June 24, 1958 H. SCHMITZ 2,840,144

COMBUSTION DEVICE FOR FUEL OILS

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Fig. 1

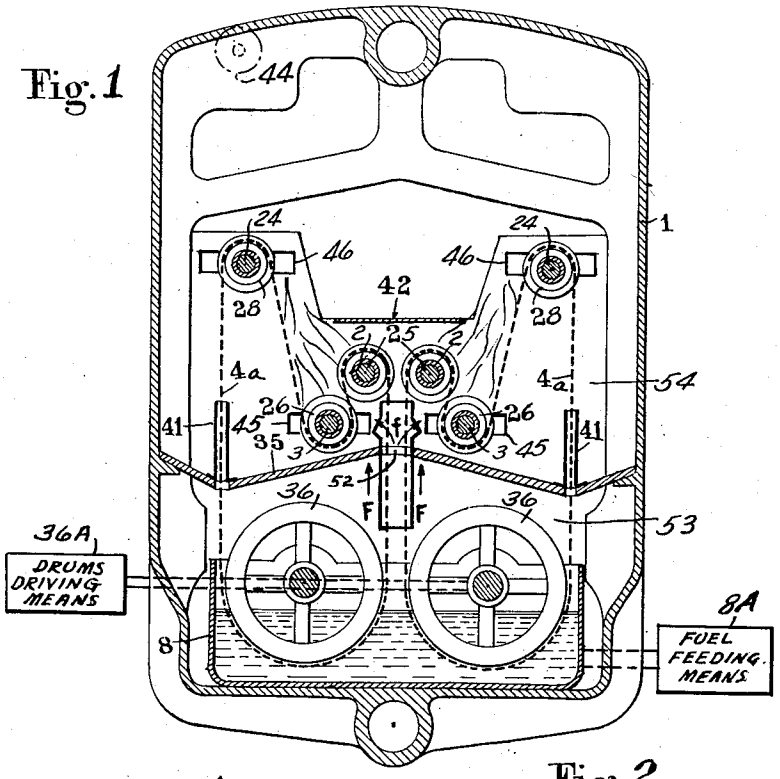


Fig. 4

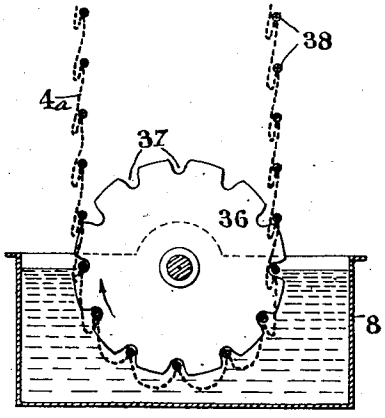


Fig. 2

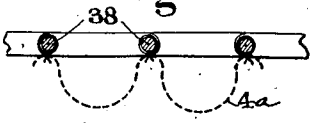
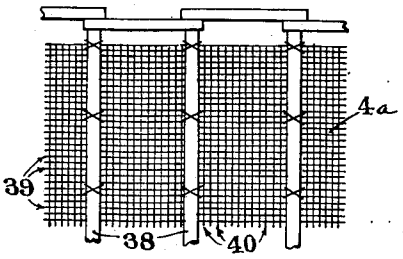


Fig. 3



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COMBUSTION DEVICE FOR FUEL OILS

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4 Claims. (Cl. 158—4)

This invention is concerned with a combustion device adapted to be fed with fuel-oils or the like, which is simple, economical, sturdy and characterized by a high degree of efficiency, while requiring neither blowing means nor atomizing means, and is furthermore adapted to be mounted at low cost on existing boilers or the like. With the present device, it is possible to use any fuels from the heaviest to the lightest oils, as well as engine crankcase oils, anthracene oils, having a flash-point higher than 60° C.

The device according to this invention consists essentially of the following principal components:

(1) A motor, possibly with a speed variator of the type either adapted to cause the motor velocity to be varied electrically, or to change mechanically the speed of the fuel-carrying member, as will be later explained.

(2) A toothed member in meshing engagement with chains secured to the fuel-carrying member.

(3) An incombustible fuel-carrying member, consisting for example:

(*a*) Of an endless plane lattice or mesh belt of incombustible material forming a yielding or chain-like structure in the longitudinal direction and rigid in the transverse direction, the links, of any desired and suitable shape, having dimensions varying according to the viscosity of the fuel employed; or alternately

(*b*) Of an endless belt consisting of a pair of lateral chains driven and interconnected by transverse bars of which the relative spacing is subordinate to the viscosity of the fuel employed and on which is secured, without being stretched, a mesh belt.

(4) A device for continuously feeding the fuel-carrying member and including a constant-level vat in which the fuel-carrying member is dipped and soaked as it is driven by the said driving members.

(5) Air inlet means and draught means in the combustion chambers.

(6) Open-work belt-carrying rollers permitting the passage therethrough of the oxygen required for the combustion which are constructed so as to avoid the extinction of the flame on the endless belt (for example spaced aligned disks mounted on a common shaft).

(7) Inclined planes positioned beneath the combustion chamber to enable any excess fuel to flow back to the aforesaid vat.

The fuel-laden endless belt enters the boiler along a rising path and then follows a downward, preferably oblique direction during the ignition and firing portion of its path through the boiler; then the endless belt may continue its movement in the combustion chamber along another rising portion as required for burning the whole fuel carried thereby, and finally it travels out of the boiler to the fuel-loading position.

The endless belt is soaked with fuel in the lower portion of the boiler: hereinafter called fuel feeding chamber. In this situation, the arrangement comprises two symmetrical belt systems positioned on either side of the vertical median plane of the boiler.

Preferably, the fuel-carrying member consists of a plane endless belt made either of links of any desired and suitable shape, for example square, rectangular, round, polygonal, etc. . . . or of a wire-netting whose links are hingedly interconnected in the longitudinal direction, for example a structure comprising yielding ropes or chains in the longitudinal direction and wires in the transverse direction.

The arrangement may also comprise a plurality of parallel endless belts.

Preferably, the air inlets to the boiler are kept to the minimum consistent with the combustion oxygen requirements.

The total useful surface of the firing endless belt is increased by providing notched driving drums, the belt being suspended freely between adjacent notches.

Other details and advantages of the invention will appear clearly as the following description proceeds with reference to the attached drawings forming part of the specification and showing diagrammatically by way of example a few forms of embodiment of the invention. In the drawings:

Figure 1 is a vertical transverse section showing a form of embodiment of the device of this invention used with a boiler.

Figures 2 and 3 are detail views showing in longitudinal section and in plan view respectively a fragment of an endless belt, and

Figure 4 is a diagrammatical view showing a modified belt construction and belt-driving means.

Referring to Fig. 1, there is shown a boiler **1** provided with a vat **8** in the lower zone thereof for which fuel may be supplied by any suitable means **8A** so as to maintain a predetermined minimum level therein. The vat is located in a fuel feeding chamber **53** and this chamber is separated from combustion chamber **54** by means of partitions **35**.

Mounted within the combustion chamber **54** on either side of the vertical median line of the boiler are transverse shafts **2**, **3** and **24** and on each shaft is mounted for free rotation, openwork rollers **25**, **26** and **28**, respectively and each set or group of rollers serves to guide an endless belt **4***a* driven by a drum **36** having its axle disposed horizontally in the fuel feeding chamber and parallel to the axes of the shafts carrying the respective rollers. The drums **36** may be driven by any suitable mechanical or electrical means such as shown at **36A**.

The direction of movement of each belt **4***a* is indicated by the arrow F and the return flight of each belt passes through a cooling duct **41** carried by the partition **35**. The shafts **2** and **3** are so disposed with respect to the shaft **24** that the belt follows an upward path as it enters the chamber **54**, then a first downward path having its lower portion inclined to the vertical of the upper portion of the path between the rollers **2** and **3**, then another upward path between the roller **3** and the shaft **24** and the downward path between the shafts **2** and **3** and the upward path between the shafts **3** and **24** constituting the combustion zone. The belt **4***a* passes downwardly from the shaft **24** through the duct **41** and about the drum **36** in the vat **8** of the feeding chamber **53**. The distance between the rollers **26** and **28** is such as to permit the complete combustion of the fuel entrained in the belt to avoid the formation of carbon deposits and this is achieved by mounting the shafts **3** and **24** in slots **45** and **46** respectively thereby enabling such shafts to be adjusted horizontally.

The distance between the ascending or fuel-soaked sides of the belts may be reduced to a minimum and baffle means **42** may be provided above the rollers **25** to assist in concentrating the flames towards the ascending sides of the belts and the boiler walls. It will be

noted that combustion air enters the chamber **54** through slots **52** formed in the partitions **35** and the air admitted in a known manner from the draft inlet of the boiler (not shown) follows a generally vertical path as indicated by the arrows F towards the baffle **42** with some of the air being directed toward that part of the belt between the rollers **25** and **26** as indicated by the arrows.

The hearth-forming area of the belt or belts **4*a*** may be increased by utilizing, as shown in Fig. 4, a driving drum **36** formed with peripheral notches or grooves **37** engaged by the transverse bars **38** of the endless belt **4*a*** shown in Figures 3 and 4; a wire-netting consisting for example of yielding longitudinal ropes **39** interwoven or interlaced with wires **40** (Fig. 3) may be secured through any adequate means on these bars **38** and the latter may engage the notches **37** with their end portions; moreover, the belt **4*a*** may hang freely between two adjacent bars, thereby increasing the heating surface (see Fig. 4).

It is evident that many modifications may be brought to the constructional details, proportions and dimensions of the device described hereinabove, according to the type of boiler to be equipped, without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. A combustion device for fuel oils comprising a boiler, means forming a fuel feeding chamber at the bottom of said boiler, means forming a combustion chamber in the upper part of said boiler, a fuel oil vat in said fuel feeding chamber, a means to supply fuel oil to said vat to at least a minimum level therein, at least one driving drum having a horizontal axis mounted in said vat with at least a part of the drum periphery beneath said minimum level, a partition separating said vat from said combustion chamber, at least one set of three guide rollers with horizontal and parallel axes mounted in said combustion chamber, the second roller of the set being located at a level lower than the first roller, the distance between the vertical planes passing through the horizontal and parallel axes of said first and second rollers being lower than the total amount of these roller radii, and the third roller being located at a higher level than the first roller, at least one endless incombustible mesh belt located within said boiler to constitute a carrier for said fuel oil and movable through said feeding and combustion chambers, said mesh belt passing about said drum to be driven and immersed into said vat under said minimum level and passing on said guide rollers within the combustion chamber so as to follow an upward path as it enters the combustion chamber, then a first downward path having its lower portion inclined to the vertical of the upper portion between said first and said second rollers, then another upward path between said second and said third rollers, said first downward and other upward paths constituting the combustion zone, then a second downward path towards said vat, slot-like apertures in said partition for permitting the passage of said belt therethrough, air-supply slots in said partition adjacent said first downward path of said belt, means for driving said drum, and baffle means in said combustion chamber for directing the flames onto the belt paths corresponding to said combustion zone.

2. A combustion device for fuel oils comprising a boiler, means forming a fuel feeding chamber at the bottom of said boiler, means forming a combustion chamber in the upper part of said boiler, a fuel oil vat in said fuel feeding chamber, a means to supply fuel oil to said vat to at least a minimum level therein, two driving drums with horizontal axes positioned on either side of the vertical median plane of the boiler and mounted in said vat with at least a part of each drum periphery being beneath said minimum level, a partition separating said vat from said combustion chamber, two sets of three guide rollers mounted in said combustion chamber and positioned on either side of the vertical median plane of the boiler, the roller axes in each set being horizontal and parallel, the second roller of each set being located at a lower level than the first roller, the distance between the vertical planes passing through the horizontal and parallel axes of said first and second rollers being lower than the total amount of the radii of these rollers, and the third roller of each set being located at a higher level than the first roller, two endless incombustible mesh belts located within said boiler, on either side of the vertical median plane of the boiler to constitute carriers for said fuel oil, each mesh belt passing about the drum located on the corresponding side of the vertical median plane of the boiler to be driven and immersed into said vat under said minimum level and passing about the three guide rollers set within the combustion chamber on the corresponding side of the vertical median plane of the boiler so as to follow an upward path as the belt enters the combustion chamber, then a first downward path having its lower portion inclined to the vertical of the upper portion between said first and said second rollers, then another upward path between said second and said third rollers, said first downward and other upward paths constituting the combustion zone, then a second downward path towards said vat, slot-like apertures in said partition for permitting the passage of said belts therethrough, air-supply slots in said partition adjacent said first downward path of each belt, means for driving said drums, and baffle means in said combustion chamber for directing the flames onto the belt paths corresponding to the combustion zones.

3. A combustion device for fuel oils comprising a boiler, means forming a fuel feeding chamber at the bottom of said boiler, means forming a combustion chamber in the upper part of said boiler, a fuel oil vat in said fuel feeding chamber, a means to supply fuel oil to said vat to at least a minimum level therein, at least one driving drum with a horizontal axis mounted in said vat with at least a part of the drum periphery being beneath said minimum level, said drum comprising flanges having formed in their marginal portions spaced notches, a partition separating said vat from said combustion chamber, at least one set of three guide rollers with horizontal and parallel axes mounted in said combustion chamber, the second roller being located at a lower level than the first roller, the distance between vertical planes passing through the horizontal and parallel axes of said first and second rollers being lower than the total amount of the radii of these rollers and the third roller being situated at a higher level than the first roller, at least one endless incombustible mesh belt located within said boiler to constitute a carrier for said fuel oil and movable through said feeding and combustion chambers, said endless mesh belt consisting of two lateral endless chains, rods bracing said chains and an endless incombustible wire-netting stretched on said rods, said rods being adapted to engage with their end portions said notches on the flanges of said drum, said mesh belt passing on said drum to be driven and immersed into said vat under said minimum level and passing on said guide rollers within said combustion chamber so as to follow an upward path as the belt enters the combustion chamber, then a first downward path having its lower portion inclined to the vertical of the upper portion between said first and said second rollers, then another upward path between said second and said third rollers, said first downward and other upward paths constituting the combustion zone, then a second downward path towards said vat, slot-like apertures in said partition for permitting the passage of said belt therethrough, air-supply slots in said partition adjacent said first downward path of said belt, means for driving said drum, and baffle means in said combustion chamber for directing the flames onto the belt paths corresponding to said combustion zone.

4. A combustion device for fuel oils comprising a boil-

er, means forming a fuel feeding chamber at the bottom of said boiler, means forming a combustion chamber in the upper part of said boiler, a fuel oil vat in said fuel feeding chamber, a means to supply fuel oil to said vat to at least a minimum level therein, two driving drums having each a horizontal axis positioned on either side of the vertical median plane of the boiler and mounted in said vat with at least a part of each drum periphery being below said minimum level, each drum comprising flanges having formed in their marginal portions spaced notches, a partition separating said vat from said combustion chamber, two sets of three guide rollers mounted in said combustion chamber and positioned on either side of the vertical median plane of the boiler, the axes of the rollers being horizontal and parallel in each set, the second roller of each set being located at a level lower than that of the first roller, the distance between the vertical planes passing through the horizontal and parallel axes of said first and second rollers being lower than the total amount of the radii of these rollers and the third roller of each set being located at a level higher than the first roller, two endless incombustible mesh belts located within said boiler, on either side of the vertical median plane of the latter to constitute carriers for said fuel oil and movable through said feeding and combustion chambers, each endless belt consisting of two lateral endless chains, rods bracing said chains and an endless incombustible wire-netting stretched on said rods, said rods being adapted to engage with their end portions said notches on the flanges

of said drums, each mesh belt passing on the drum situated on the corresponding side of the vertical median plane of the boiler to be driven and immersed into said vat under said minimum level and passing over the three guide rollers set within the combustion chamber on the corresponding side of the vertical median plane of the boiler so as to follow an upward path as the belt enters the combustion chamber, then a first downward path having its lower portion inclined to the vertical of the upper portion between said first and said second rollers, then another upward path between said second and said third rollers, said first downward and other upward paths constituting the combustion zone, then a second downward path towards said vat, slot-like apertures in said partition for permitting the passage of said belts therethrough, air-supply slots in said partition adjacent said first downward path of each belt, means for driving said drums, and baffle means in said combustion chamber for directing the flames onto the belt paths corresponding to the combustion zones.

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