Sept. 8, 1970 S. PRESSLAUER 3,527,440

BLANKING PLATE FOR GAS FLOW PASSAGES

Filed June 17, 1968 4 Sheets-Sheet 1

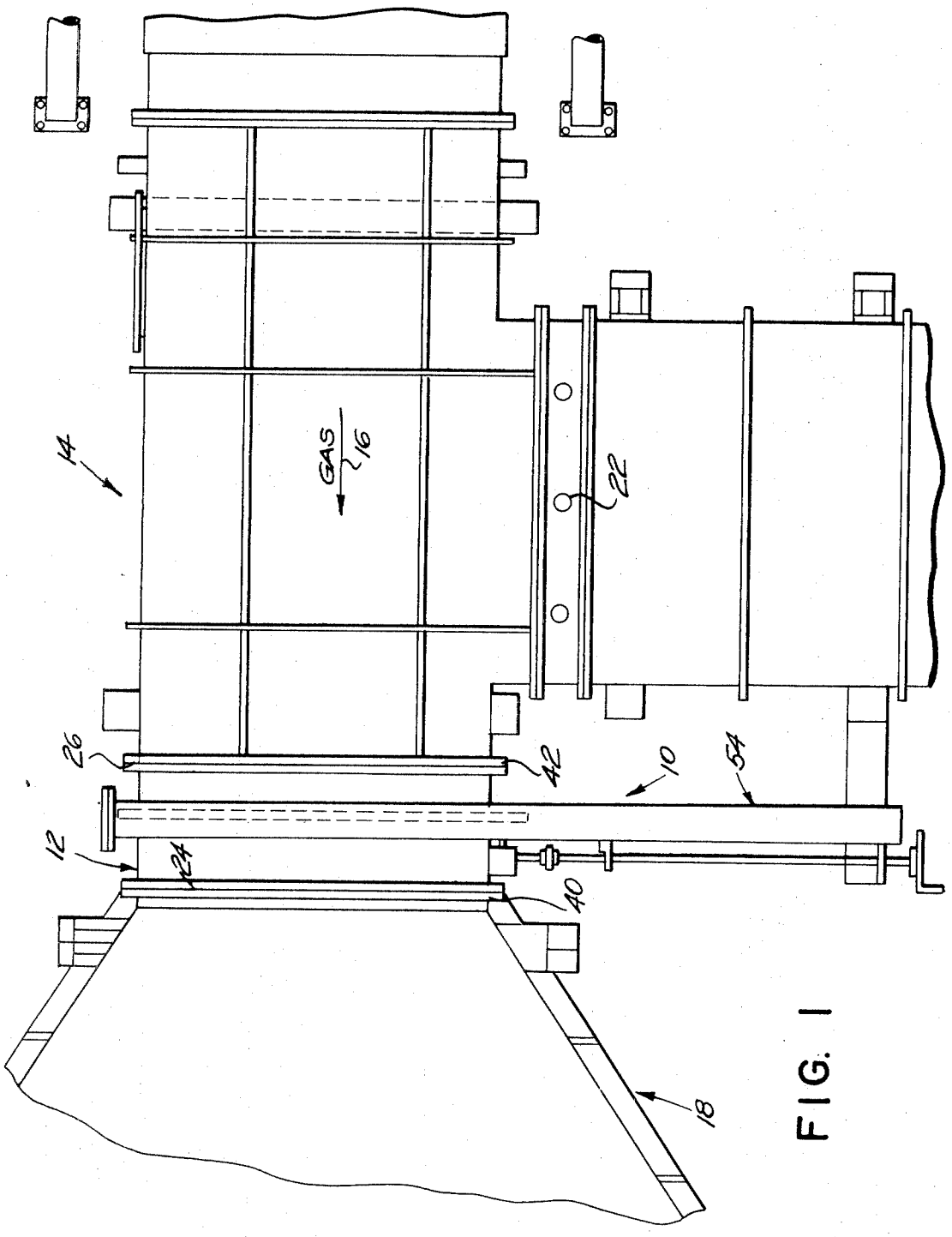


FIG. 1

INVENTOR.
SIEGFRIED PRESSLAUER
BY Salter & Michaelson
ATTORNEYS

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Filed June 17, 1968 4 Sheets-Sheet 2

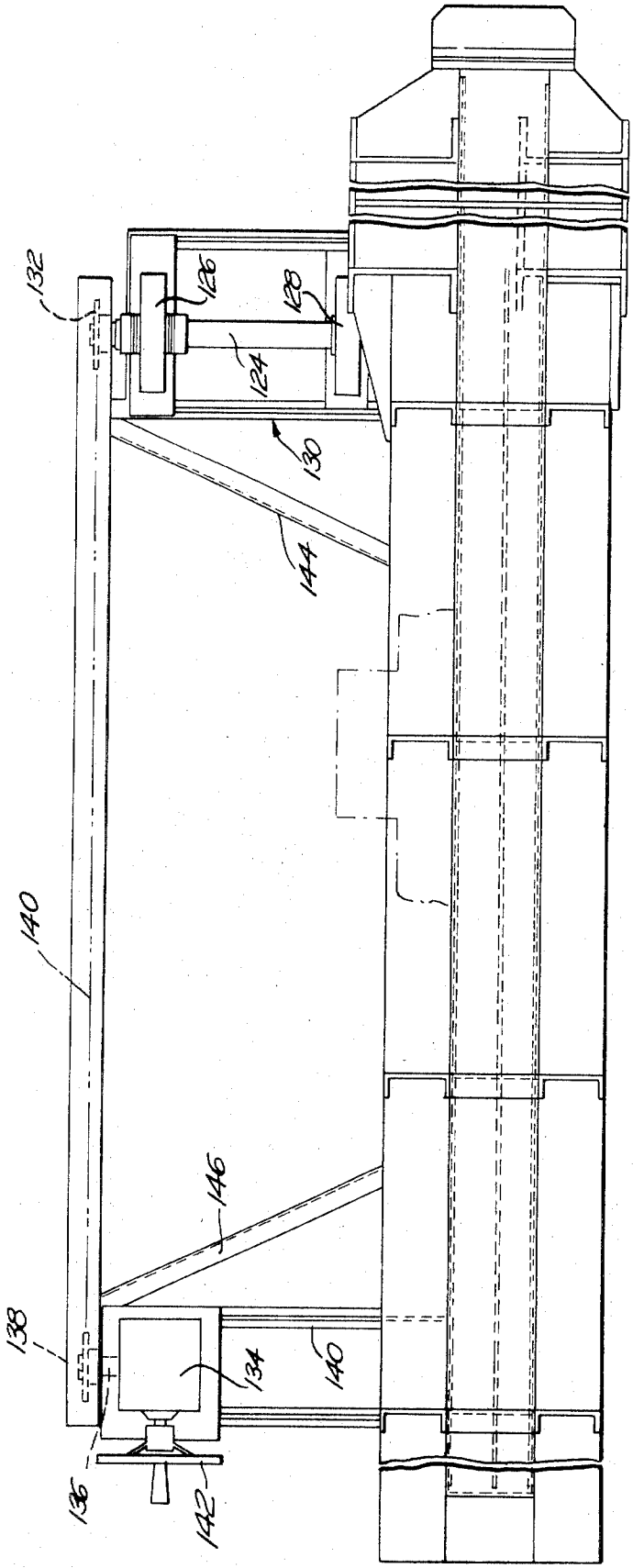


FIG. 2

INVENTOR.
SIEGFRIED PRESSLAUER
BY Salter + Michaelson
ATTORNEYS

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BLANKING PLATE FOR GAS FLOW PASSAGES

Filed June 17, 1968 4 Sheets-Sheet 3

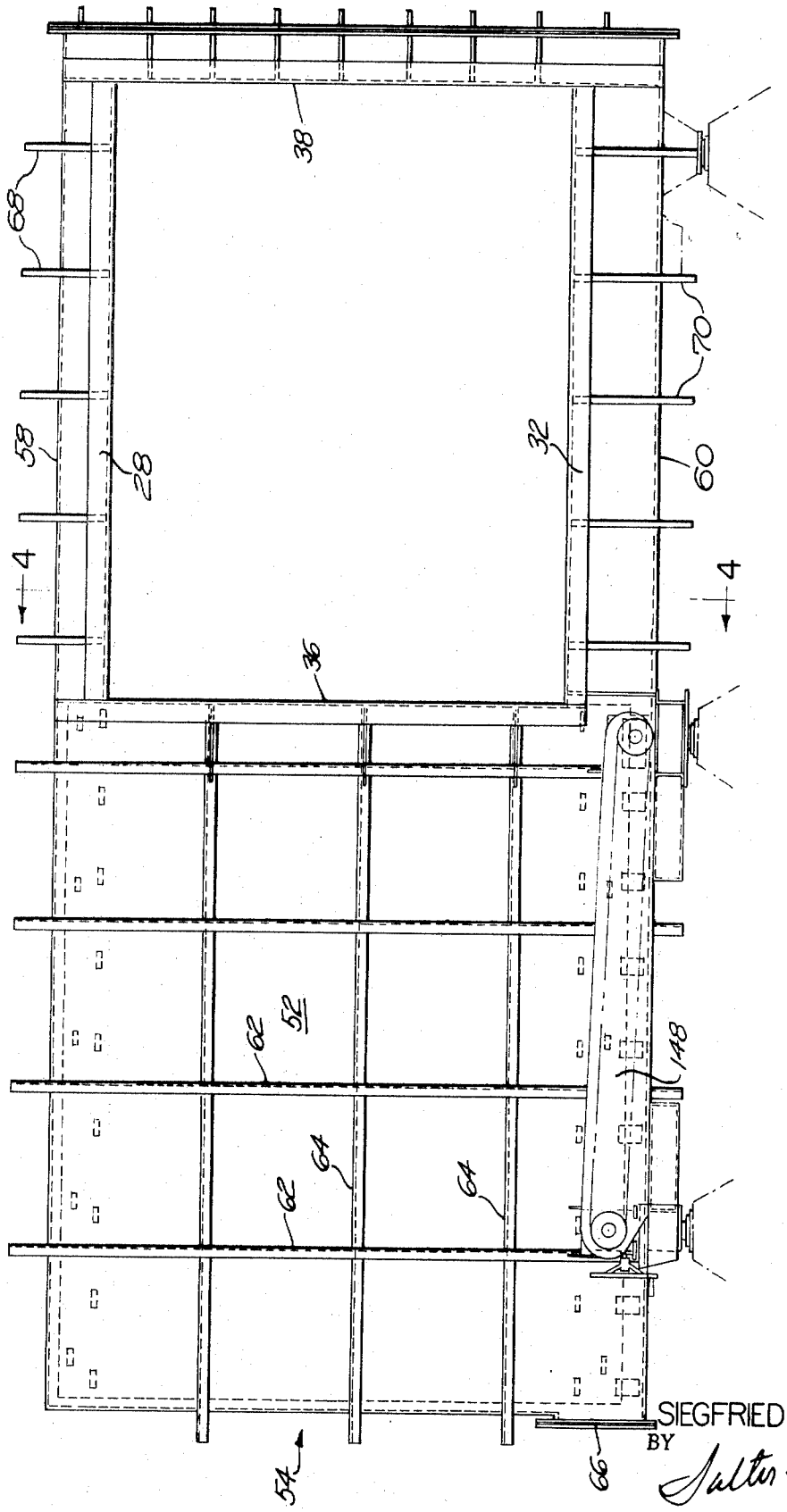


FIG. 3

INVENTOR.
SIEGFRIED PRESSLAUER
BY Salter & Michaelson
ATTORNEYS

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BLANKING PLATE FOR GAS FLOW PASSAGES

Filed June 17, 1968 4 Sheets-Sheet 4

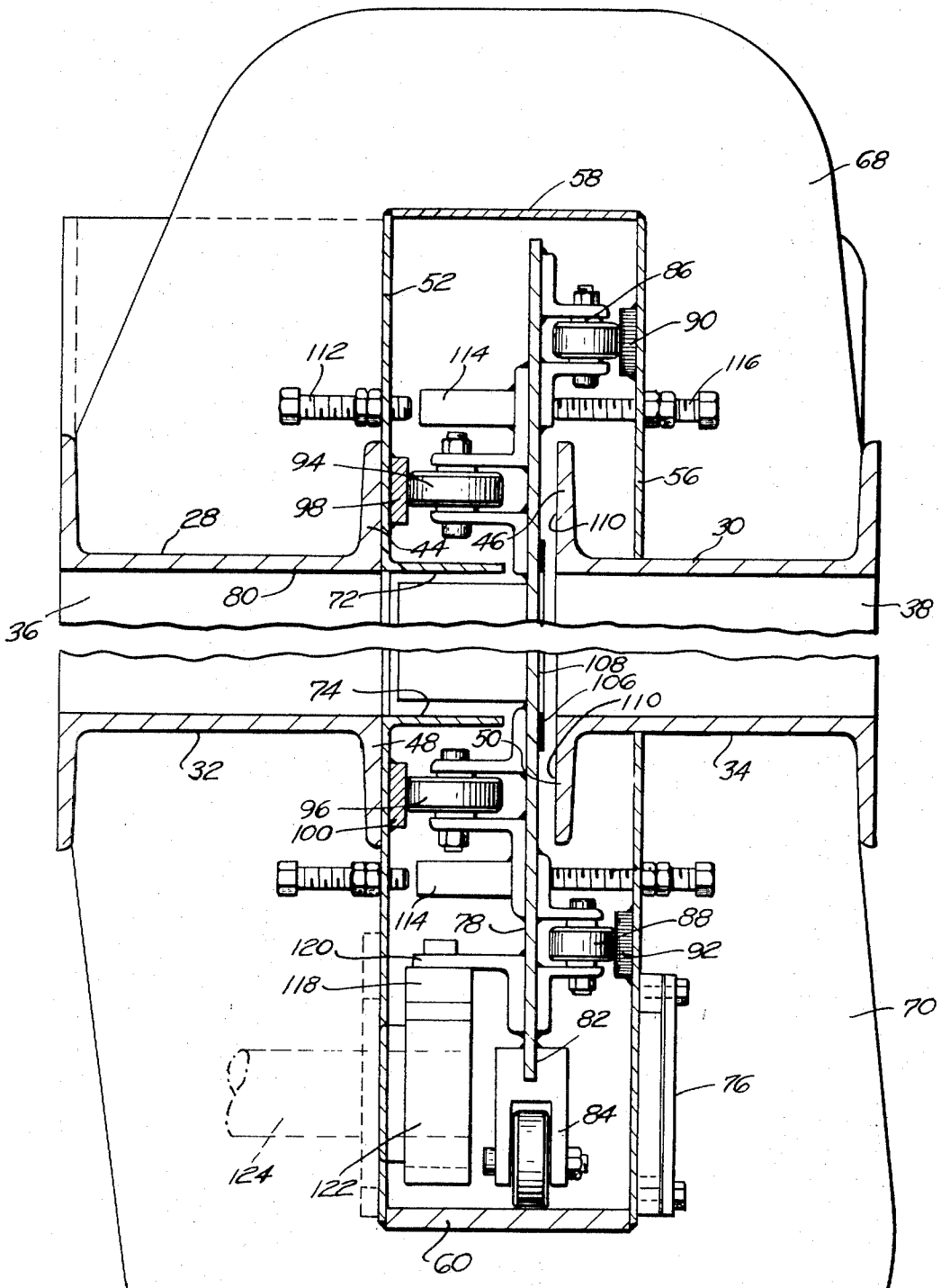


FIG. 4

INVENTOR.
SIEGFRIED PRESSLAUER
BY Saltz + Michaelson
ATTORNEYS

United States Patent Office

3,527,440

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BLANKING PLATE FOR GAS FLOW PASSAGES

Siegfried Presslauer, Seekonk, Mass., assignor to Tower Iron Works Inc., Seekonk, Mass., a corporation of Rhode Island

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Int. Cl. F16k 3/10

U.S. Cl. 251—187 3 Claims

ABSTRACT OF THE DISCLOSURE

A blanking plate assembly for gas flow passages, such as turbine passages and the like, movable from a completely open position wherein the gas is free to flow through the passage to a heat exchanger, boiler or the like to a completely closed position wherein the gas-flow is completely blocked and diverted to permit complete and safe isolation of a heat exchanger, boiler or any other equipment located downstream from the blanking plate without shutting down the entire system.

Several problems have been encountered with prior arrangements for effecting close-off turbine passages and the like. For example, because of the size and weight of the blanking plate, difficulty in moving the plate was experienced; the plate would freeze in closed position; the plate would damage the seat during movement; and a tight peripheral seal was not easily obtainable. Close tolerance manufacture of the blanking plate is expensive and does not solve the problem because of the high temperature of the gases in the passage which causes warping and uneven seating.

Accordingly, it is a primary object of the present invention to provide an improved blanking plate assembly for turbine passages and the like which overcomes problems heretofore encountered.

Another object of the present invention is to provide an improved blanking plate assembly for turbine passages and the like wherein a blanking plate of non-rigid design and wide tolerances can be utilized, yet wherein tight seating can be effected when in closed position.

A further object of the present invention is to provide an improved blanking plate assembly wherein novel means is employed for moving the blanking plate into and out of seating engagement with the passage it controls and for moving the blanking plate between open and closed positions.

Still another object of the present invention is to provide simple means for effecting a tight peripheral seal throughout the circumference of the seat.

A still further object of the present invention is to provide an improved blanking plate assembly wherein a non-metallic seat can be employed and wherein relative movement between the plate and passage is such that abrasive sliding contact against the seat is obviated.

Still another object of the present invention is to provide an improved blanking plate assembly wherein the blanking plate can be of lightweight construction.

A further object is the provision of a blanking plate that when in closed or blocking position permits complete and safe isolation of a heat exchanger, boiler or the like without shutting down the entire system.

Various other objects and advantages will become apparent from the detailed description to follow.

The blanking plate assembly of the instant invention comprises a plate adapted to be moved between closed and open positions suitable means such as a rack and pinion, with the plate supported on its back and front faces and bottom edge by rollers. Certain of the rollers ride on tracks which support the plate out of contact with its passage seat during lateral movement but allow it to move to seating position when laterally moved to fully closed position. Bolts are provided around the periphery to constitute multiple pressure points for clamping the plate in seating positions. Also a series of bolts are provided for unseating the plate. The plate is of relatively non-rigid design so that it can be conformed to the contour of the seating against which it is pressed.

In the drawings:

FIG. 1 is a top plan view of a turbine passage with the blanking plate assembly of the present invention incorporated therein;

FIG. 2 is an enlarged detail plan view of the blanking plate assembly and operating means, per se;

FIG. 3 is a side elevational view of the assembly; and

FIG. 4 is a vertical sectional view taken substantially on the plane of line 4—4 in FIG. 3.

Although my invention is applicable to any system having a gas flow passage, it has been illustrated and will be described in connection with a turbine system wherein the gases flow to a heat exchanger, boiler or the like. It will be understood, however, that this represents only one of many environments in which my invention has utility.

Referring more particularly to the drawings wherein like numerals apply to like parts throughout, it will be seen that I have provided an improved blanking plate assembly **10** for a turbine passage **12** in a turbine system **14**. Details of the turbine system are well known in the art so it will suffice to say that **12** is the passage from the turbine, with the gas flow in the direction of arrow **16**, to the heat exchanger **18**. The blanking plate assembly **10** is interposed in passage **12** so that the gas flow can be diverted into the passage **20** past dampers at **22** when it is desired to do repair work in the heat exchanger without shutting down the entire system.

The passage has end faces **24** and **26** between which the blanking plate assembly is to be received and secured, as by bolts.

Referring to FIGS. 3 and 4, the details of the assembly will now be described.

The casing or housing for the assembly comprises a pair of channels **28, 30** across the top and a pair of channels **32, 34** across the bottom with similar vertical channels **36** and **38** at the sides joined as by weld or other suitable means. The channels **28, 30, 32, 34, 36** and **38** define the passageway corresponding with the turbine passage to the heat economizer. The channels abut the flanges **40, 42** at their end faces **24, 26** for joinder therewith, as shown most clearly in FIG. 1.

The channels are longitudinally spaced, i.e., the flanges **44, 46** are spaced from each other as are the flanges **48, 50**. Side plate **52** is abutted against flanges **44, 48** and welded or otherwise secured thereto. Plate **52** is of a size to form a side panel of the box into which the blanking plate is to be retracted for its "open" position. The box shown generally at **54** also includes a second side plate **56** secured to channels **30, 34** and the respective side channels **36, 38**, a top plate **58** and a bottom plate **60**.

For strength, I provide an exterior frame for the box **54** including a series of vertical channels **62**, and a series of horizontal channels **64** (not shown) joining the opposing vertical channels and opposing horizontal channels at the top and bottom and sides, respectively.

A suitable access door is provided at **66** closed as by bolts.

Around the passageway, the casing is rigidified as by the plates **68, 70**. Also the plate **52** has inturned walls at **72, 74** acting as baffles to prevent gas from flowing out of the duct passage **80** toward walls **58, 60**.

Another access door is provided at **76** secured as by bolts for access into the casing about the blanking plate.

The blanking plate is shown at **78** as being a large rectangular sheet of a size greater than the passageway **80**.

It is relatively non-rigid but may be provided with reinforcing ribs for strength against the gas pressure. The plate **78** is supported on its lower edge **82** by a series of rollers **84** adapted to ride on bottom wall **60**. One face of plate **78** has a series of upper and a series of lower rollers **86**, **88** which are adapted to ride on tracks **90**, **92** when in box **54**. The tracks **90**, **92** terminate at passage **80** so that the plate **78** can be moved to the right, when viewed in FIG. 4, and when in position to close passageway **80** as will be described.

Similarly a series of upper and a series of lower rollers **94**, **96** are attached on the opposing side of plate **78** and similarly ride on tracks **98**, **100**. The tracks thus support the plate **78** as it moves through box **54** to its blocking position in passage **80**. As the plate moves into passage **80** the tracks **90**, **92** are no longer present but gas pressure in the passage holds the plate against tracks **98**, **100**. If no gas pressure is present, the plate will still be maintained against tracks **98**, **100** due to the fact all of the rollers **86**, **88** will not become disengaged from tracks **90**, **92** until the plate **78** is completely in its blocking position in passage **80**.

A seat in the form of a gasket **106** is secured on the seating face **108** of plate **78** for cooperation with the seating face **110** of the flanges **46**, **50** and at the sides as well.

When the plate is in position to close passageway **80**, it is free of the tracks **90** and **92**, as aforesaid. The series of elements **112** in the form of bolts through wall **52** can be threaded against bosses **114** on the plate **78** to press the seating faces into interengagement so that seat **106** seals against seat **110** to close off the flow of gas through passage **80**.

The element **116**, also preferably bolts, are carried on side wall **56** and can be threaded inwardly to unseat plate when it is desired to retract plate **78** from its closed position. Of course, bolts **112** must first be retracted.

Any suitable means may be employed for moving the plate **78** between open and closed position. One such means includes rack **118**, carried on bracket **120** secured to plate **78**, and a pinion **122** engaged with the rack. Pinion **122** is mounted on shaft **124** which in turn is supported in bearings **126**, **128** carried by frame **130** of any suitable design. A sprocket **132** is mounted on the outer end of shaft **124**.

A drive mechanism, which can be electrically or hand-operated, includes a box **134** with a drive shaft **136** extending therefrom. Shaft **136** has a sprocket **138** and a link belt **140** is engaged over the sprockets **132**, **138** to drivingly connect the same. Box **134** is mounted on frame **140** and a hand wheel **142** may be utilized to drive sprocket **138** as by a bevel gear arrangement (not shown). Rigidifying angles **144**, **146** are provided as shown in FIG. 2. Also, a protective casings is provided **148** for the link belt.

Thus plate **78** can be moved from box **54** to closed position and back to open position by operation of the hand wheel and through the rack and pinion arrangements. Other equivalent arrangements involving the use of a screw, pulley, or chain could also be used for effecting opening and closing of plate **78**.

It will be understood that when the plate **78** is moved to closed position, the rollers first ride on the tracks **90**, **92**, **98**, **100** and then are free of the tracks **90**, **92** when

the plate is in the passageway. The plate by reason of its non-rigid construction, can be clamped closed by the bolts **112** providing multiple pressure points whereby irregularity in the seats is overcome.

In view of the foregoing it is believed that I have provided an improved blanking plate assembly which fulfills the objects hereinbefore enumerated.

What is claimed is:

1. A blanking plate assembly for closing flow of gas through a gas flow passage, said assembly comprising a blanking plate slidably movable between two end positions, in one of which positions said passage is fully open and in the other of which positions said passage is closed, said plate being larger than said passage whereby when said plate is in its closed position it has a marginal portion that extends outwardly beyond the periphery of said passage, operating means connected with said plate for moving it betwen said end positions, said plate and passage having cooperating peripheral seat means, pressure means carried by said assembly for forcing said plate into and out of sealing engagement with said passage when the plate is in its closed position whereby said seat means block flow of gas through said passage, roller means carried by said plate marginal portion on opposite sides thereof and at one pair of opposite edges thereof, and track means carried by said assembly for receiving said roller means, said roller means and track means cooperating to maintain said plate substantially normal to the longitudinal axis of said passage during slidable movement of said plate between its said end positions and at the same time maintaining said peripheral seat means disengaged during said movement, the track means adjacent the side of said plate opposite from the direction of gas flow extending completely across said passage, the track means adjacent the other side of the plate terminating short of the passage, whereby when the plate has moved to its blocking position, the plate is free to be moved into sealing engagement by said pressure means.

2. In the assembly of claim **1**, said roller means comprising a series of aligned rollers extending across said plate at the aforesaid locations on said plate, the axes of said rollers being substantially parallel to the plane of said plate.

3. In the assembly of claim **2**, the rollers on the side of the plate closest to the direction of gas flow being located closer to the peripheral edge of said marginal plate portion than the rollers on the opposite side thereof.

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HAROLD W. WEAKLEY, Primary Examiner

U.S. Cl. X.R.

251—158, 193, 329