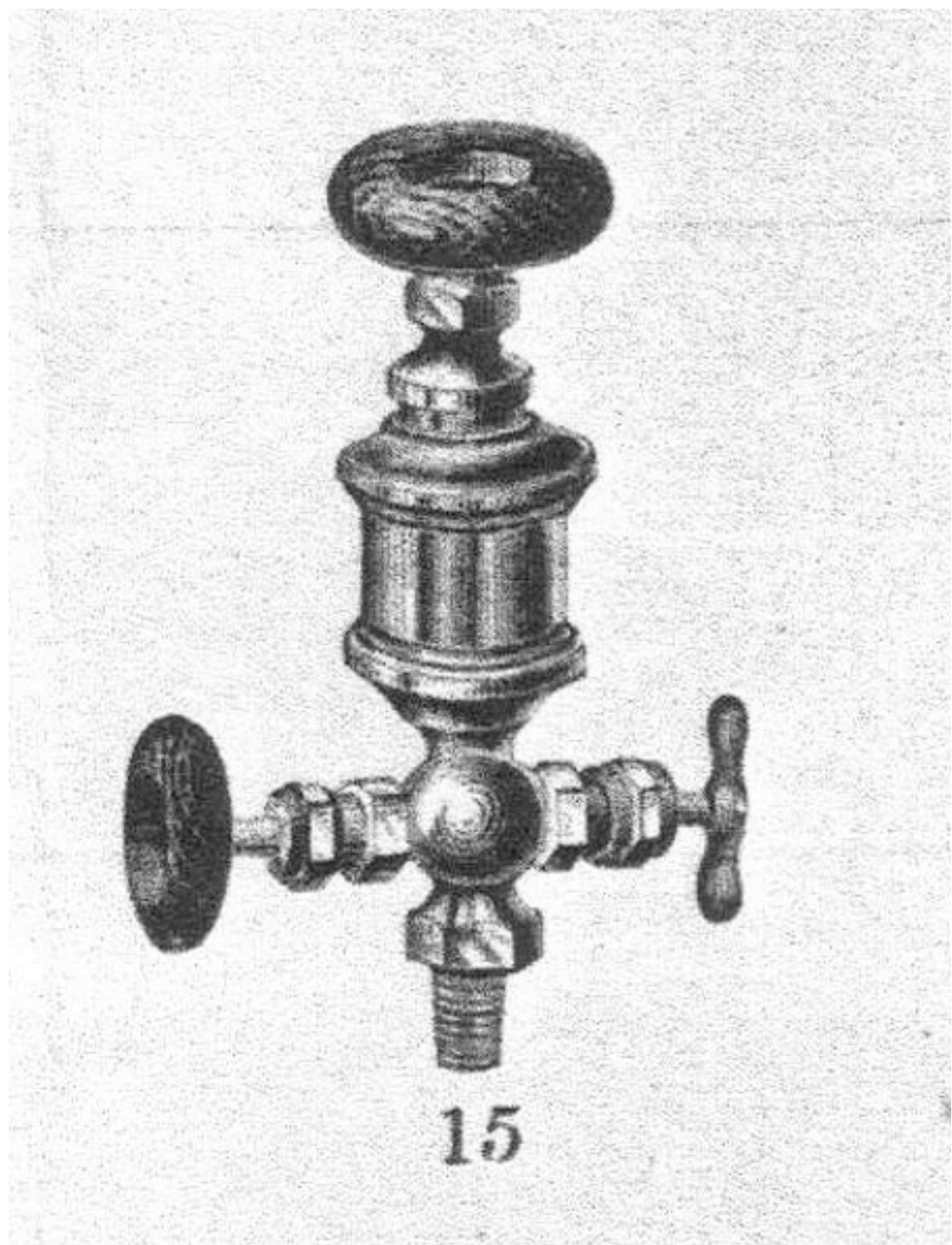


12

ENGINEER'S BRAKE-VALVE.

PLATE A11.



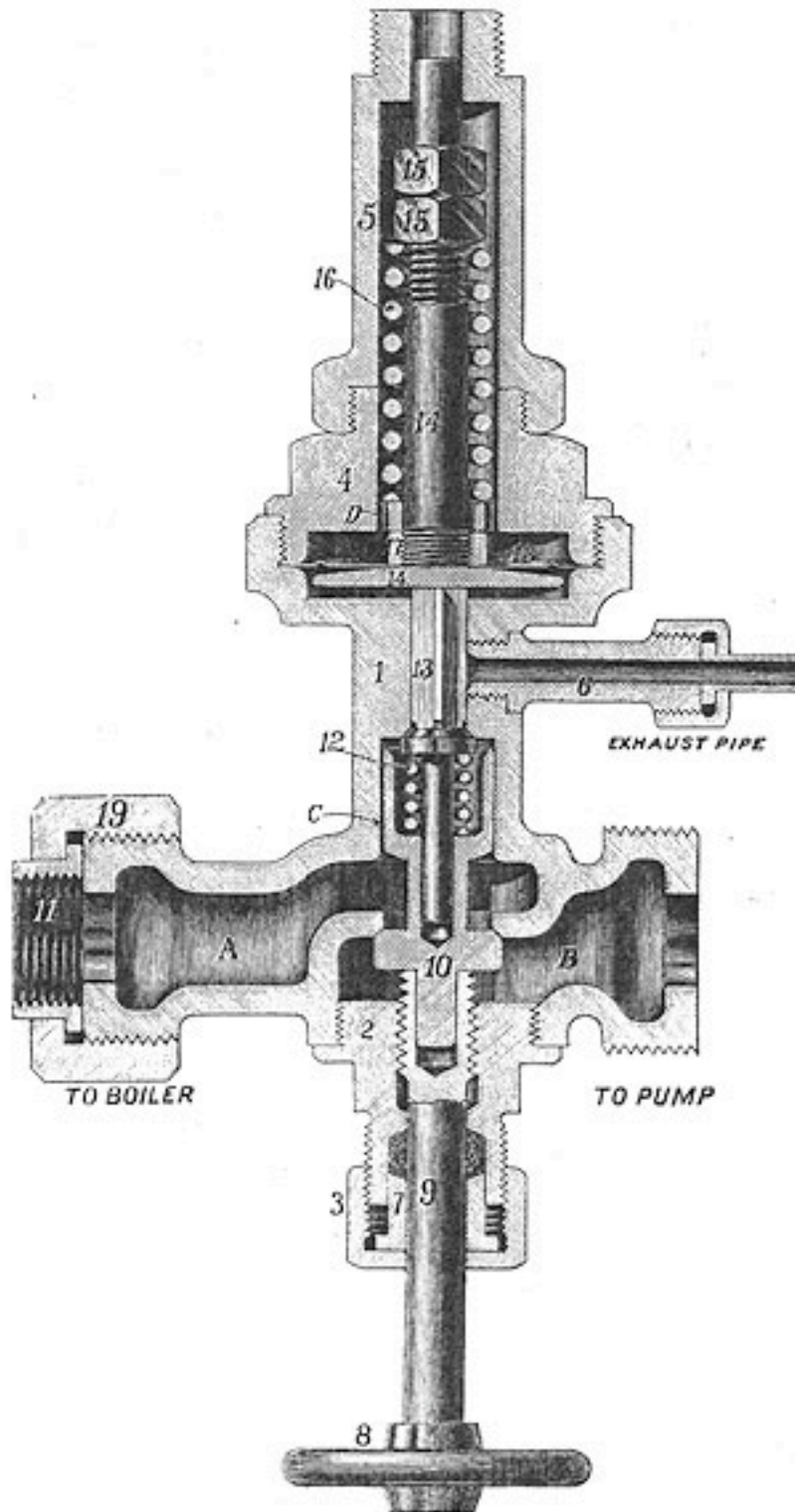


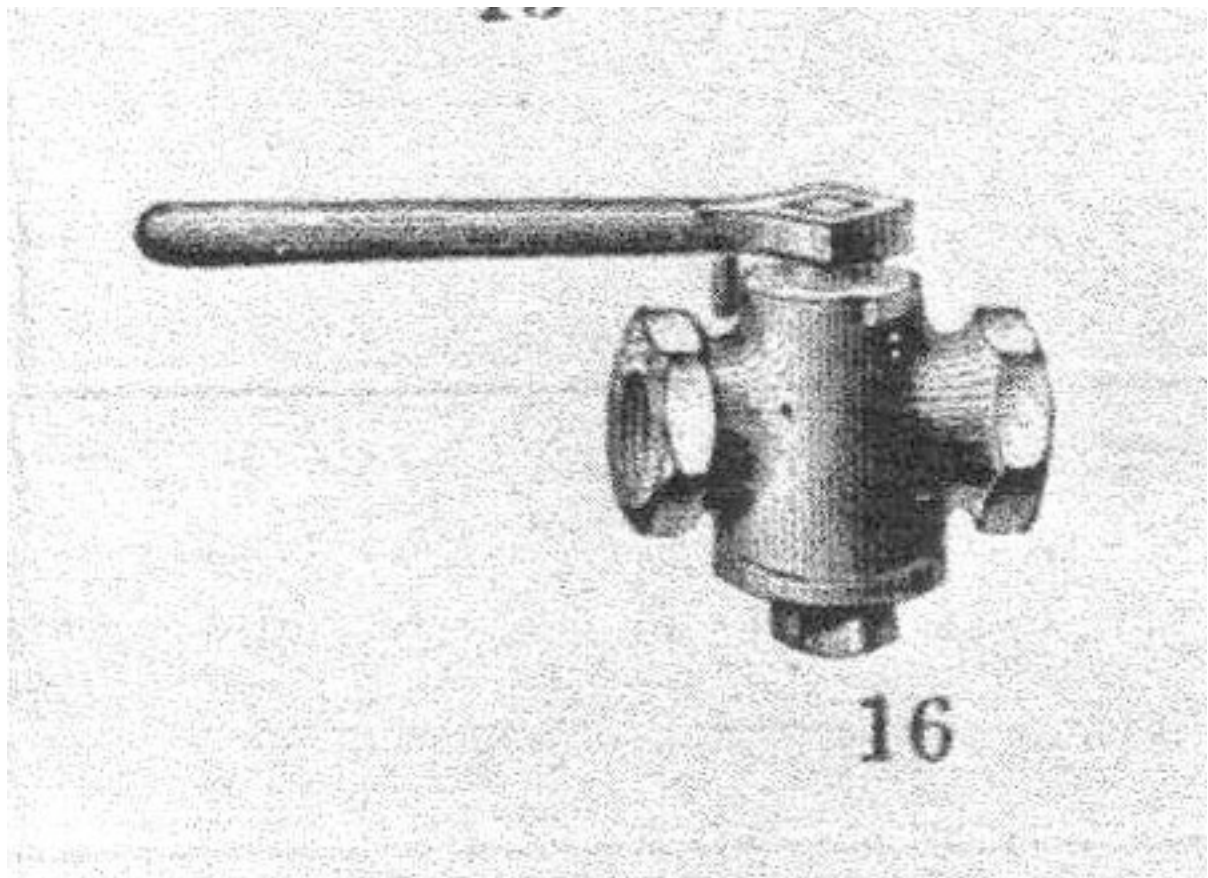


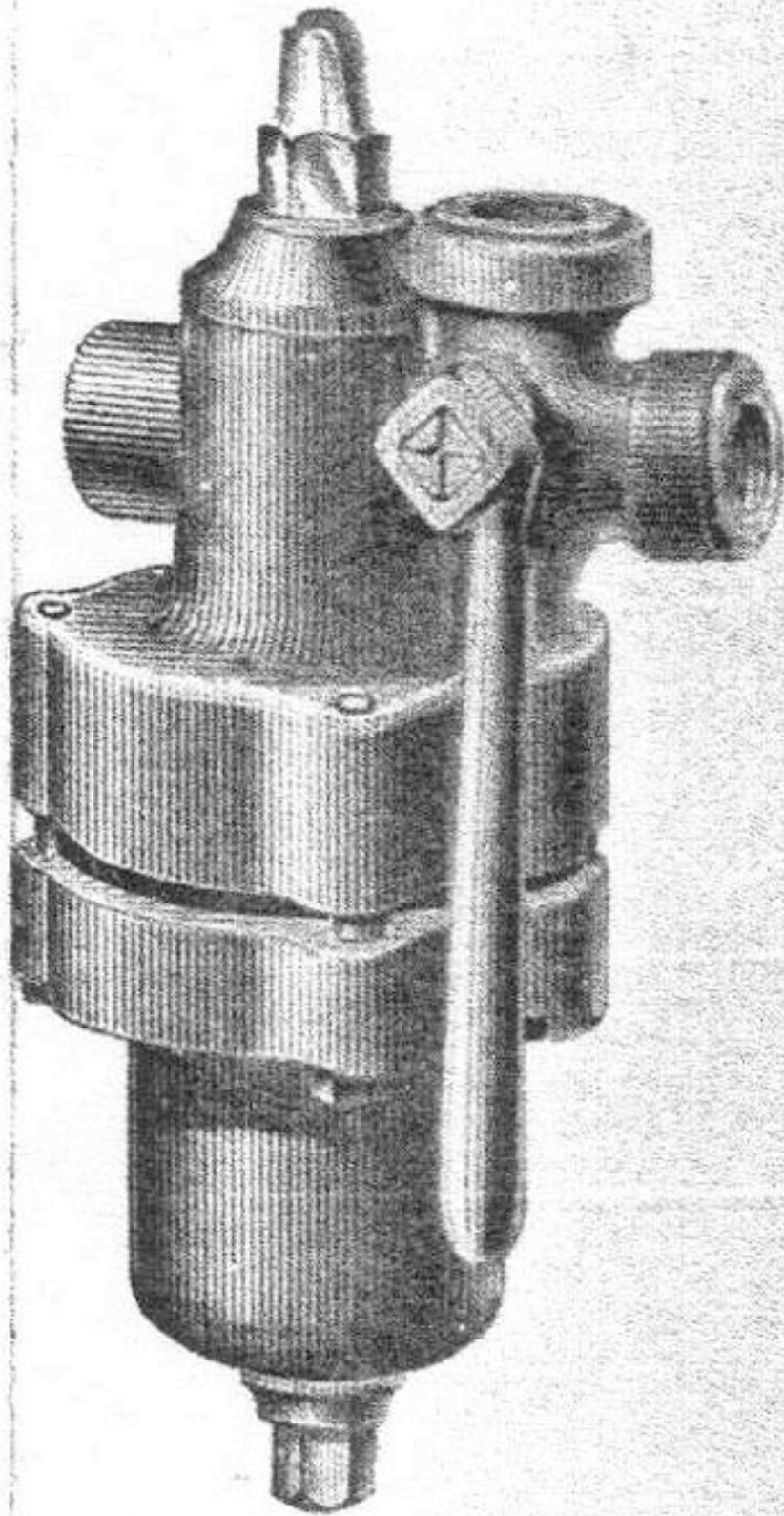
PUMP GOVERNOR.

PLATE B19.

TO TRAIN PIPE

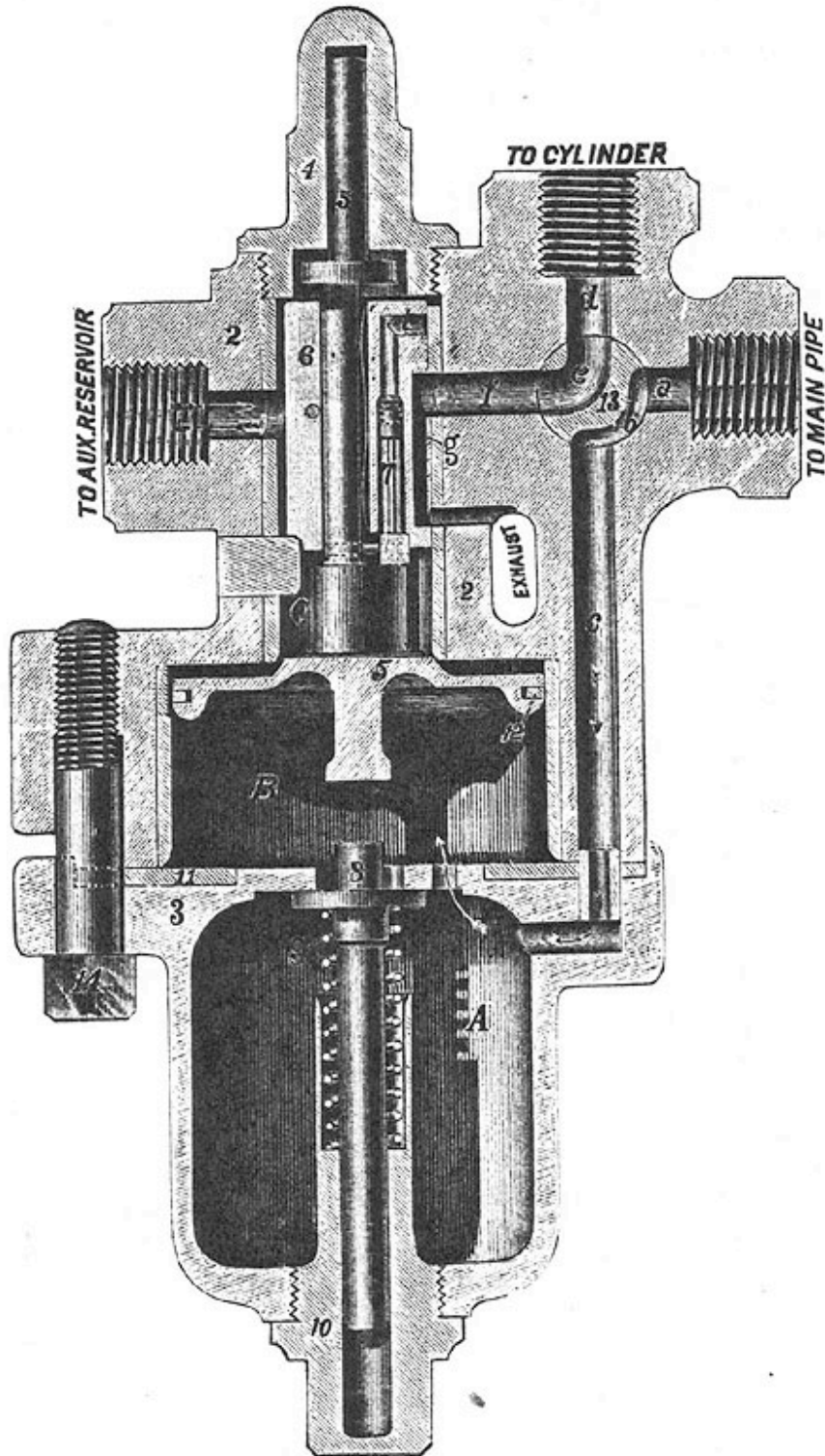






TRIPLE VALVE.

PLATE A9.



These pages represent the Eames system in its entirety..nothing more to it.

Use these drawings instead of the 'westinghouse' set. The rest of the pipework drawings from CH7 are to be used as-is.

Note that there does not appear to be a brake hose on the front of the Masons. Therefore the brake line only runs to the back of the loco and to the loco's own brake cylinder.

The brake cylinder operated the rear truck only...no brakes on the drive wheels.

I suspect there was no forward vacuum brake hose because maybe not all cars were brake equipped, and Masons were used in forward running on the DSP. Pushing etc was not a good idea, as it tender to push the stream truck in funny directions.

I would see no problem in adding a hose up front if you wanted, I'm sure some did, but I cant see that in the photos, the pilot is clear. I was specifically looking for hoses above the deck, not necessarily handing down the pilot staves.

The ejector is brass in colour, and the two levers on it, operate it very much like a loco injector. The steam lever on it turns on the steam which runs through a venturi sucking the air out of the brake line, pulling the brakes on. You can close the lever off and maintain vacuum in the line. To release the vacuum, pull on the vertical handle, which lets the air back into the line, and hence the brakes off. There are no brake stands - the levers on the ejector are the brake stand! Hence the unit is set up within reach of the engineer, just above the injectors.

To model this, use the scans from the Eames catalogue Pete has provided, the size is shown on these attached drawings (darn small). I'd attach the unit to the roof of the cab, and let it hang. I'd also attach the bracket to the front cab wall, but not physically glued to the ejector...so they can separate when lifting off the roof/cab.

The single vac pipe I'd run up from the floor to the bottom of the bracket.

The Eames brake cylinder was a two part affair. The cone with the rod poking out ( facing to the rear of the loco) was actually leather, and moved in and out. The front side cone was solid. I'd make this out of layers of styrene....OR two conelike buttons, leg rubbers from the bottom of chairs, dowels etc - anything that is the right shape, mounted back to back with a bolted plate between the the two halves. The unit is mounted to a rectangular plate of 2mm styrene, which is suspended between the inner and outer fire-box braces via two rods. I'd probably leave off the brake rod sticking out the rear of the cylinder to avoid snagging the tender truck frame.

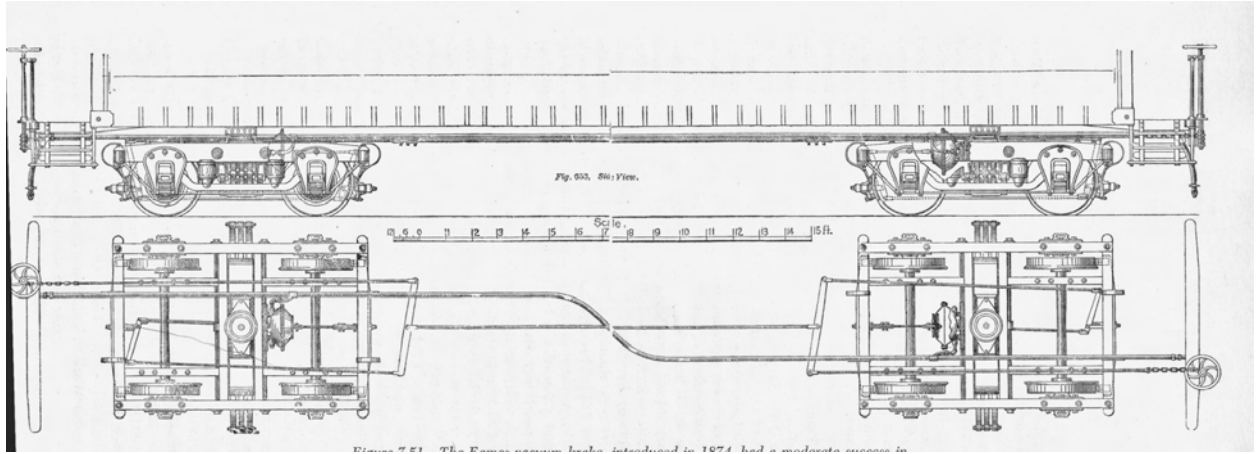
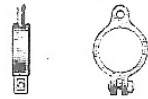
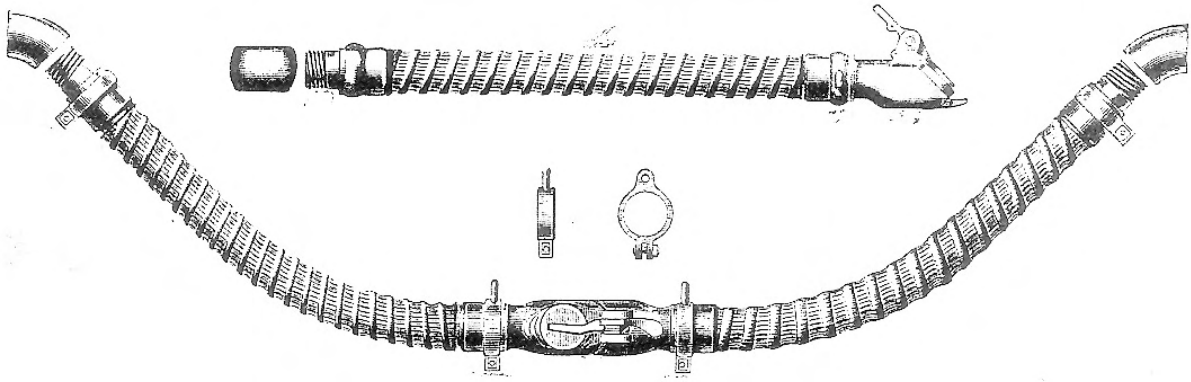
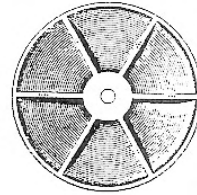
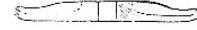
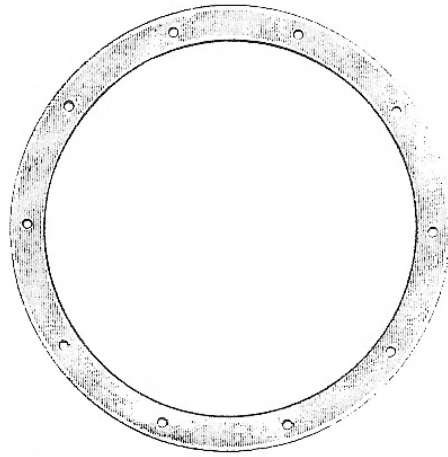
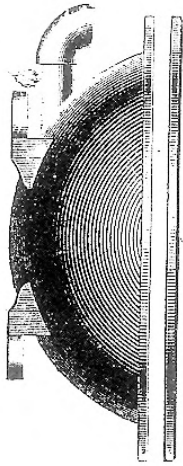
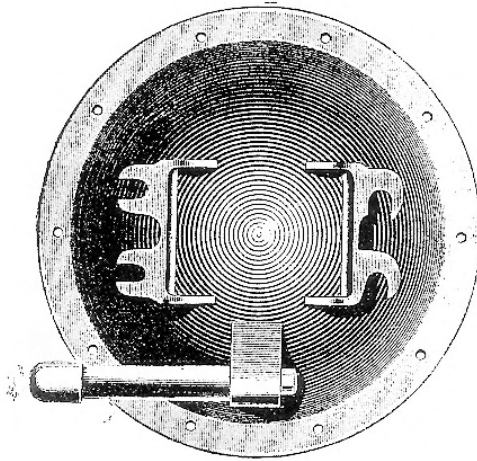
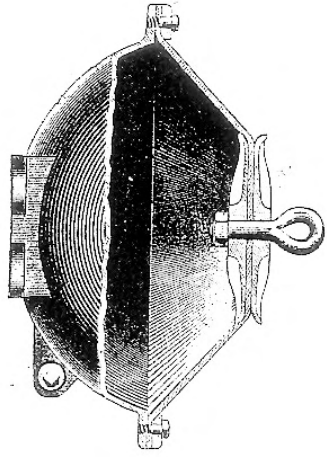
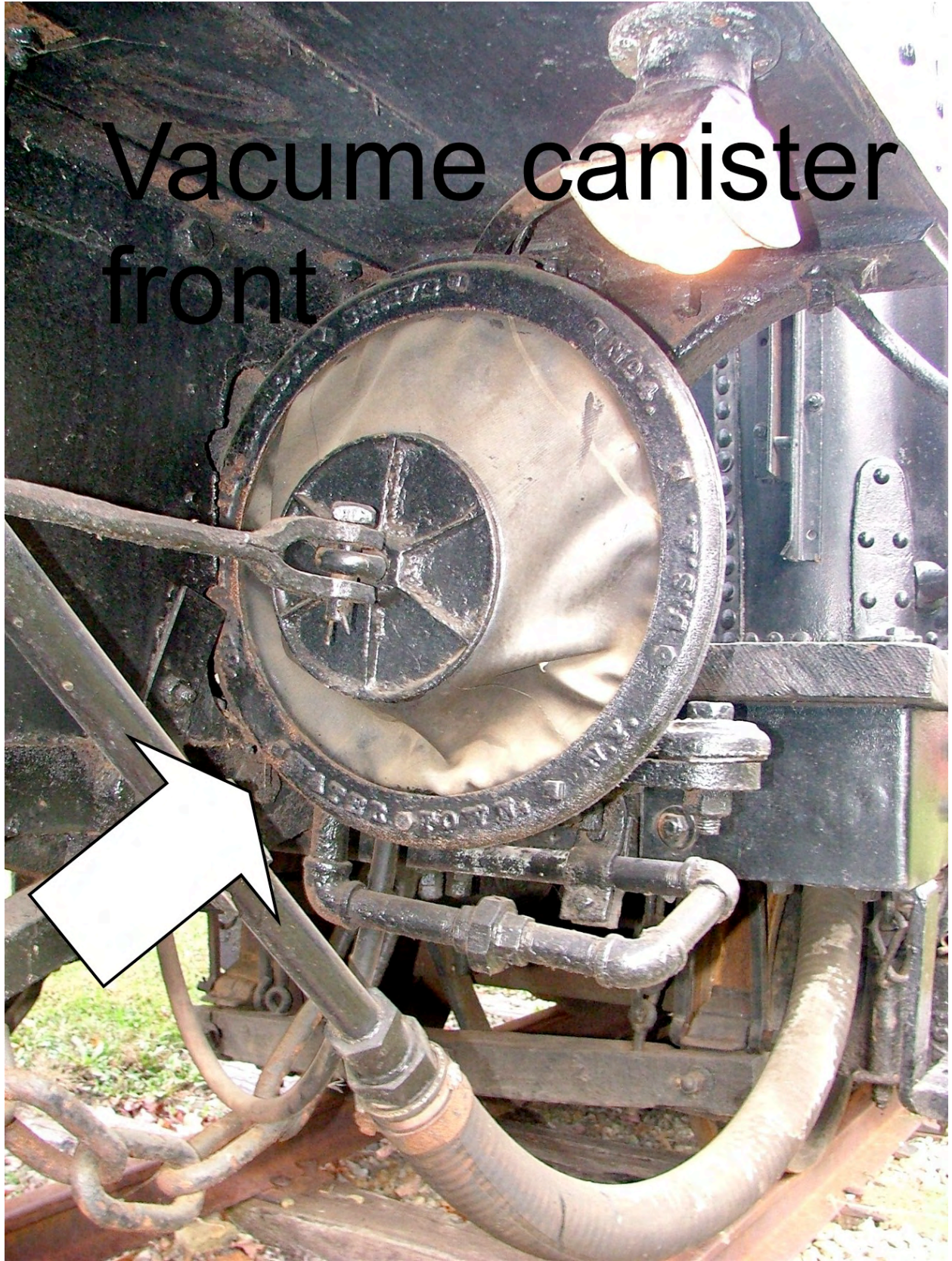


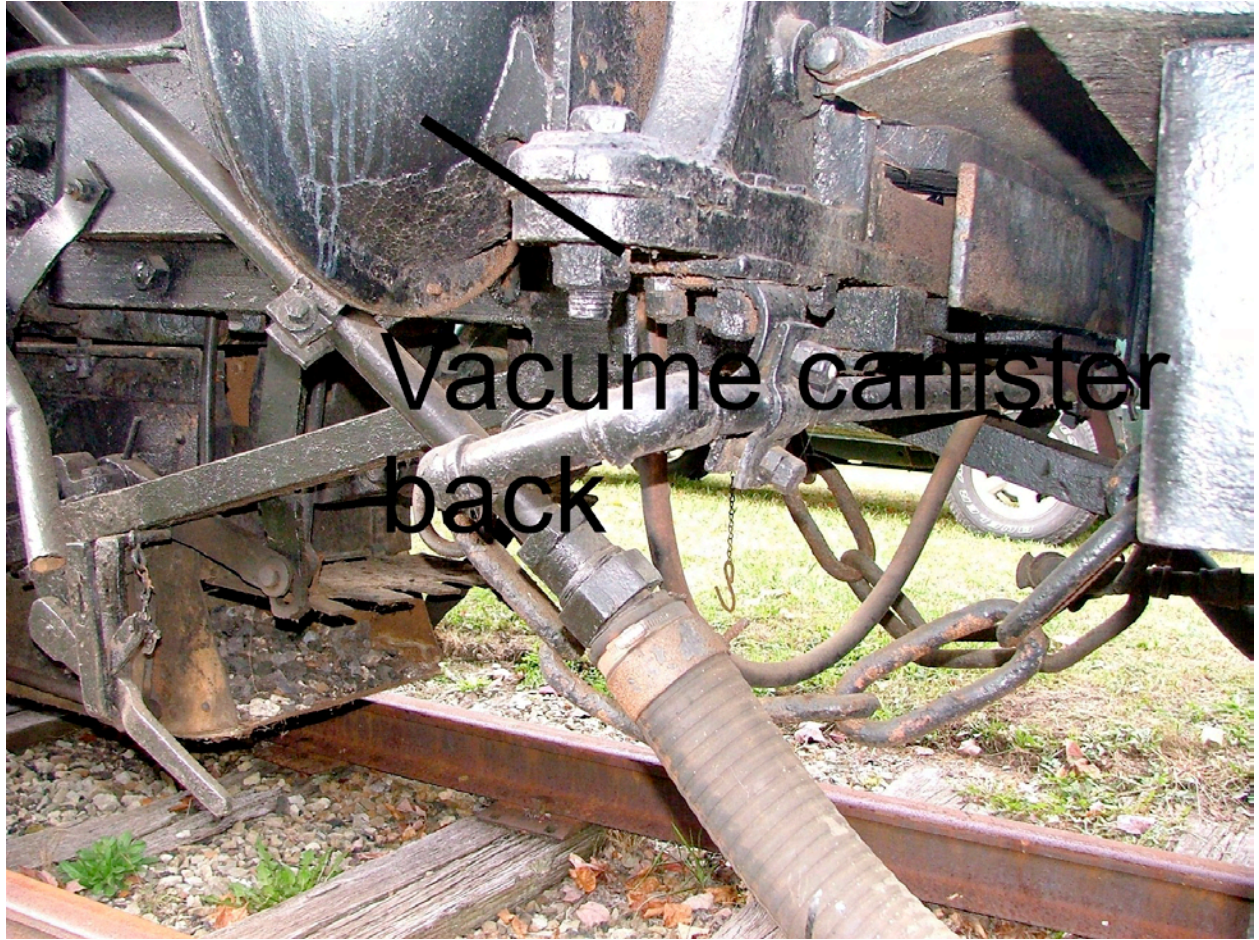
FIGURE 551. The Fairlie vacuum brake, introduced in 1874, had a moderate success in



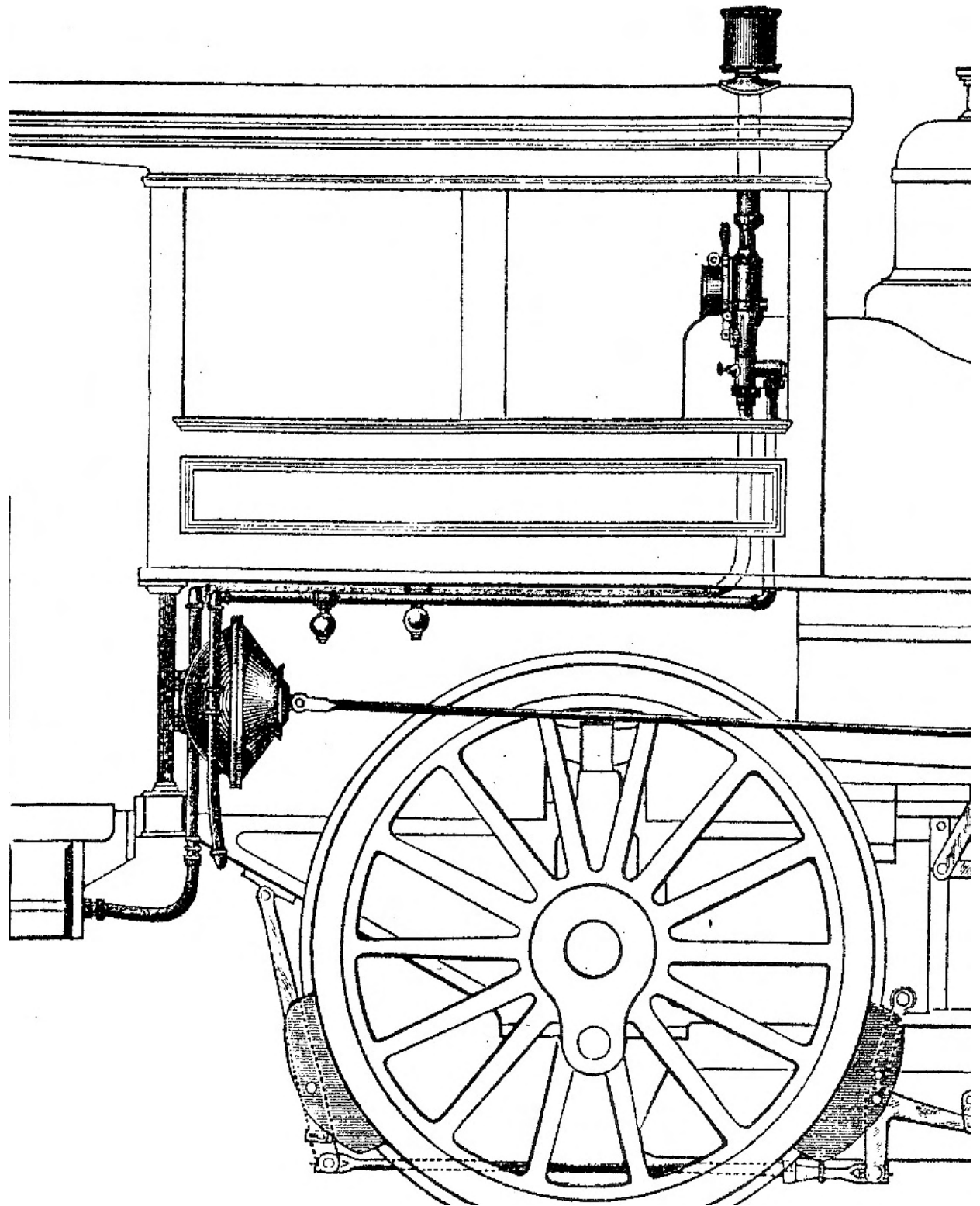
Vacume canister  
front

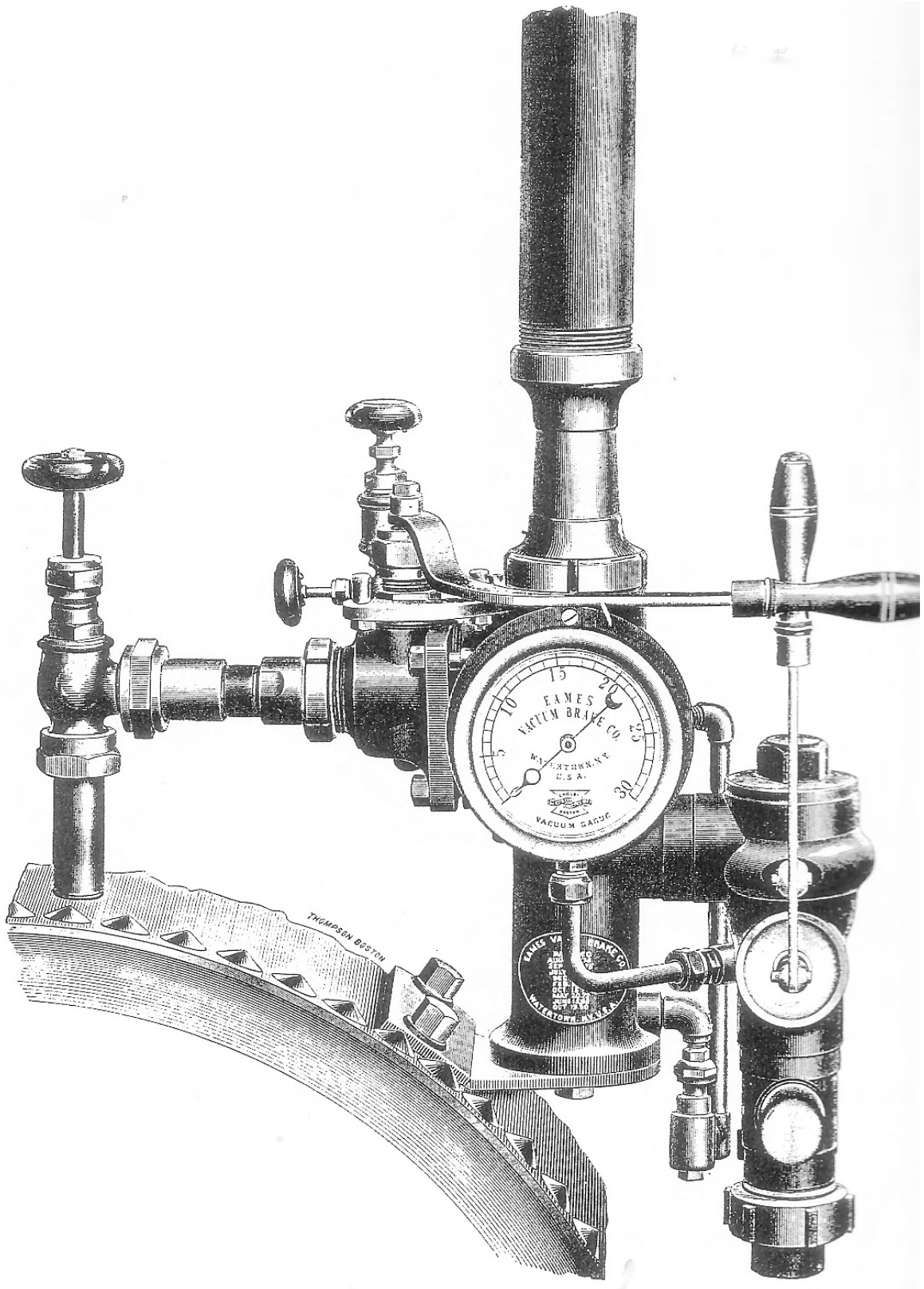


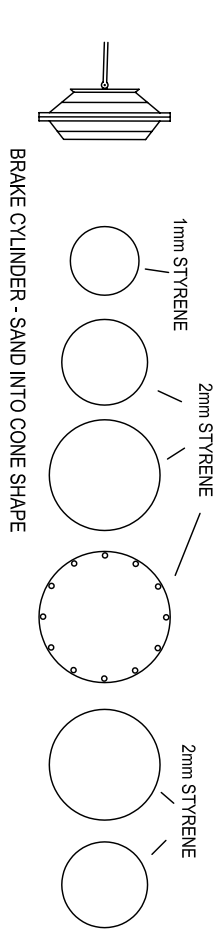
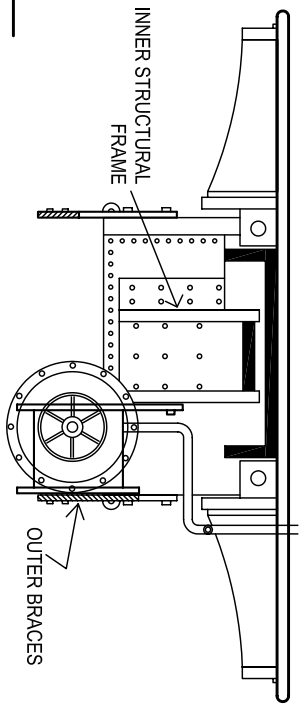
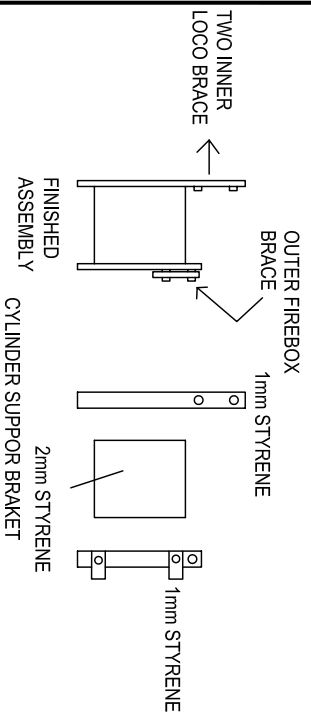




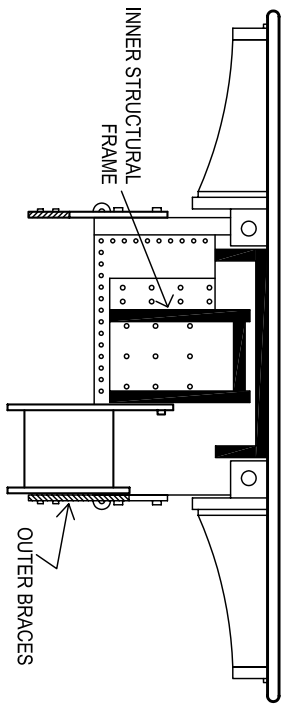
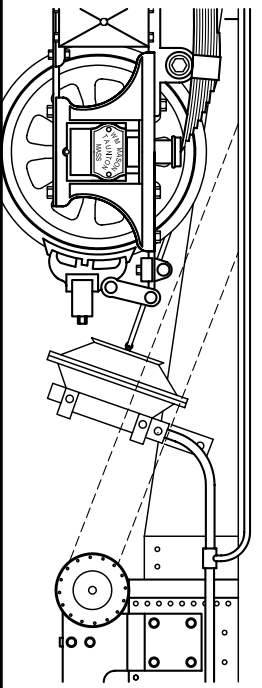
Vacume canister  
back



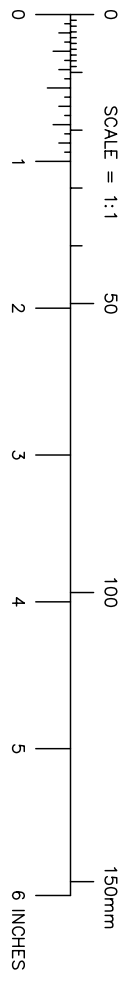




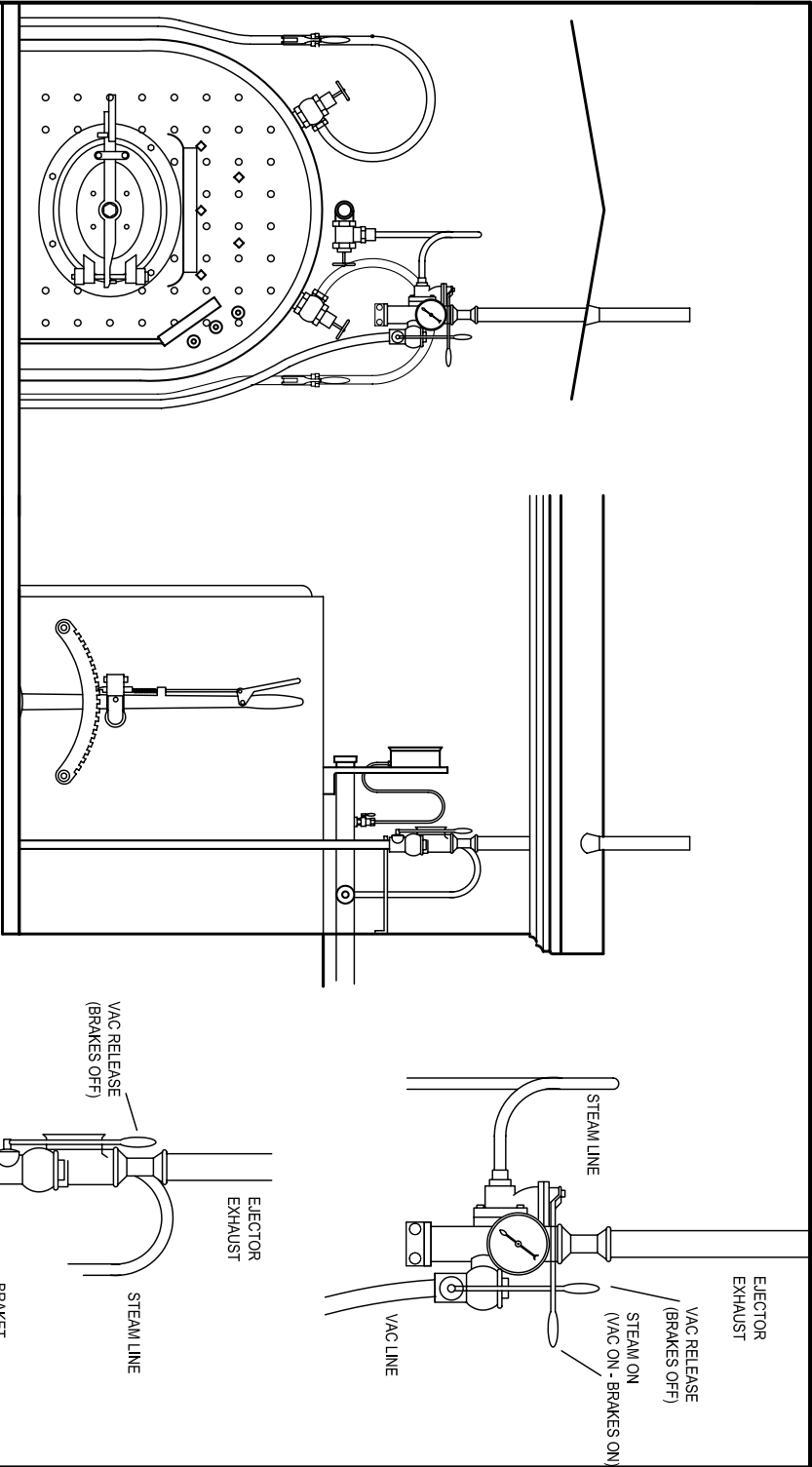
BRAKE CYLINDER - SAND INTO CONE SHAPE



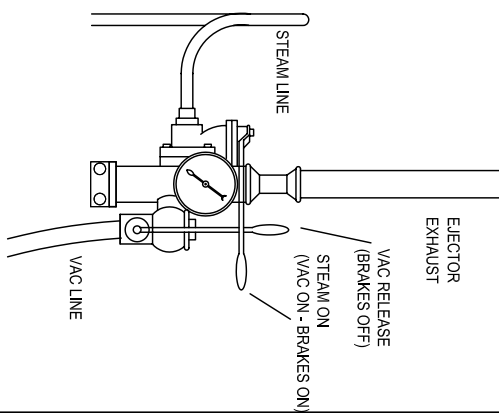
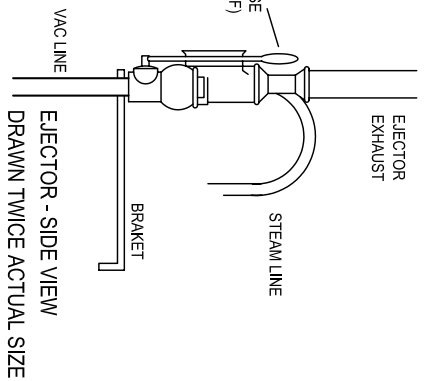
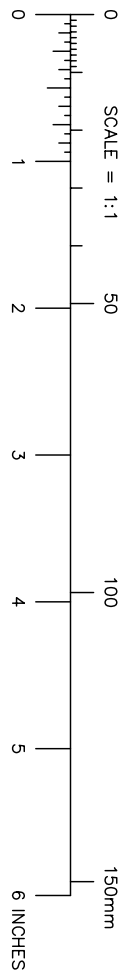
# EAMES BRAKE SYSTEM - BRAKE CYLINDER







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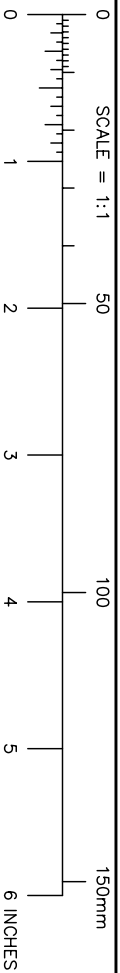
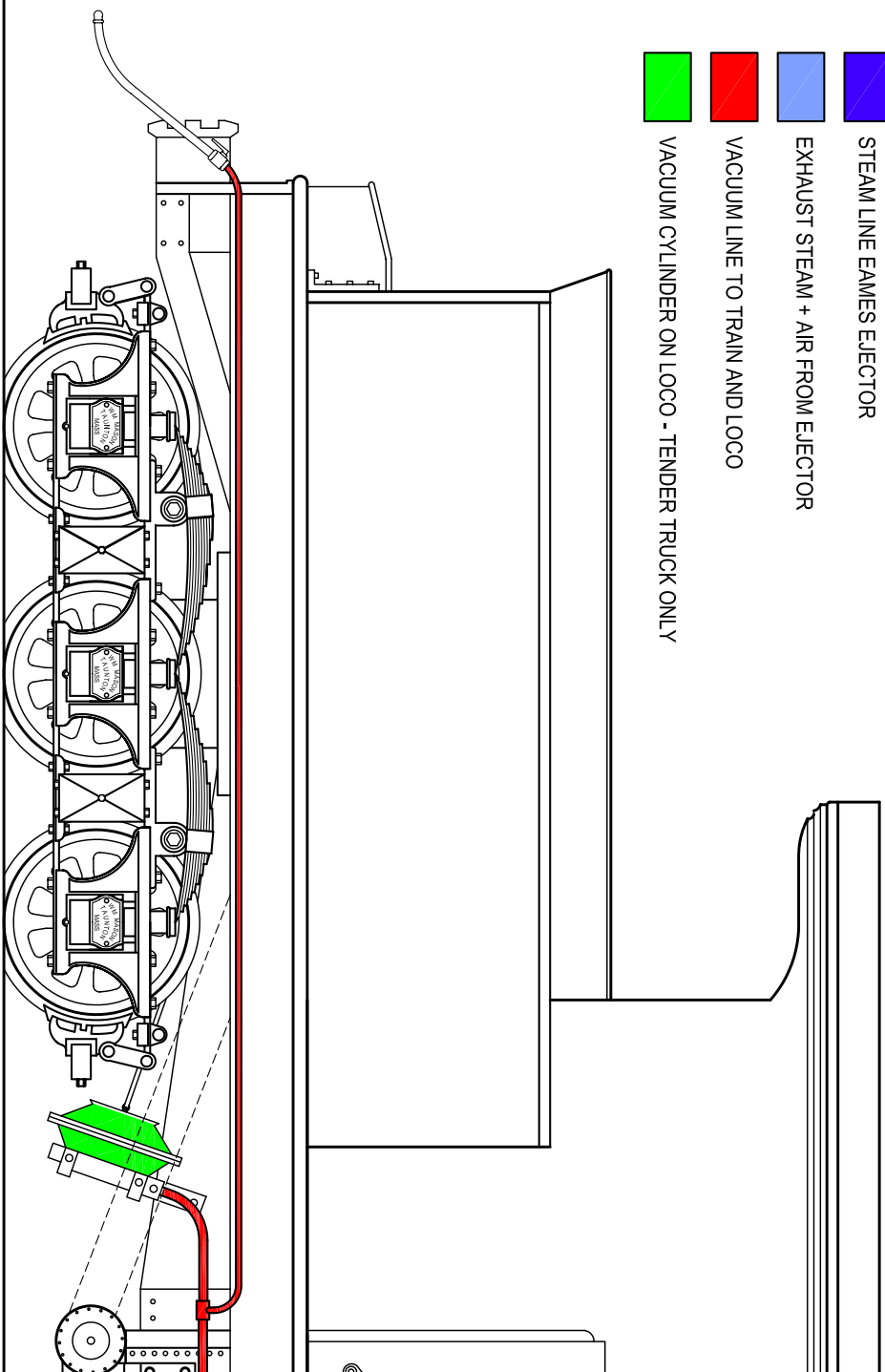


**EAMES EJECTOR - CAB FITMENT**

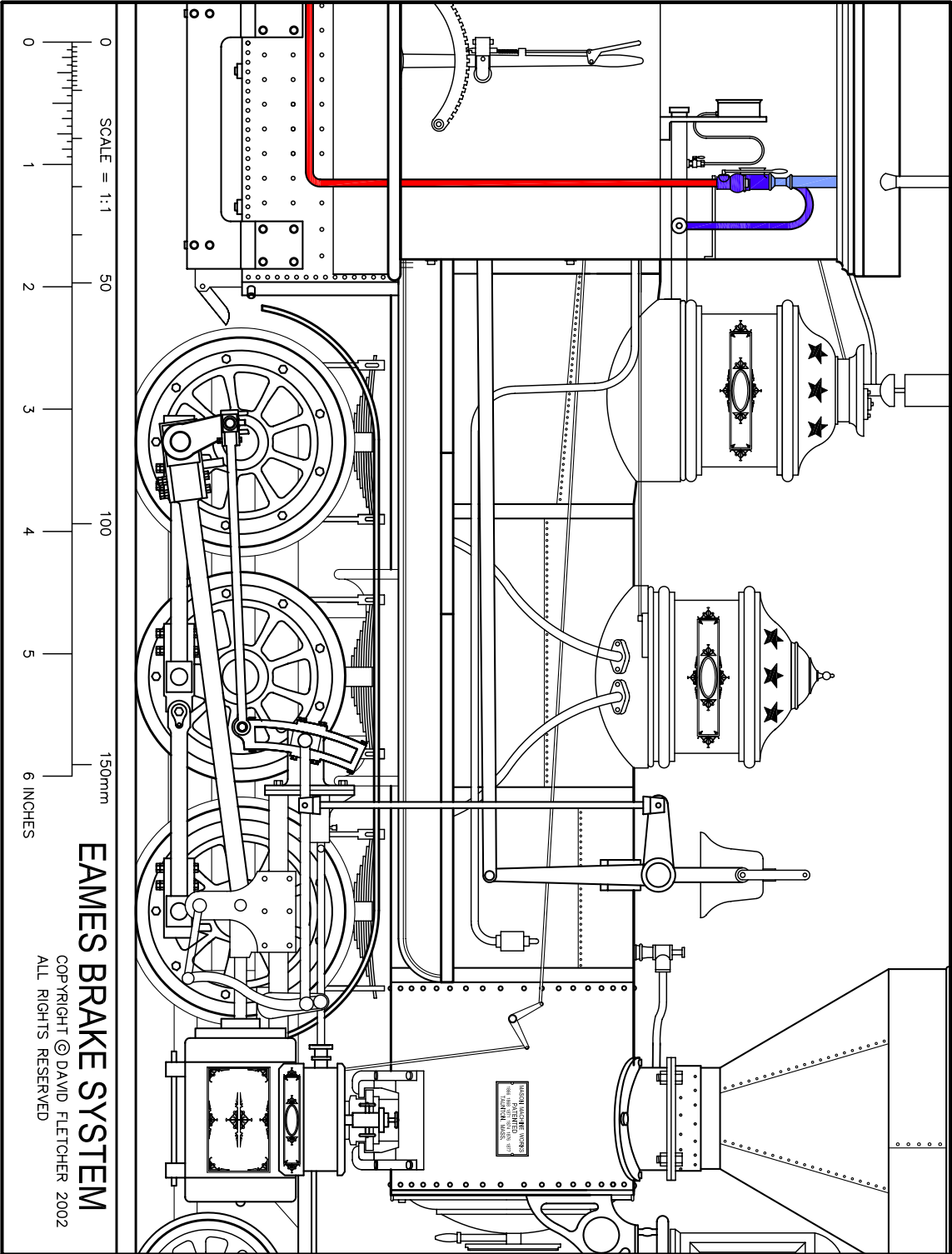


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-  STEAM LINE EAMES EJECTOR
-  EXHAUST STEAM + AIR FROM EJECTOR
-  VACUUM LINE TO TRAIN AND LOCO
-  VACUUM CYLINDER ON LOCO - TENDER TRUCK ONLY



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SCALE = 1:1  
0 1 2 3 4 5 6 INCHES  
0 50 100 150mm

DAVID FLETCHER ENGINEERS  
1000 AVENUE OF THE STARS  
SUITE 1000  
FARMINGTON HILLS, MI 48334  
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