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Shoemaker

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(54) **FLAPPER GAS NOZZLE ASSEMBLY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 104 days.

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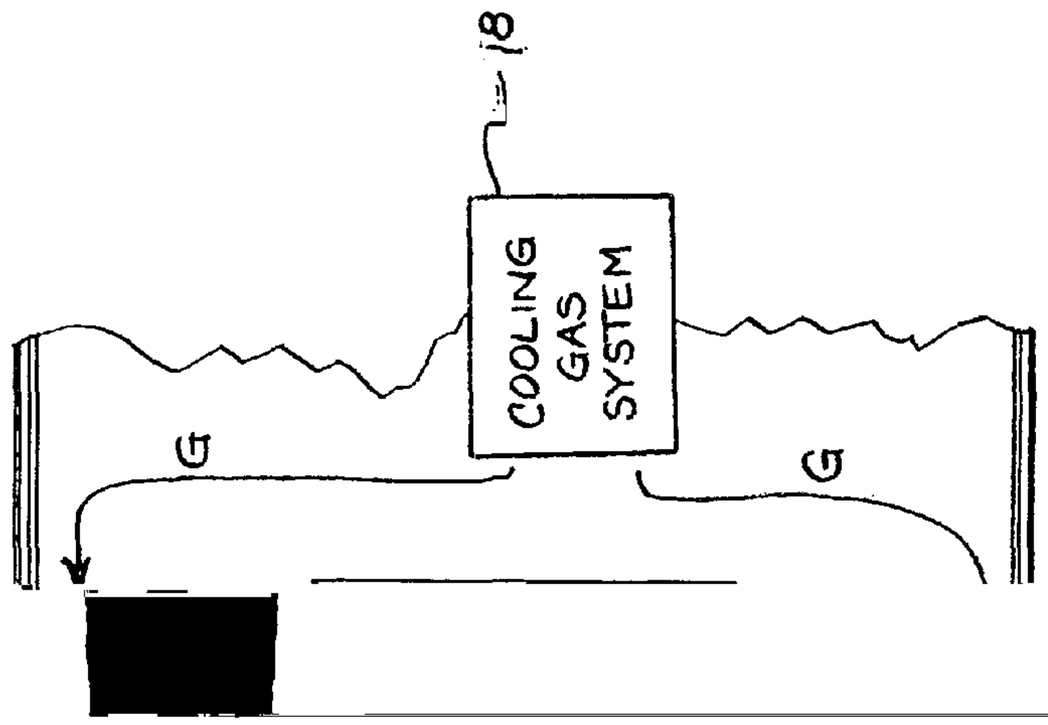
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COOLING GAS SYSTEM
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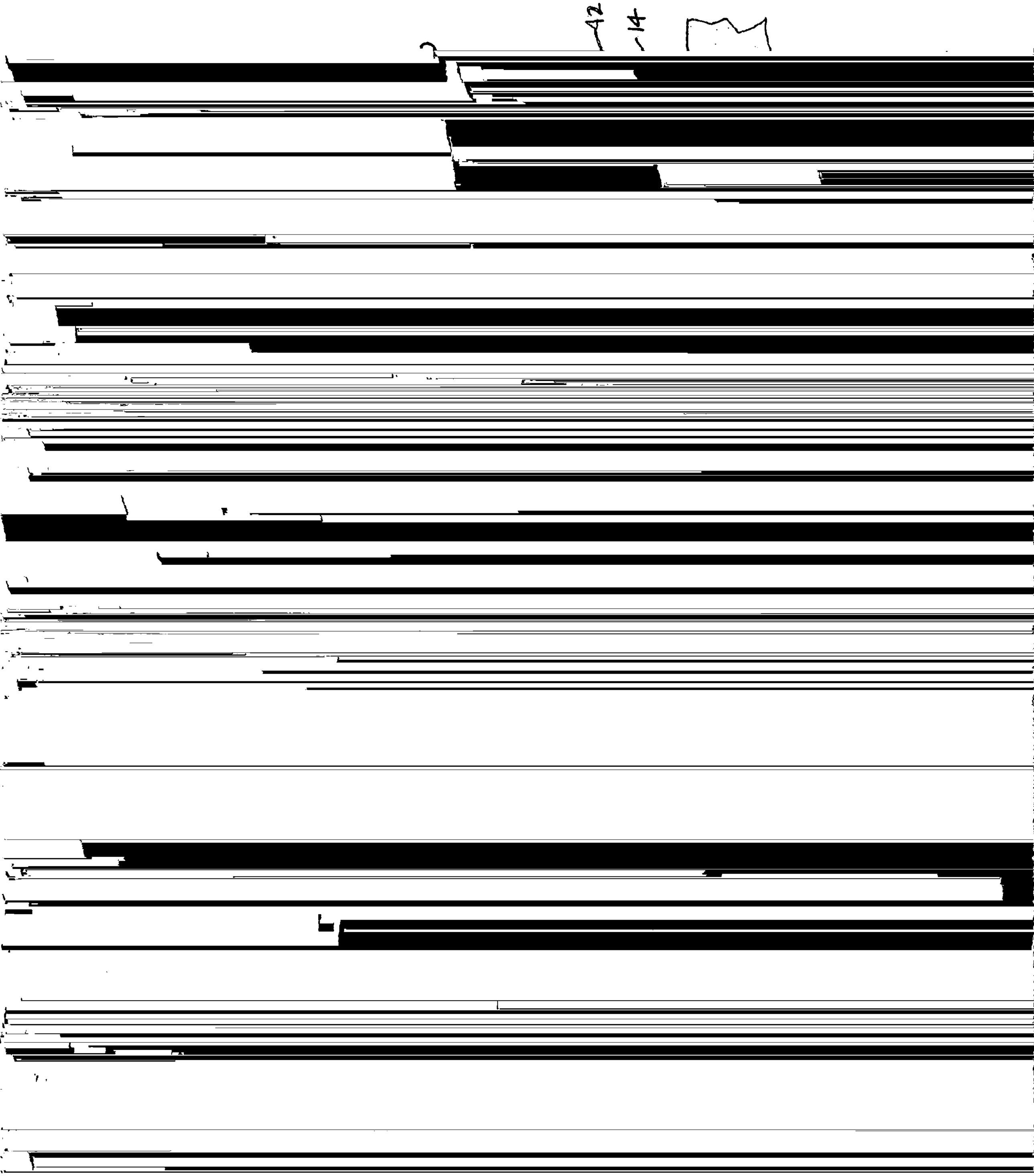
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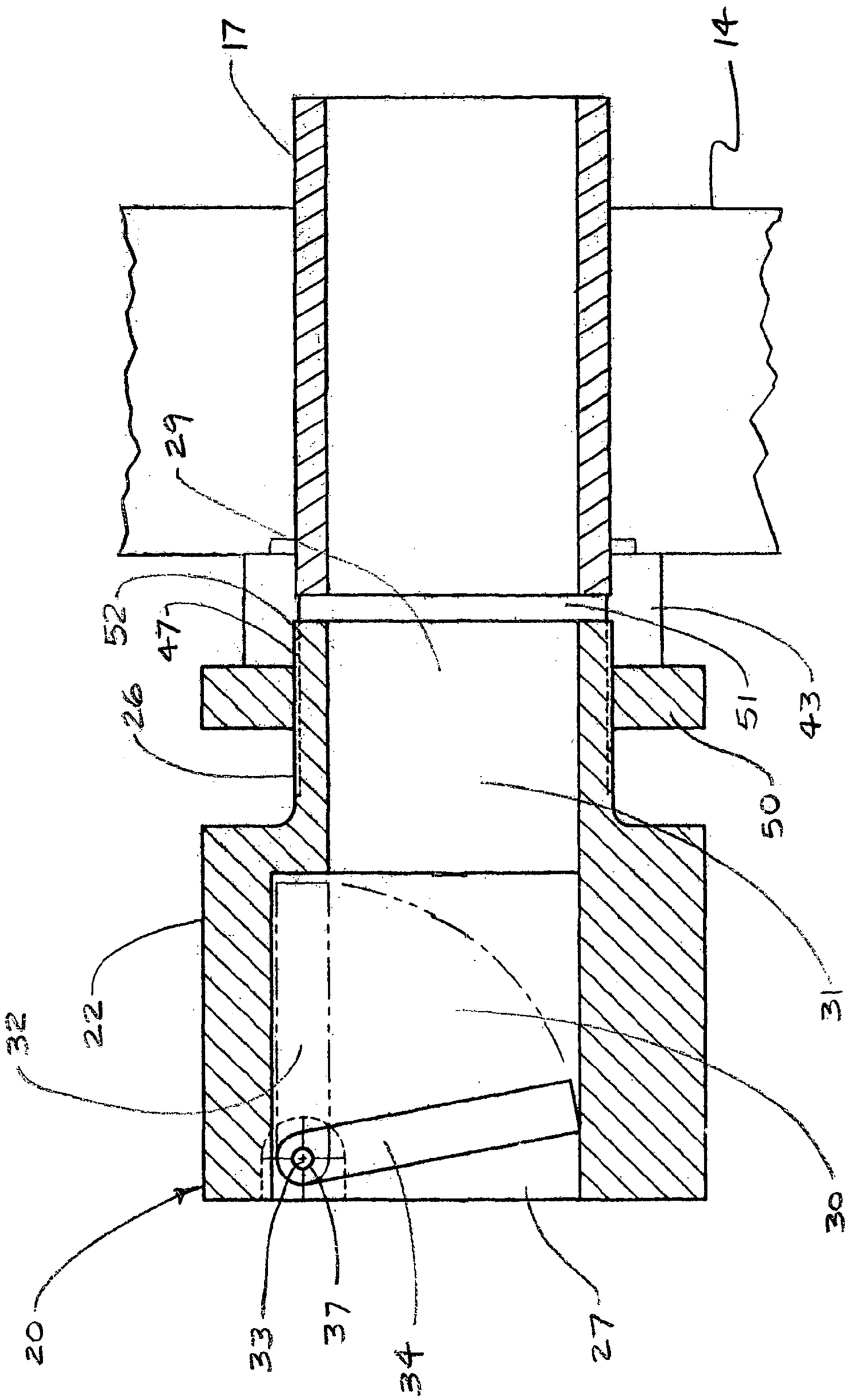

FIG. 4

FLAPPER GAS NOZZLE ASSEMBLY

FIELD OF THE INVENTION

for providing a forced cooling gas into the plenum and a

the nozzles externally of the hot zone wall.

the exterior of the hot zone wall. The plenum **16** is in fluid communication with the cooling gas system **18**.

The cooling gas system **18** is operable to deliver cooling gas under positive pressure through the plenum **16** and into the hot zone **15** through the hot zone wall **14** via the nozzles **17**. The valve assemblies **20** are mounted on the cylindrical side wall and may be mounted on one or both end walls of the hot zone wall **14**. Each valve assembly **20** is connected

gular cross section of the first chamber **30** are more or less tangential to the circumference of the circular cross section of the second chamber **31**, as shown in FIG. **2**. In addition, three sides of the rectangular first chamber **30** are generally equidistant from the longitudinal axis of the valve body **22**. The fourth side of the first chamber **30** is offset and spaced further away from the longitudinal axis of the valve body **22**, forming the recess **32**. The recess **32** has dimensions that

The flap **34** is operable in the closed position during a heat treatment cycle to minimize the escape of heat from the hot zone **15** into the plenum **16**. When the flap **34** is in the closed position, the flap engages the walls of the first chamber. The cross-sectional shape of the flap **34** is substantially commensurate with the cross sectional shape of the inlet **27**. As such, the flap **34** has a rectangular shape that substantially coincides with the sidewalls of the first chamber when the

to tighten the engagement between the threads on the small diameter section **26** and in the socket. The tightened engagement between the threads limits rotational displacement of the valve body **22** relative to the elbow, securing the orientation of the valve body so that the flap is retained in the proper orientation for receiving the cooling gas flow.

Valve assemblies **20** that are disposed on one or both of the end walls of the hot zone **15** receive cooling gas flow

tive first chambers of each valve. In the manner, the channels **28** are no longer obstructed by the flaps **34**, and cooling gas flows through the channels and through the nozzles **17** into the hot zone **15**.

[redacted]

3. The vacuum heat treating furnace of claim **2**, wherein the shaft is formed of molybdenum.

4. The vacuum heat treating furnace of claim **1**, wherein the flap has a shape that substantially conforms with the [redacted]