Dec. 9, 1930. A. A. LINDLEY 1,784,149

BOILER

Filed Nov. 13, 1925 4 Sheets-Sheet 1

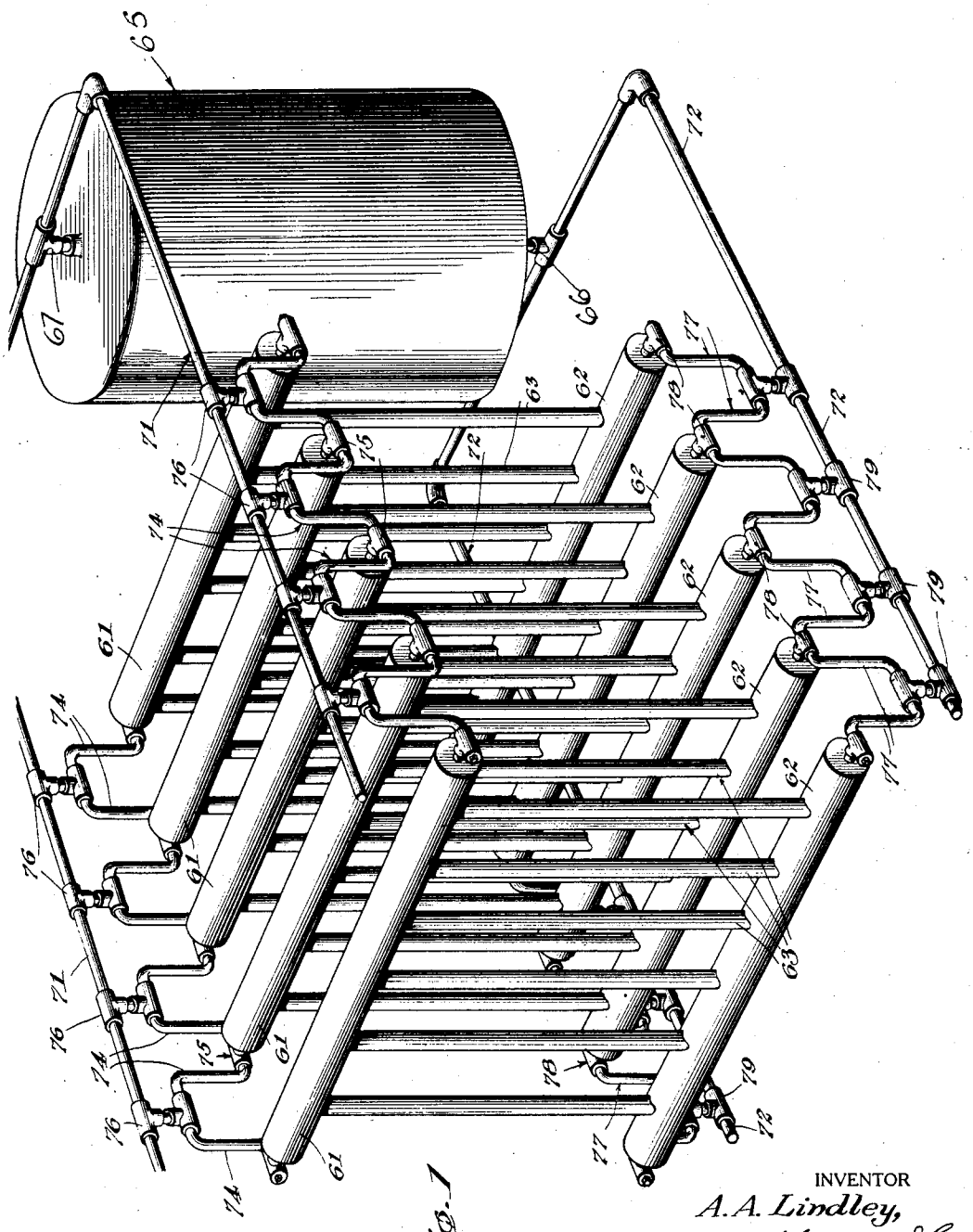


Fig. 1

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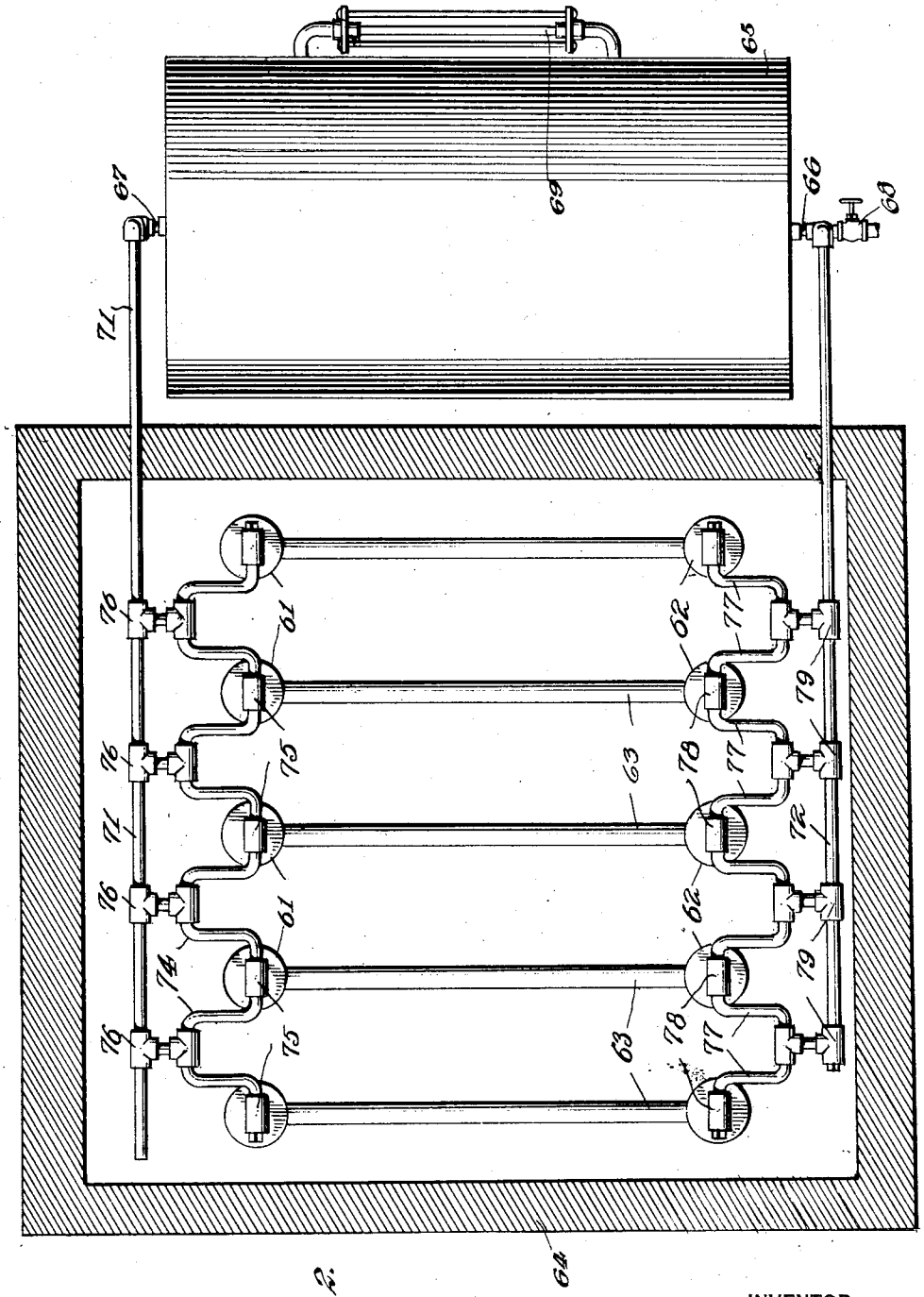


Fig. 2.

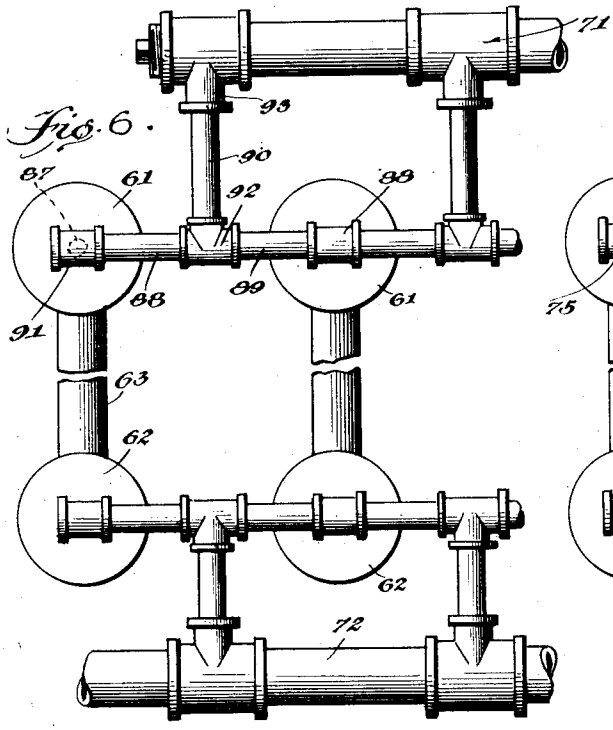
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BOILER

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Fig. 6.



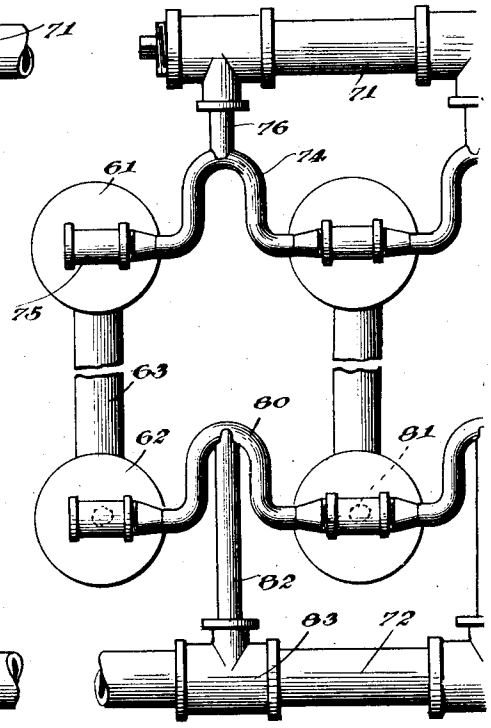


Fig. 3.

Fig. 7.

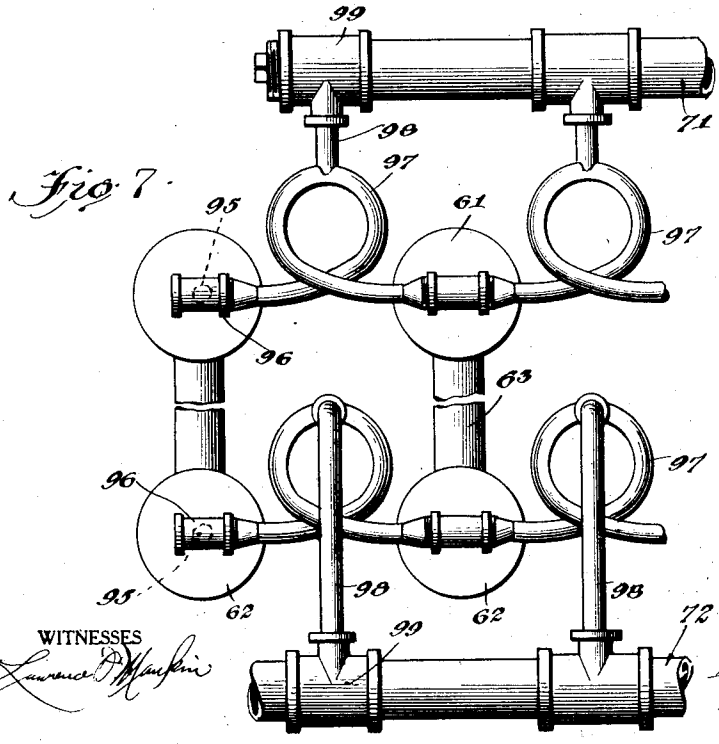
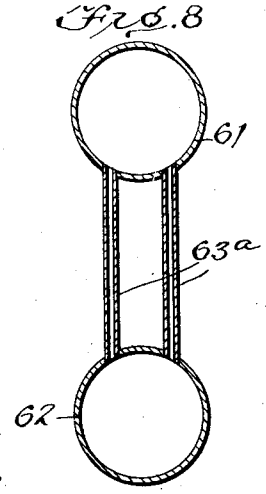


Fig. 8.



WITNESSES

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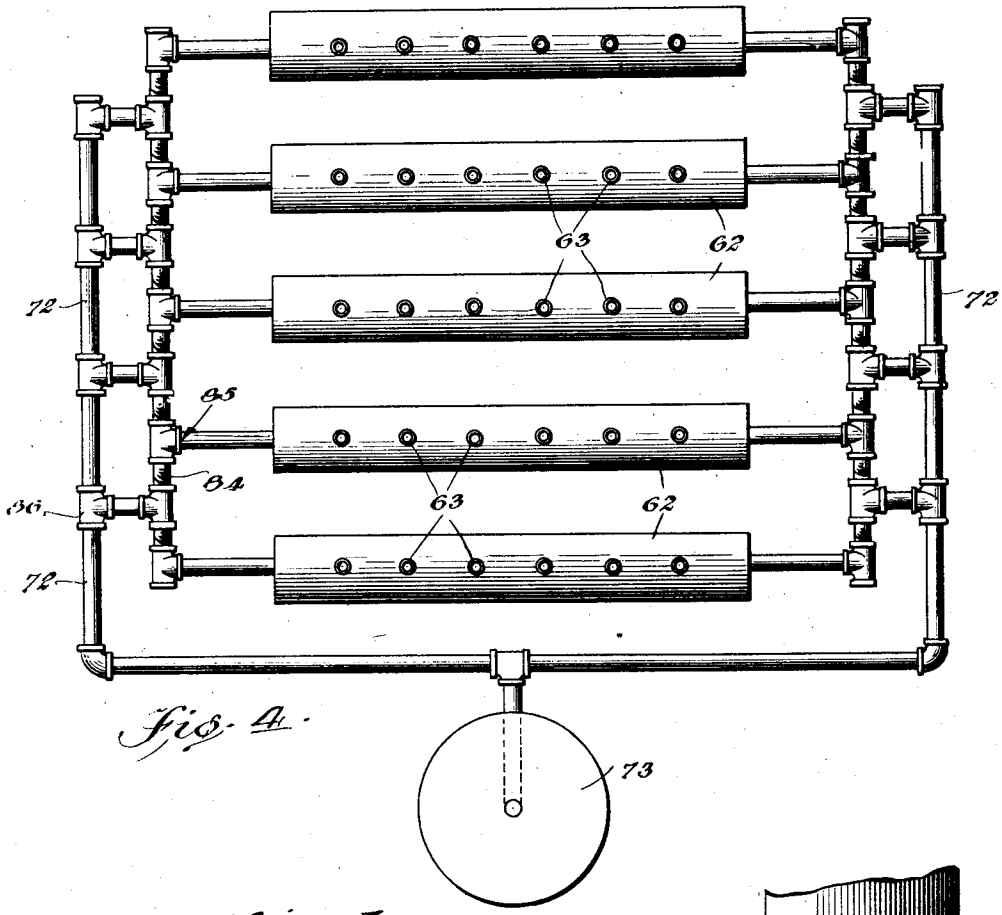


Fig. 4.

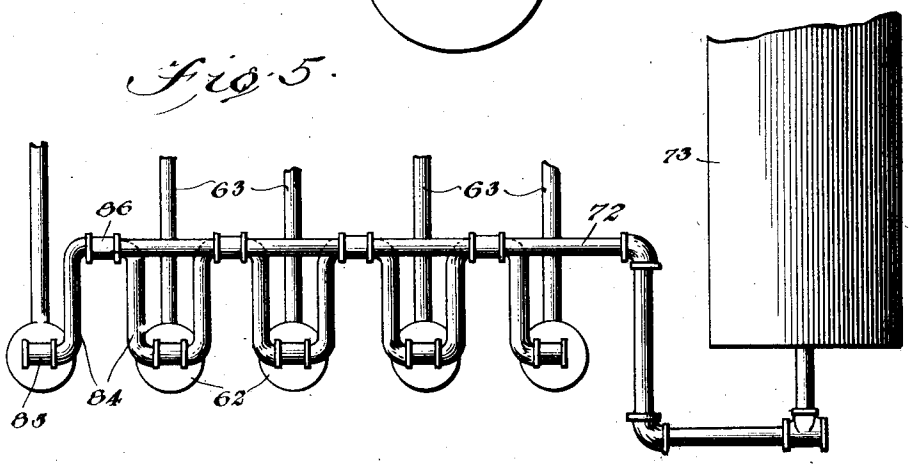


Fig. 5.

WITNESSES

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Patented Dec. 9, 1930

1,784,149

UNITED STATES PATENT OFFICE

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BOILER

Application filed November 13, 1925. Serial No. 68,856.

This invention aims to provide an improved boiler which has all the advantages of a flash boiler and a constant water level boiler and none of the disadvantages of either which also embodies a superheater and which avoids the use of rivets, stay bolts, threaded or sectional parts, calking tools, etc.

A further object is the provision of a boiler which is of simple construction, reliable and efficient in operation and easy and comparatively inexpensive to manufacture.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claim, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a fragmentary perspective view illustrating the arrangement embodied in a multiple unit boiler,

Figure 2 is an elevational view of the device of Figure 1,

Figure 3 is a fragmentary view in front elevation illustrating a slight variation of the arrangement shown in Figure 1,

Figure 4 is a view partly in horizontal section and partly in plan showing another modification of the form of the invention illustrated in Figures 1 to 3, inclusive,

Figure 5 is a fragmentary view in front elevation further illustrating the embodiment shown in Figure 4,

Figure 6 is a fragmentary view in front elevation illustrating a slightly different form of the invention shown in Figures 4 and 5, respectively,

Figure 7 is a view illustrating another variation of this arrangement, and

Figure 8 is a sectional view showing a form in which the upper and lower longitudinal headers are connected by spaced water tubes.

Referring to Fig. 1 it will be seen that the embodiment of the invention shown therein comprises a series of longitudinal upper and lower headers, designated at 61 and 62, respectively, the headers 61 and 62 being connected by vertical water tubes 63 and the assembly just described constituting a series of units which may be employed singly or in multiple. Exteriorly of the furnace 64 a vertically disposed drum 65 is provided and has its lower end connected, as at 66, with the lower header 72, the upper end being connected by pipes and fittings 67 to the upper header 71. This drum or tank 65 provides a reserve water supply and also a steam dome and a mud drum. In order that the mud drum may be cleaned a valved blow-off 68 is provided. A water gage 69 is coupled with the tank 65 to clearly indicate the amount of water in the boiler. This arrangement has all of the advantages of a flash boiler, the water being instantly flashed into steam in the small tube 63. Along with these advantages, rapid deterioration is precluded due to the provision of the reserve water supply which is automatically drawn upon as the water is converted into steam. There is thus provided a boiler which contains a small amount of water moving rapidly so that the heat from the fuel is taken up rapidly to increase the efficiency of the boiler and to make the boiler more economical in the consumption of fuel. The rapid circulation thus provided is carried out on the principle of a siphon or injector.

The boiler may be provided in multiple or individually. In all of the embodiments illustrated, there is provided a plurality of units, and these units comprise longitudinally extending upper and lower headers 61 and 62 and relatively small water tubes 63 connecting the headers and transversely extending headers 71 and 72. These headers 71 and 72 are adapted to extend along the edge of the longitudinal heads 61 and 62, respectively.

In the form of the invention shown in Figs. 1 to 5, inclusive, the connections between the longitudinal headers and the transverse headers consist of looped or U-shaped tubes and the several embodiments shown in Figs. 1 to 5 differ only in the arrangement of such tubes. In Fig. 1 inverted U-shaped or looped tubes 74 are provided between the ends of the upper longitudinal headers 61 and the upper transverse headers 71, the inverted U-shaped or looped tubes 74 being connected by short pipes and T fittings 75 with the ends of the

longitudinally extending upper headers 61, the bights of the looped tubes 74 being connected by short pipes and T fittings 76 with the upper transverse headers 71. The lower longitudinal headers 62 are connected to the lower transverse headers 72 by means of looped or U-shaped tubes 77 disposed in normal position and are connected to the ends of the longitudinally extending headers 62 by short pipes and T fittings 78 having their bights connected to the transverse lower headers 72 by short pipes and T fittings 79.

In the form of the invention shown in Figure 3 the looped tubes 74 and connecting elements 75 and 76 are provided between the headers 61 and the headers 71. A somewhat different arrangement is employed for connecting the upper headers 61 with the lower headers 62 and this arrangement comprises inverted or U-shaped tubes 80 connected to the ends of the lower headers 62 by means of short pipes or T fittings 81 indicated in dotted lines Fig. 3, the bights of the inverted or U-shaped tubes 80 being connected by pipes 82 and T fittings 83 to the transverse headers 72. It is to be noted that in this form of the invention as well as in the form shown in Fig. 1, the headers 71 and 72 are spaced vertically from the headers 61 and 62.

In the form of the invention shown in Figs. 4 and 5 the headers 71 and 72 are aligned with the bights of the looped tubes with which they connect, the looped tubes being designated at 84 and being connected to the ends of the headers 61 and 62 by means of pipes and fittings 85 and to the headers 71 and 72 by pipes and fittings 86.

In the form of the invention illustrated in Fig. 6 straight pipes 87, 88, 89 and 90 and T fittings 91, 92, and 93 are employed for connecting the longitudinal headers 61 and 62 to the transverse headers 71 and 72.

In the form of the invention shown in Fig. 7 the ends of the longitudinal headers 61 and 62 are connected with the transverse headers 71 and 72 by means of short pipes 95, T fittings 96, coil pipes 97, pipes 98 and T fittings 99, the short pipes 95 and T fittings 96 connecting the ends of the coil tubes 97 with the ends of the headers 61 and 62 and the pipes 98 connecting the bights or intermediate portions of the coils 97 with the T fittings 99, the latter being embodied in the headers 71. The longitudinal headers 61 and 61 may be connected by pairs of spaced water tubes 63ª as shown in Fig. 8.

I claim:

A boiler, including a housing, a plurality of units therein, each unit comprising spaced apart upper and lower longitudinal headers, vertical water tubes connecting said longitudinal headers, upper and lower transverse headers adjacent the opposite ends of said longitudinal headers, bent pipe connections between the longitudinal and transverse headers to facilitate assembly as well as accommodate expansion, a vertical feed drum or tank positioned exteriorly of the housing, and pipe connections between the upper and lower ends of said tank and said upper and lower transverse headers, said vertical feed tank extending throughout the length of said vertical water tubes to maintain the water in said tubes at the desired level therein.

ALVA ARTHUR LINDLEY.