A. NEU.

FUEL FEEDING MEANS FOR CEMENT KILNS.

APPLICATION FILED APR. 22, 1908.

958,970.

Patented May 24, 1910.

2 SHEETS—SHEET 1.

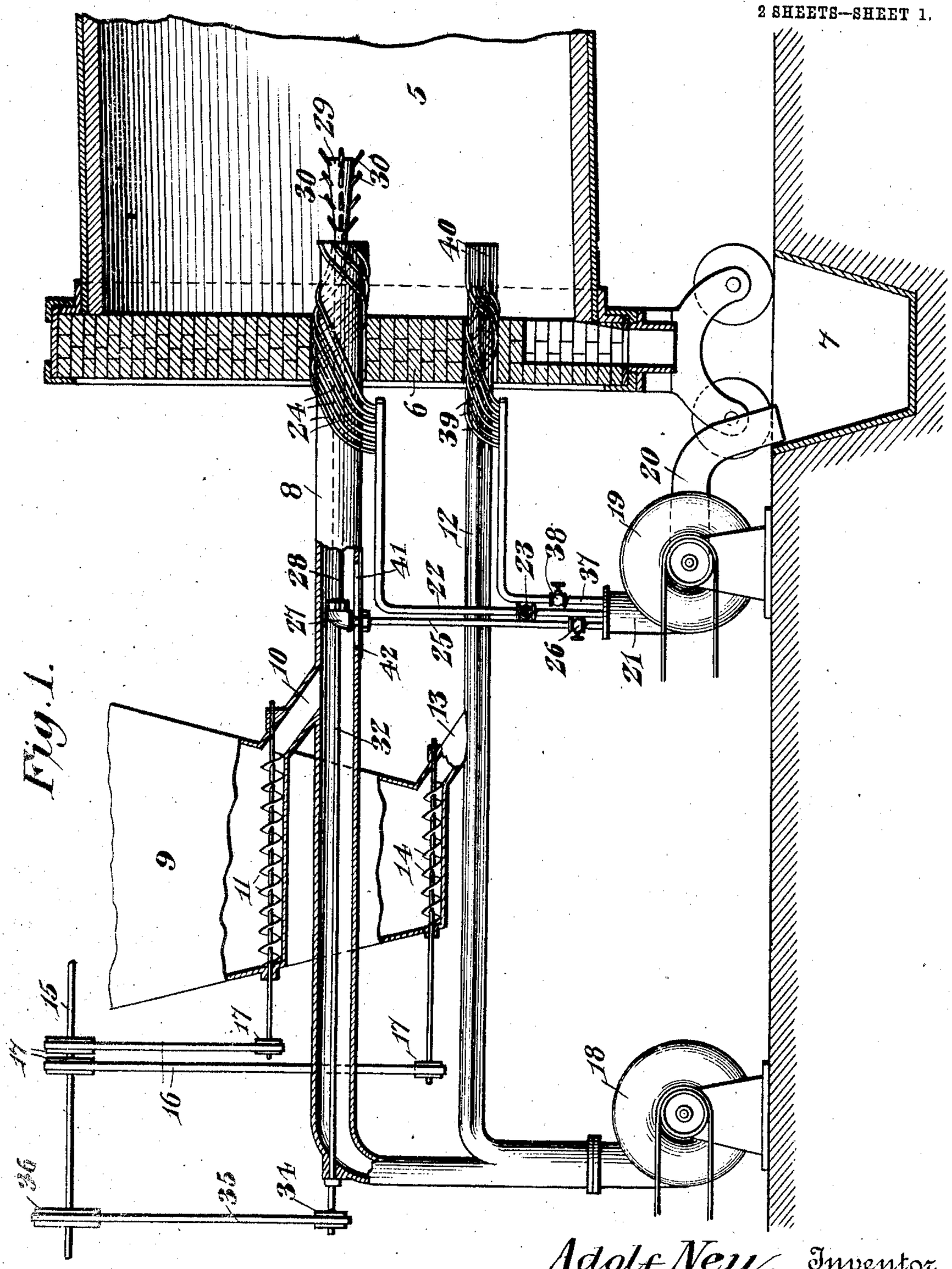

Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

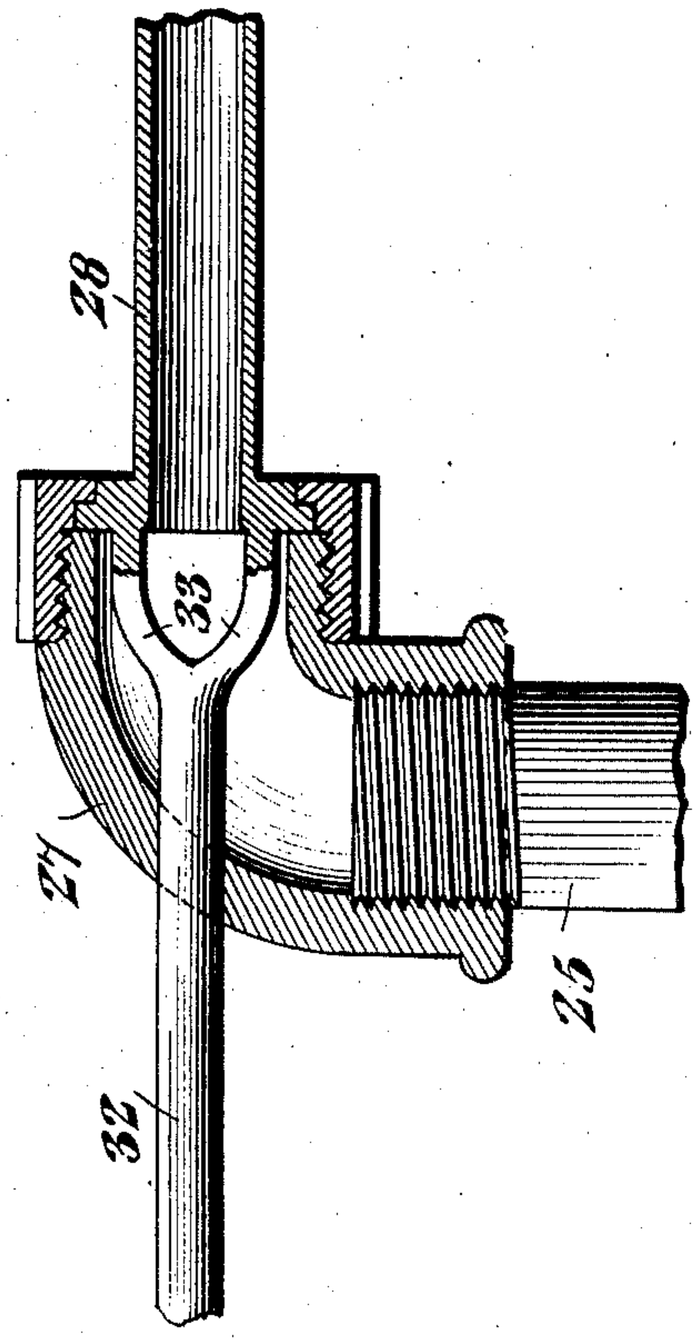


Fig. 3.

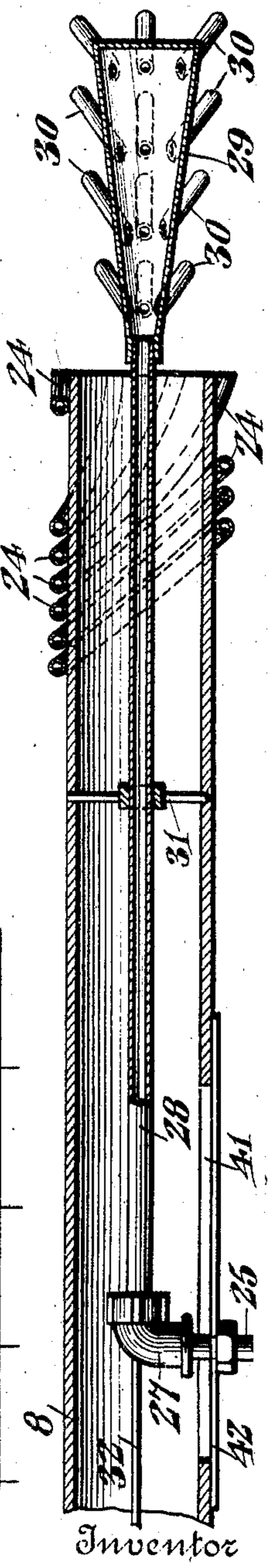
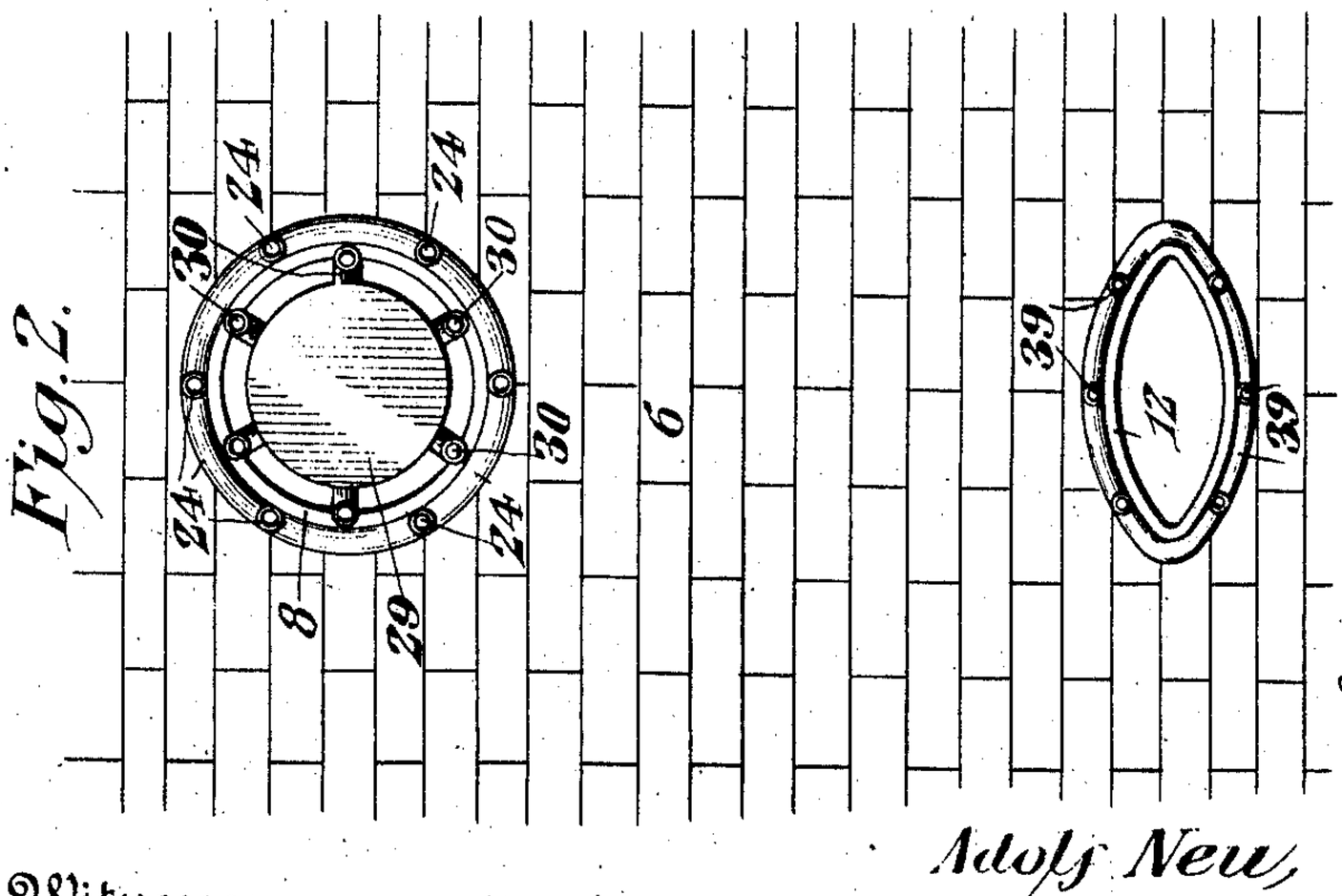


Fig. 2.



Witnesses

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FUEL-FEEDING MEANS FOR CEMENT-KILNS.

958,970. Specification of Letters Patent. Patented May 24, 1910.

Application filed April 22, 1908. Serial No. 428,527.

To all whom it may concern:

Be it known that I, ADOLF NEU, a subject of the King of Great Britain, residing at Tod Inlet, British Columbia, Dominion of Canada, have invented a new and useful Fuel-Feeding Means for Cement-Kilns, of which the following is a specification.

In cement kilns now in general use, it is the ordinary custom to employ a fuel conduit having an open discharge end and to blow through the same by means of a cold air blast, powdered coal or other fuel. With this system there is a considerable loss of fuel, for a comparatively great amount of the same, blown with great force, is necessary in order to secure sufficient heat, and as a result, considerable coal is blown directly through the kiln and into the stack so that the smoke carries a large percentage of carbon.

One of the primary objects of the present invention is to provide a novel system by which more perfect combustion is secured, thus effecting a material saving in fuel and also permitting the employment of a lower grade, said system moreover being less wearing upon the lining of the kiln at the hot zone, thereby eliminating oft-repeated renewals and the consequent necessity of shutting down the kilns.

A further and important object is to provide fuel feeding means that will permit the employment of larger kilns than are now in use and to provide means by which the amount and character of the feed can be varied as desired in order to secure the highest amount of output with the lowest amount of fuel possible.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a sectional view through the discharge end of a kiln, showing the novel feeding system partially in elevation and partially in section. Fig. 2 is a view in elevation of a portion of the inner face of the kiln head showing the feeding means in end elevation. Fig. 3 is a detail longitudinal sectional view on an enlarged scale through a portion of the upper conduit and the hot air distributing means. Fig. 4 is a detail sectional view through the coupling for the rotary pipe.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment disclosed, the kiln comprises a rotatable cylindrical body 5 having a non-rotatable head 6, beneath which is located the usual clinker receiving pit 7. A fuel conduit 8 extends through the head 6 into the body, and has an open discharge end. This conduit is prefeably constructed of metal or material that is not readily affected by heat. A hopper or reservoir 9 for the fuel located above the conduit, has a discharge spout 10 communicating with said conduit, the material being fed to the spout by a suitable screw 11 or by any other means appropriate for the purpose.

Located below the fuel conduit 8 is another fuel conduit 12 that extends through the head 6, and has its discharge end located in the body contiguous to the lower side thereof. This conduit or at least the discharge end thereof is substantially elliptical in cross section, as illustrated in Fig. 2. Fuel is fed to the conduit 12 through a spout 13, to which said fuel is delivered by a screw 14, the screws 11 and 14 being driven from any suitable source, as for instance, a drive shaft 15 connected by belts 16 and pulleys 17 to said screws. A fan 18 is connected to the conduits 8 and 12 for delivering air thereto. Another fan 19 has an intake 20 communicating with the clinker pit, said fan having an outlet or discharge 21. A hot air supply pipe 22 having a controlling valve 23 therein, leads from the discharge 21, and has a series of branches 24 that are coiled about the discharge portion of the conduit 8, said pipes terminating at the discharge end of the conduit and in angular relation thereto. Another hot air supply pipe 25, leading from the discharge 21, has a valve 26 therein, and said pipe extends to a coupling 27 located within the conduit. A rotatable pipe 28, disposed centrally and longitudinally within the conduit 8, has one end journaled in the coupling, its other end projecting from the discharge end of the conduit and carrying a nozzle 29 that increases in diameter toward its rear end. This nozzle is provided on different sides with a plurality of rearwardly and outwardly extending discharge nipples 30. The pipe 28 is supported within the conduit 8 by a suitable spider or transverse supporting bar 31. The rotation of the pipe 28 and nozzle 29 is secured by means of a shaft 32 that extends through the coupling 27, and has its end branched, as shown at 33 in Fig 4, and secured to the pipe 28. This shaft extends

longitudinally through the conduit and projects from the rear end of the same where it is provided with a pulley 34. A belt 35, passing around this pulley, passes around a pulley 36 on the drive shaft 15. Another air supply pipe 37 is connected with the discharge 21 of the fan 19, and has a controlling valve 38 therein. This pipe is associated with the conduit 12, and a plurality of branches 39, leading from said pipe, are carried about the said conduit and have their discharge portions 40 located longitudinally of the discharge end of the conduit 12, and on different sides of the same.

With this structure, heavy blasts of air are not necessary in the conduits 8 and 12, but it will be evident that as with the ordinary construction, coal delivered into the said conduits through the spouts 10 and 13 will be driven by said air blasts to the discharge ends of the conduits. The temperature in the clinker pit 7 is very high, and consequently hot air will be drawn from the clinker pit by the fan 19 and will be delivered into the pipes 22, 25 and 37. The branches 24 of the pipe 22 will cause gyratory currents of air to be delivered around the discharge end of the conduit 8 and rearwardly into the kiln or furnace, while the nipples 30 of the nozzle 29 will direct currents of air outwardly into this gyratory body of hot air. Consequently the powdered coal or other fuel delivered by the conduit 8 will be forced outwardly by the currents of air from the nippies 30 and whirled into the furnace, this hot air insuring quick combustion. The particular character of the discharge from the conduit 8 can be readily controlled by varying the force of the jets of air, through the medium of the valves 23 and 26, and by adjusting the nozzle 29 longitudinally into and out of the discharge end of said conduit, the latter being permitted by the natural resiliency of the pipe 25 and by means of the slot 41 formed in the conduit 8 through which the pipe 25 passes, this slot being covered by a suitable plate 42. The lower conduit constitutes a supplemental feeding means delivering a comparatively broad stream of fuel over the lower portion of the furnace or kiln, and insuring the proper fusing of the material.

The central fuel-feeding device is so designed and operated that the fuel is discharged to follow a gyratory course longitudinally through the kiln and in proximity to the inner surface thereof, while the lower fuel discharging device is so designed and arranged that a comparatively broad belt of fuel is discharged close to the surface of the material treated in the kiln, and furthermore, such flat belt intercepts the gyratory stream discharged by the central device so that an effective commingling of the two streams or belts takes place close to the material in the kiln where the maximum heat is required. The two feeding devices operate simultaneously in this manner, but it may be desirable, in some instances, to use the upper feeding device without feeding fuel through the lower device.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. The combination with a furnace, of a fuel conduit having its discharge end projecting thereinto, an air supply pipe extending longitudinally through the conduit and projecting beyond the discharge end thereof, said pipe having a closed rear end and having a plurality of laterally extending hollow air discharging members on its projecting portion to break up the column of fuel discharged from the conduit and also deliver air into the fuel, and means for rotating the pipe.

2. The combination with a furnace, of a fuel conduit leading thereinto, and an air supply pipe extending within the conduit and having a nozzle at the discharge end of said conduit, said nozzle being provided with a plurality of lateral discharge nipples.

3. The combination with a furnace, of a fuel conduit delivering thereinto, an air supply pipe extending longitudinally within the conduit, and having a discharge end disposed at the discharge end of said conduit and provided with lateral discharge ports, means for rotating said pipe, and outstanding members on the pipe and rotating therewith in the path of the fuel issuing from the conduit to deflect the fuel.

4. The combination with a furnace, of a fuel conduit delivering thereinto, an air supply pipe extending longitudinally within the conduit, a rearwardly flared nozzle carried by the discharge end of said pipe and located at the discharge end of the conduit, said nozzle having a plurality of outstanding discharge nipples, and a shaft extending into the conduit and connected to the pipe for rotating the same.

5. The combination with a furnace, of a fuel conduit communicating therewith, a plurality of air supply pipes discharging at the end of the conduit and causing gyratory currents of air longitudinally of said conduit, and an air supply pipe extending longitudinally within the conduit and having an outwardly flared nozzle at its rear end,

said nozzle being located adjacent to the discharge end of the conduit.

6. The combination with a furnace, of a fuel conduit delivering longitudinally thereinto, a fan having a discharge, an air supply pipe connected to the discharge and having a plurality of branches wrapped about the conduit and having their discharge ends located at the discharge end of said conduit, another air supply pipe located longitudinally within the conduit, a nozzle carried by the end of the second air supply pipe and having a plurality of outwardly extending discharge nipples, and means for effecting the rotation of the second air supply pipe and the nozzle.

7. The combination with a furnace, of a fuel conduit delivering thereinto, means for creating gyratory currents of hot air around the discharge end of the conduit and within the furnace, and means for delivering jets of hot air laterally of the conduit at the discharge end thereof to drive the fuel delivered by said conduit outwardly into said gyratory currents.

8. The combination with a kiln, of a clinker-receiving pit located below the same, a fuel conduit delivering into the kiln, a fan having an intake communicating with the clinker pit, and discharge pipes leading from the fan, certain of said pipes creating gyratory currents of air within the kiln at the discharge end of the conduit, and another of said pipes producing jets of air laterally of the discharge end of the conduit to drive the fuel from said conduit outwardly into the gyratory currents.

9. The combination with a furnace, of a fuel conduit delivering thereinto, a fan having a discharge spout connected to the conduit for directing a current of air through said conduit, means for supplying fuel to the conduit between its discharge end and its point of connection with the spout of the fan, another fan, a discharge pipe connected to said fan and having branches wrapped about and supported on the discharge end of the conduit for delivering jets of air to spread the fuel, a continuously rotating device at the discharge end of the conduit to assist in the spreading of the fuel after it leaves the latter, and operating means for the rotary device.

10. The combination of a furnace, of a feeding device located centrally thereof at one end and constructed to deliver a combustible mixture into the furnace in a gyratory stream longitudinally of the furnace, and a second feeding device for discharging a combustible mixture longitudinally into the furnace in a relatively flat stream close to the surface of the material therein and intercepting the gyratory stream discharged by the first-mentioned feeding device to cause a commingling of the streams directly over the surface of the material in the furnace.

11. The combination with a furnace, separate fuel-discharging devices, a mechanism for supplying fluid through the devices for mingling with and carrying the fuel therethrough, air-delivering means arranged within one of the devices, an air-discharging means arranged outside and associated with each device, a common source of air connected with all the said means to mix air with the fuel after leaving the devices, and a controlling valve for each means.

12. The combination with a kiln, separate fuel-feeding devices arranged in one end of the kiln and disposed one above the other, the upper feeding device consisting of means for directing fuel and air longitudinally of the kiln in a gyratory stream, and the lower feeding device consisting of means for delivering a relatively broad flat stream of fuel and air longitudinally of the kiln in close proximity to the material therein and intercepting the stream delivered by the first device at a point in close proximity to such material.

13. The combination of a rotary kiln, a pair of stationary fuel-feeding devices arranged in the same end of the kiln and located respectively in line with the axis of the kiln and between such axis and the bottom, the axially arranged device comprising means for discharging fuel outwardly from the axis and in a gyratory stream, and the other device consisting of means for discharging fuel in a straight stream in a path to intercept the said gyratory stream at a point below the axis of the kiln.

14. The combination with a furnace, of a fuel-discharging conduit communicating therewith, a hollow conical deflector arranged in line with the conduit and tapering toward the latter for spreading the fuel, means for adjusting the deflector axially of the conduit, continuously operating means for rotating the deflector, and a plurality of members arranged on the conical face of the deflector and inclined away from the conduit with respect to the axis of the deflector.

15. The combination with a furnace, of a fuel-discharging conduit communicating therewith, a rotary hollow shaft disposed longitudinally of the conduit, a flaring deflector on the shaft and located beyond the discharge end of the conduit, means for adjusting the shaft longitudinally to vary the position of the deflector, means for connecting the shaft with a source of air under pressure, and a plurality of outstanding members on the conduit and having apertures for discharging air outwardly into the fuel delivered by the conduit.

16. The combination with a rotatable kiln body, of a head therefor, a clinker-receiving pit located below the body, an upper fuel

conduit delivering to the body through the head, a lower conduit in its discharge end substantially elliptical in cross section, means for feeding fuel to the conduits, a fan having a discharge connected to the conduits, another fan having an intake communicating with the clinker-receiving pit, a plurality of discharge pipes leading from the second fan, certain of said discharge pipes having branches coiled about the conduits and having discharge ends disposed at the discharge ends of said conduits, a rotatable pipe located longitudinally within the upper conduit and having a rearwardly enlarged nozzle at the discharge end, said nozzle being provided with a plurality of outstanding discharge nipples, and a shaft connected to the pipe for rotating the same.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ADOLF NEU.

Witnesses:
E. SCHAPER,
H. W. TRIPP.