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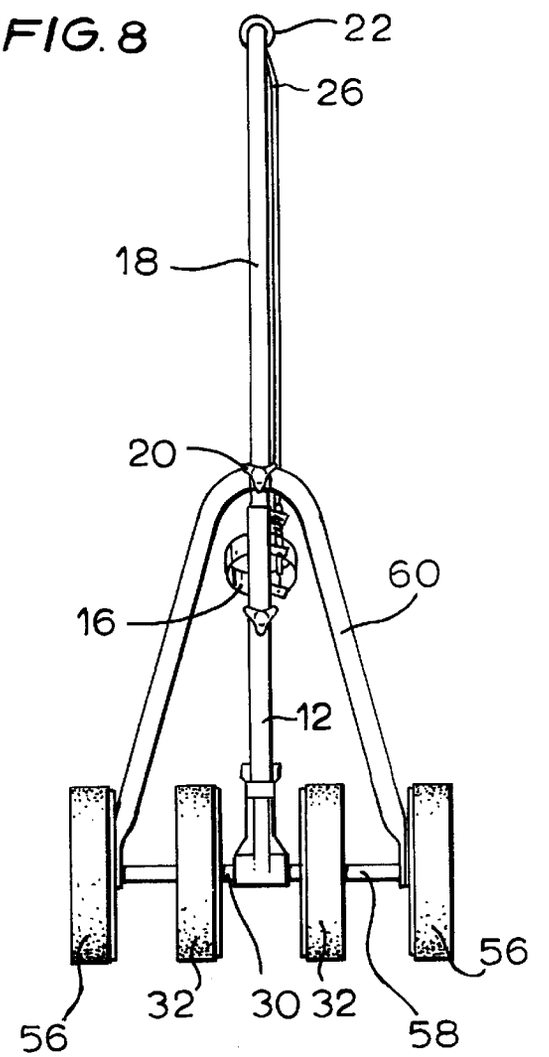
(54) Line marking applicators.

(57) A line marking applicator (10) comprising a frame (12) having an axle (30) on which is journalled a pair of surface contacting wheels (32) and a marker fluid aerosol mounting (14,16) positioned on the frame so that, when fitted with an aerosol (15), marker fluid can be sprayed between the wheels onto a surface, the width of the sprayed line being defined by, on each of said pair of wheels (32), an integral inner surface (40) extending continuously from the axle (30) to a rim (42) having a smaller diameter than that of the wheel rim (44) and which is axially inwardly offset from the wheel rim to provide a circumferential groove (46); preferably each wheel (32) is provided with a tyre (44), the diameter (D2) of which is greater than the diameter (D1) of the inner surface rim (42) and which is axially offset from the inner surface rim to form the peripheral groove (46).

FIG. 8



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This invention relates to wheeled applicators for line marking on surfaces such as roads, car parks, factory floors and playing areas including gymnasium floors, basket ball courts, artificially-turfed and naturally-turfed playing fields and the like. Our United Kingdom Patent Specification No. 1456411 A discloses such a line marking applicator to comprise a pressurised aerosol spray dispenser of marker fluid mounted to spray downwardly between the wheels of a two-wheeled carriage and pair of shields each co-axially mounted on the inner side of one of the carriage wheels; whereby a line of marker fluid can be deposited on a surface as the carriage is wheeled along, the two shields limiting sideways spraying of marker fluid.

United Kingdom Patent Specification No. 2111568 A also discloses separate rigid planar shield discs (3). United Kingdom Patent Specification No. 2101181 A discloses masking discs (41,42) having essentially cup-shaped inner surfaces which trap paint.

It is an object of the present application to provide a simpler, but at least as effective, line marking applicator.

According to the present invention, a line marking applicator comprises a frame having an axle on which is journalled a pair of surface contacting wheels and a marker fluid aerosol mounting positioned on the frame so that, when fitted with an aerosol, marker fluid can be sprayed between the wheels on to a surface, means being provided to define the width of the sprayed line; wherein said width defining means comprise, on each of said pair of wheels, an integral inner surface extending continuously from the axle to a rim of which has a smaller diameter than that of the wheel rim and which is axially inwardly offset from the wheel rim to provide a circumferential groove.

We have found that such a pair of wheels function equally effectively to define the width of a sprayed line as the two axially mounted shields of our above-mentioned patent. Moreover, by forming the inner "shield" as an integral part of the wheel and providing a circumferential groove; a simpler, equally effective and more economically produced applicator is obtained.

According to a preferred embodiment of the present invention, each wheel is provided with a tyre, the diameter of which is greater than the inner surface rim and which is axially offset from the inner surface rim.

In an embodiment, each wheel is a moulding having a generally cylindrical rim with an axial and radial extension forming said inner surface, the diameter of the wheel rim is less than the diameter of the inner surface rim and the radial thickness of the tyre is greater than the radial difference between the diameters of the inner and wheel rims. By this means choice of tyre thickness can set the difference in diameters; i.e. the clearance between the inner surface rim and the surface onto which marker fluid is to be sprayed. The axial position of the tyre on the wheel rim sets the circumferential groove.

In another embodiment of the present invention the axial width of the wheel is a significant fraction of the wheel diameter. Hitherto, all two-wheeled applicators have had quite narrow surface contacting wheels and are thus relatively unstable. The provision of wide wheels makes for an applicator that is more stable transversely of the direction of motion of the applicator over a surface; the wide wheels help to resist the applicator from rocking sideways.

In a further embodiment of the present invention each wheel has an axial cylindrical bore for an axle and removable means are provided to axially block part of said bore, whereby the wheel may be non-rotatably fixed to a non-cylindrical axle. For example and in known manner, the axle may be of D-section with a complimentary shaped blocking part so that, when a pair of such wheels are mounted on the common axle they will rotate one with the other and, should one wheel be lifted clear of the surface, it will continue to be rotated by the other wheel so as to maintain the width delimitation action.

The above and other features of the invention are illustrated by way of example, in the accompanying drawings wherein:-

Fig. 1	is a side elevation of a two-wheeled applicator in accordance with the present invention and showing an aerosol mounted to the applicator;
Fig. 2	is a front elevation of a surface contacting wheel for the applicator of Fig. 1;
Fig. 3	is a section on the line III-III of Fig. 2;
Fig. 4	is a detail illustrating a preferred tyre tread pattern;
Fig. 5	is an isometric detail showing a D-section removable insert for the hub of the wheel of Figs. 2 and 3;
Fig. 6	is an elevation of an applicator similar to the elevation of Fig. 1; but with the addition of two rear stabiliser wheels;
Figs. 7 and 8	are respectively rear and front elevations of the applicator of Fig. 6, but with the line marker aerosol omitted;
Fig. 9	is a rear elevation of a twin aerosol embodiment of the present invention; and,
Fig. 10	is a detail of an actuator mechanism for the twin aerosol embodiment of Fig. 9.

As shown by Fig. 1, an applicator 10 comprises a lower frame tube 12 having mounted proximate the bot-

tom thereof a stop bracket 14 to receive and locate the spray nozzle of an aerosol 15. The upper end of the lower frame tube 12 has a circular collar 16 to slidingly receive the base of an aerosol. A handle tube 18 is removably fitted to the lower frame tube 12 by a plug and socket joint 19 and is locked in place by a screw 20. The upper end of the handle tube 18 has a handle grip 22 and a Bowden cable handle lever 24 there beneath. A Bowden cable 26 extends from the handle lever 24 and is attached to the lower tube frame 12 in the vicinity of the aerosol mounting collar 16. An aerosol can actuating lever 28 is operatively and rotatably mounted to the Bowden cable such that upwards movement of the handle lever 24 towards the handle grip 22 causes the aerosol actuating lever 28 to be moved axially downwardly of lower frame tube 12, in much the same manner as bicycle brakes are operated. The actuating lever 28 is also rotatable about the Bowden cable so that it can be rotated away from the mounting collar 16 to permit an aerosol to be slid therein until the aerosol nozzle meets the stop bracket 14. The actuating lever 28 can then be rotated back to a central position against the base of the aerosol. Operation of handle lever 24 will cause the actuating lever 28 to move downwardly and will therefore force the aerosol nozzle against the stop bracket 14; opening the nozzle valve and permitting marker fluid to be sprayed downwardly.

A D-section axle 30 (shown in dotted line in Fig. 1) is mounted transversely of the bottom of the lower tube frame 12 on an extension mechanism. A pair of identical surface contacting wheels 32 is mounted on axle 30, one to each side of the lower tube 12. As more clearly shown by Figs. 2 and 3, each wheel 32 is a moulding having a central hub 34 with radially extending spokes 36 that meet a generally cylindrical rim portion 38. The wheel 32 has an integral, solid axial and radial extension 40, which has a generally radially planar surface and a rim 42; the diameter D1 of rim 42 is less than the diameter D2 of the wheel 32 and a tyre 44. In fact, the diameter of the wheel rim 38 is less than the diameter of the inner surface rim 42 but the radial thickness of tyre 44 mounted on the wheel rim is greater than the difference in diameters of the inner rim and wheel rim. By this means adjustment in tyre thickness can readily adjust the difference (D2 minus D1) between the overall wheel diameter and the inner rim diameter. This sets the rolling clearance between the inner surface rim 42 and the surface over which the applicator is to be rolled. The inner surface 40 is also inwardly axially offset from the wheel body so as to leave a circumferential groove 46. The small radial clearance between the inner surface rim 42 and the surface to be marked and the axial groove 46 serve to limit sideways spraying of marker fluid onto the surface so that a clean edged line is produced. Groove 46 provides a trap to prevent marker fluid from migrating onto the tyre surface.

The tyre may be provided with any tread pattern, such as that indicated in Fig. 4 as a series of distinct frusto-pyramidical projections 48.

Hub 34 is provided with a knock-out plug 50 which is shown in more detail in Fig. 5 to be of generally top-hat shape with an external key 51 and a D-section axial bore 52, so that, when mounted as a push fit in the key-slotted axial bore of hub 34 and on the D-section axle 30, that is rotatably journalled in the lower frame member 12; positive drive can be provided from one of the pair of wheels to the other of the pair of wheels. This permits both wheels to continue to rotate even if one wheel should leave contact with the marking surface.

The axle 30 is mounted in an assembly 54 that is longitudinally movable within the lower tube member 12 between an upper and a lower position and has camming surfaces whereby, in known manner, the axial separation between the two wheels may be adjusted so that the width of the sprayed line can be varied as the distance between the nozzle and the sprayed surface is correspondingly adjusted.

As shown by Figs. 6, 7 and 8, a pair of stabiliser wheels 56, individually rotatable on a plane axle 58 that spans the ends of an inverted, generally U-section, sub-frame 60, can be attached to the applicator. The sub-frame 60 has a mounting ring 62 that fits over the plug 19 of lower frame member 12 and is locked in place by upper handle member 18 and locking screw 20. The stabiliser wheels 56 are the same as the pair of surface contacting, line width defining wheels 32 with the exception that axial plug 50 has been removed, to leave the plane, cylindrical axial bore which enables each wheel to freely rotate on either a D-section axle or a cylindrical section axle. This freedom to rotate for each wheel permits of differential wheel rotation when the applicator turns a corner and the removable plug 50 enables the same wheel to be used as either surface contacting, width delimiting wheel or a stabiliser wheel.

As can be seen the width of the wheel 32 is a relatively large fraction of its diameter D2, as opposed, for example, to the wheels shown in aforesaid Patent Specification 1456411, which are narrow and the norm for line marking applicators. These wide wheels add to the lateral stability, especially of the two-wheeled embodiment of the applicator. It is not, of course, possible to improve lateral stability by increasing the separation of the two wheels as these have to limit the width of the sprayed line.

Figs. 9 and 10 show a twin aerosol embodiment of the present invention. The single aerosol embodiment of the previous figures is adjustable to spray 2" or 3" wide lines whereas the twin aerosol embodiment can spray 4" wide lines; adjustable up to 5" if fitted with an adjustable axle assembly similar to assembly 54 of the single aerosol embodiment.

As can be seen, the lower frame tube 12 has a double, V-shaped stop bracket 64 mounted thereon, each arm of the bracket receiving and locating the spray nozzle of one of two aerosols (not shown). The upper end of the lower frame tube has a pair of circular collars 66 each positioned to receive one of a pair of aerosols so that the spray axes of the two aerosols converge.

An aerosol can actuating lever 68 is operatively and rotatably mounted to the Bowden cable 26. As is most clearly shown by Fig. 10, the actuating lever 68 comprises an inverted V-shaped actuator 90 and a central handle 92. In its central position, each arm of the actuator overlies one of the collars 66, the whole assembly can be rotated in either direction, as shown in dotted line, with respect to the Bowden cable so that either of the actuator arms can rotate clear of its respective collar to allow insertion or removal of an aerosol.

Claims

1. A line marking applicator (10) comprising a frame (12) having an axle (30) on which is journalled a pair of surface contacting wheels (32) and a marker fluid aerosol mounting (14,16) positioned on the frame so that, when fitted with an aerosol (15), marker fluid can be sprayed between the wheels onto a surface, means being provided to define the width of the sprayed line characterised in that said width defining means comprise, on each of said pair of wheels (32), an integral inner surface (40) extending continuously from the axle (30) to a rim (42) having a smaller diameter than that of the wheel rim (44) and which is axially inwardly offset from the wheel rim to provide a circumferential groove (46).

2. An applicator as claimed in claim 1 and further characterised in that each wheel (32) is provided with a tyre (44), the diameter (D2) of which is greater than the diameter (D1) of the inner surface rim (42) and which is axially offset from the inner surface rim to form the peripheral groove (46).

3. An applicator as claimed in claim 2 and further characterised in that in each wheel (32) is a moulding having a generally cylindrical rim (38) with an axial and radial extension (40) forming said inner surface, the diameter of the wheel rim is less than the diameter (D1) of the inner surface rim (42) and the radial thickness (D2 - D1) of the tyre (44) is greater than the difference in diameters between the inner and wheel rims.

4. An applicator as claimed in any of claims 1 to 3 and further characterised in that the axial width of the wheel (32) is a significant fraction of the wheel diameter (D1).

5. An applicator as claimed in any of claims 1 to 4, and further characterised in that each wheel (32) has an axial cylindrical bore for the axle (30) and removable means (50) are provided to radially block part of said bore, whereby the wheel may be non-rotatably fixed to a non-cylindrical axle.

6. An applicator as claimed in any of claims 1 to 5 and further characterised in that a pair of stabiliser wheels (56) mounted on a sub-frame (60) are attachable to the line marking applicator frame (12).

7. An applicator as claimed in claims 5 and 6 and further characterised in that said radially blocking parts (50) are removed from each of said pair of stabiliser wheels {58) to enable each said stabiliser wheel to be individually rotatable on a sub-frame axle (58).

8. An applicator as claimed in any of claims 1 to 7 and further characterised in that a stop bracket (14) is mounted on the frame (12) proximate said pair of surface contacting wheels (32) in use to receive and locate the spray nozzle of an aerosol (15), the frame has a collar (16) to slidingly receive the base of the aerosol and an actuator (28) is provided to move the aerosol downwards of the frame to force the spray nozzle against the bracket and open the nozzle valve; the actuator being rotatable with respect to the collar to permit insertion and removal of the aerosol.

9. An applicator as claimed in any of claims 1 to 7 and further characterised in that mountings (64,66) for a pair of marker fluid aerosols are provided.

10. An applicator as claimed in claim 8 and claim 9 and further characterised in that the stop bracket (64) is mounted to, in use, separately receive and locate two spray nozzles, the frame (12) has two collars (66) each to slidingly receive one of a pair of aerosols so that the spray axes of the aerosols converge and a

single actuator (90) is provided to move both aerosols downwards and to be rotatable with respect to both collars to permit separate insertion and removal of each aerosol.

11. A wheel (32) for a line marking applicator (10) as claimed in any of claims 1, 2, 3, 4 or 5.

FIG. 1

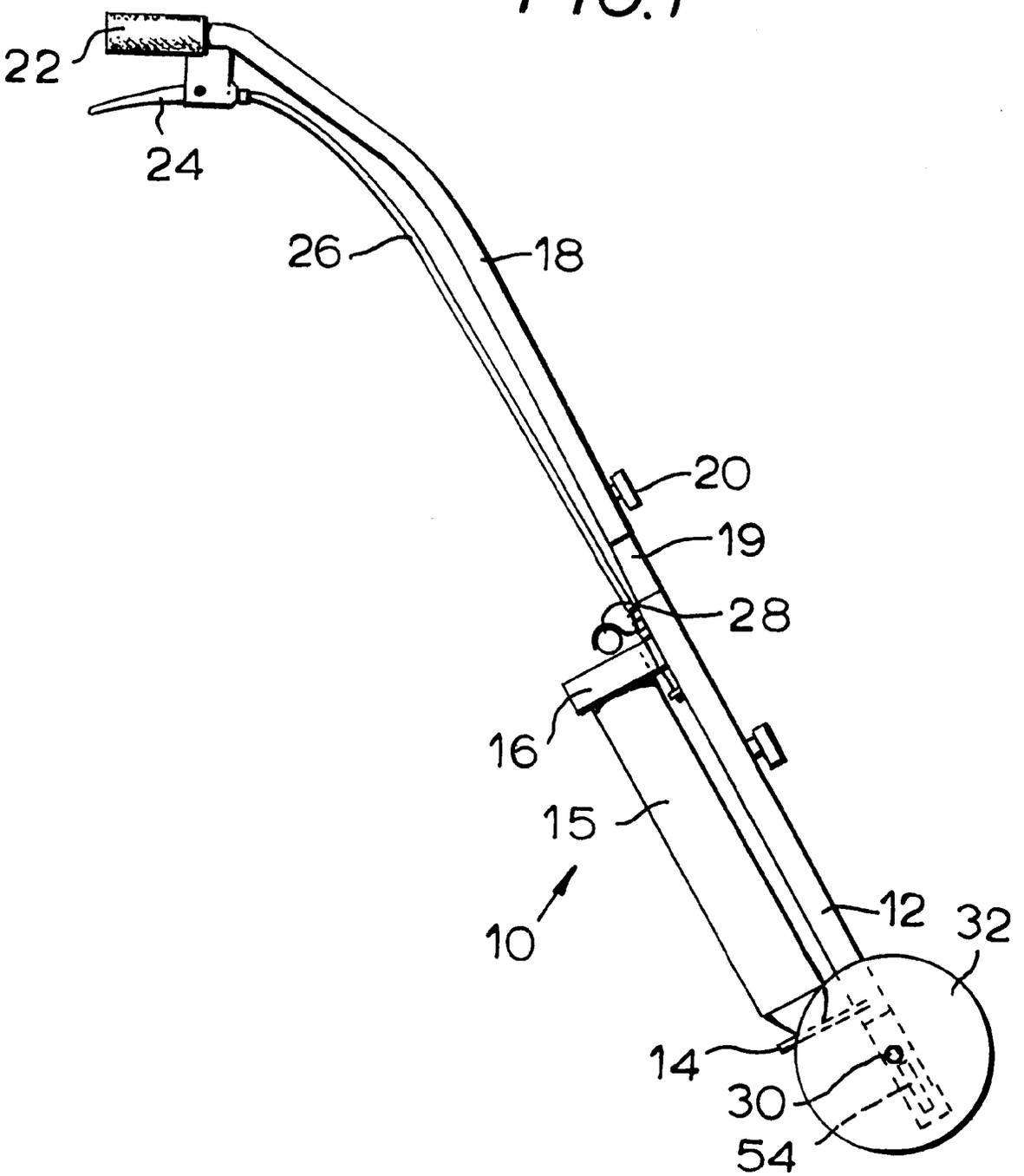


FIG. 3

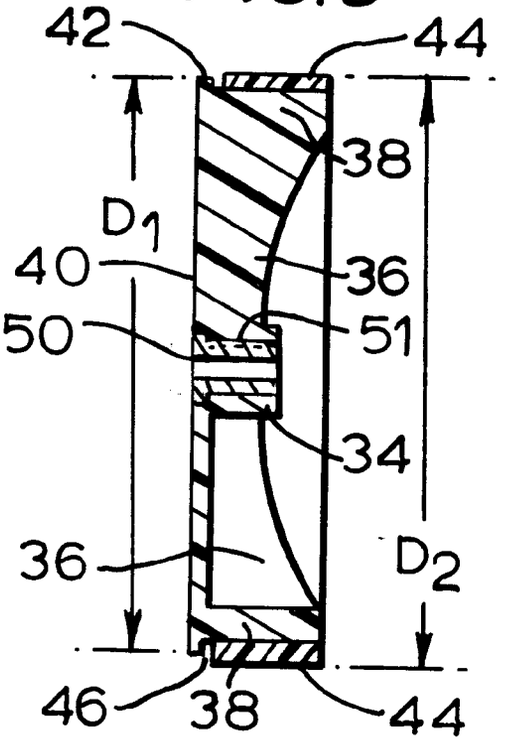


FIG. 2

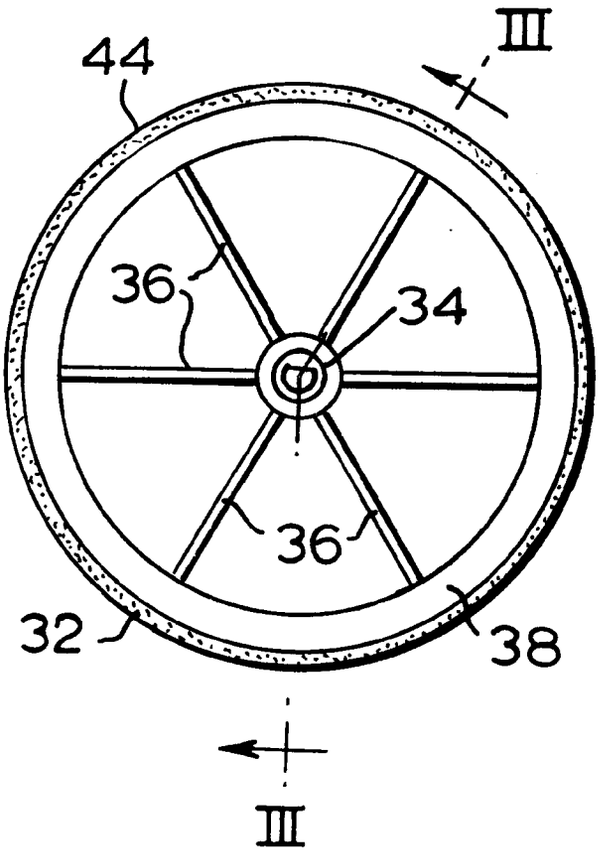
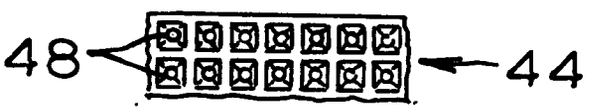


FIG. 4



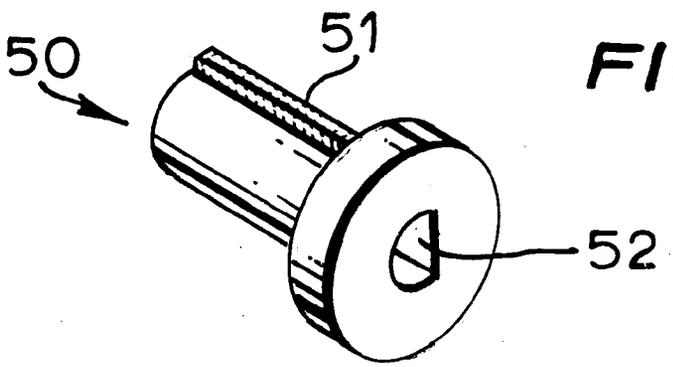


FIG. 5

FIG.6

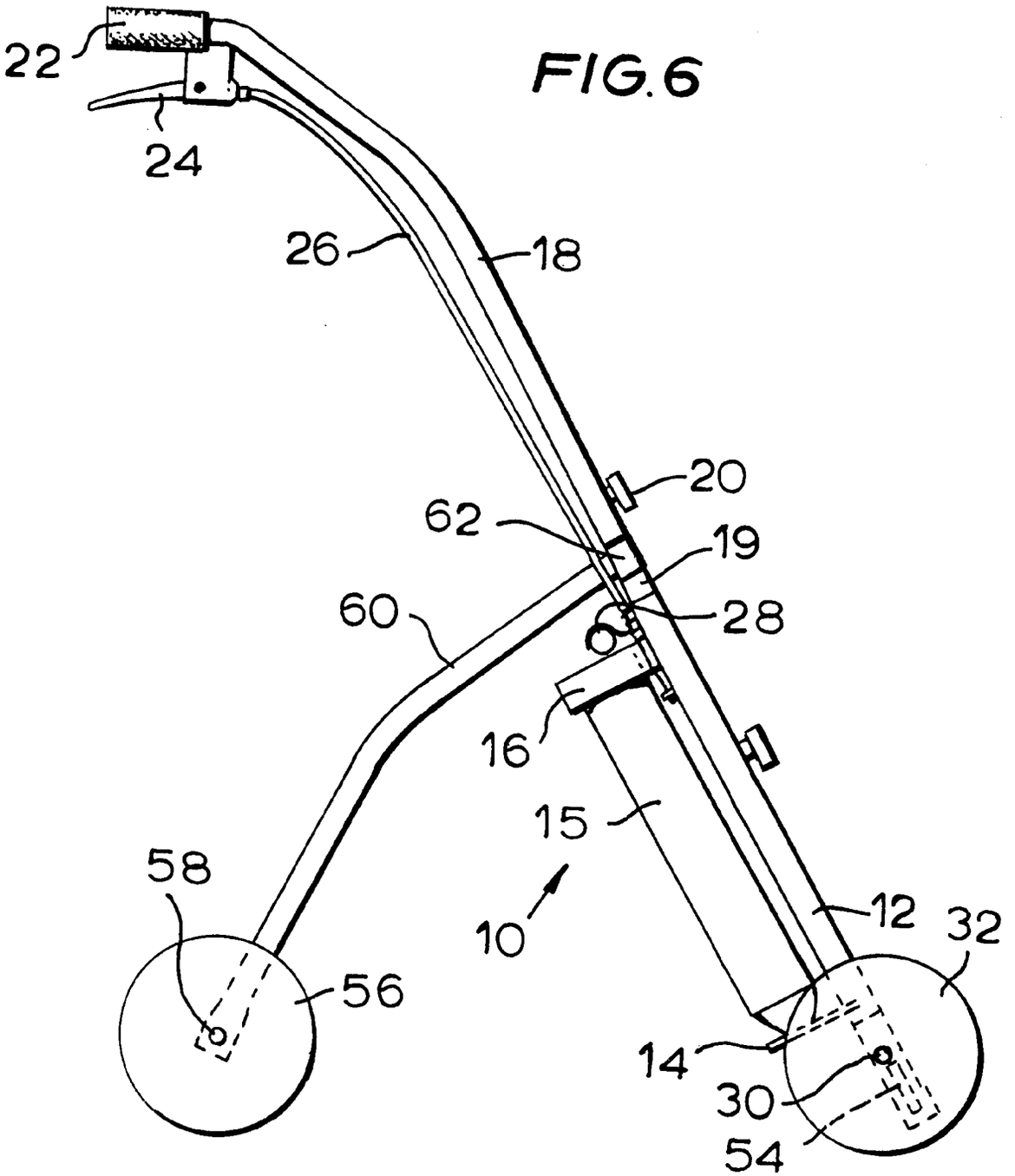


FIG. 7

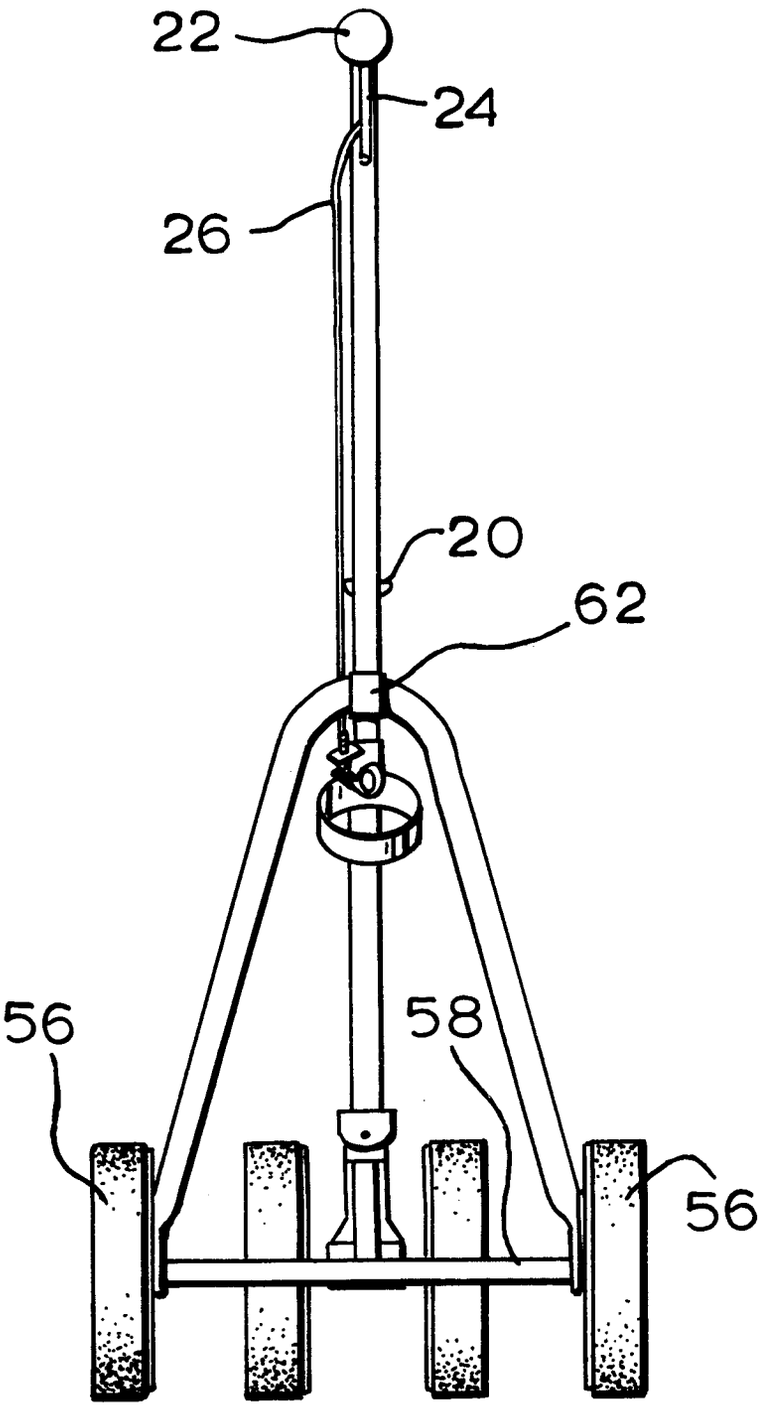


FIG. 8

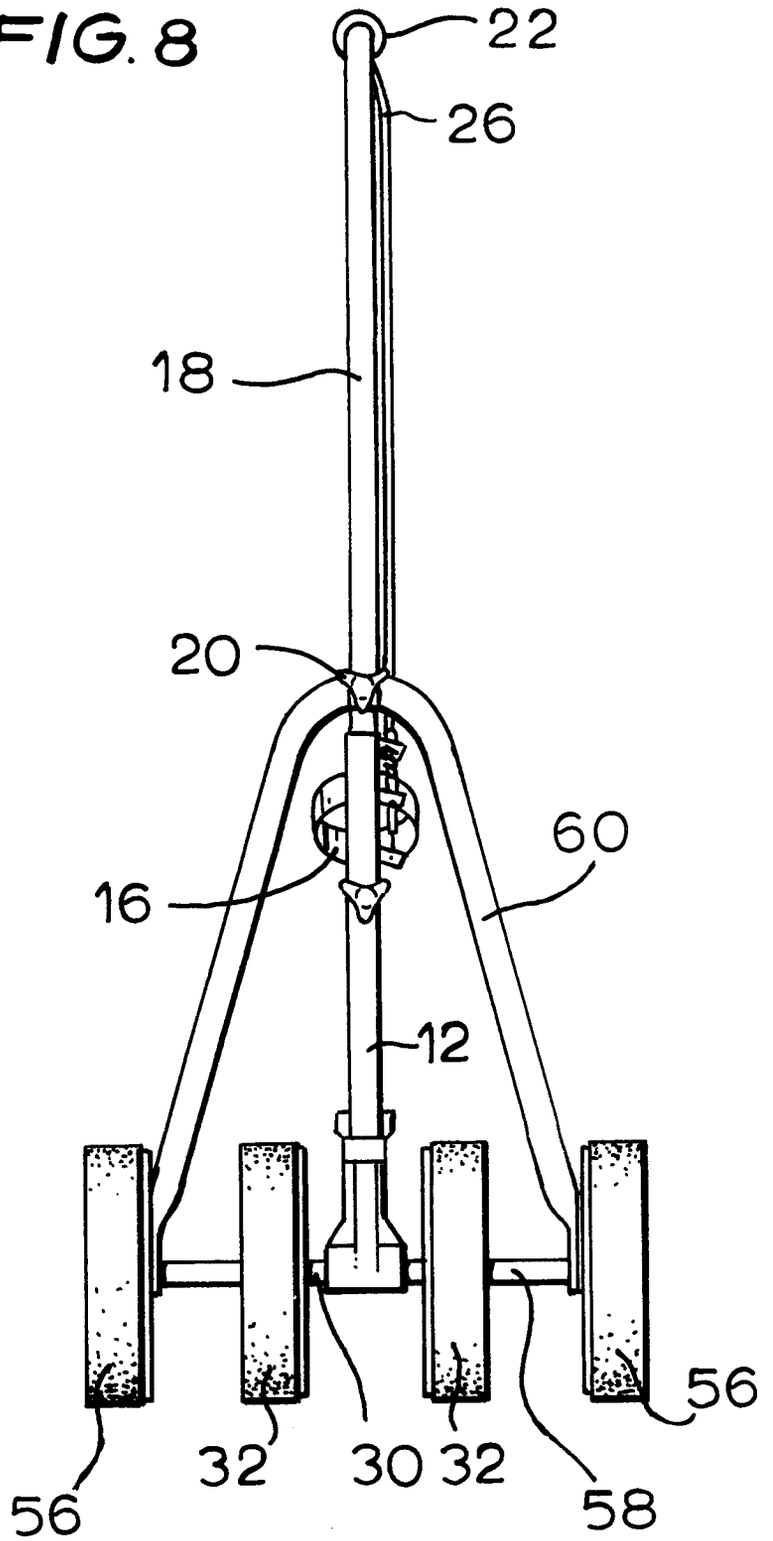


FIG. 9

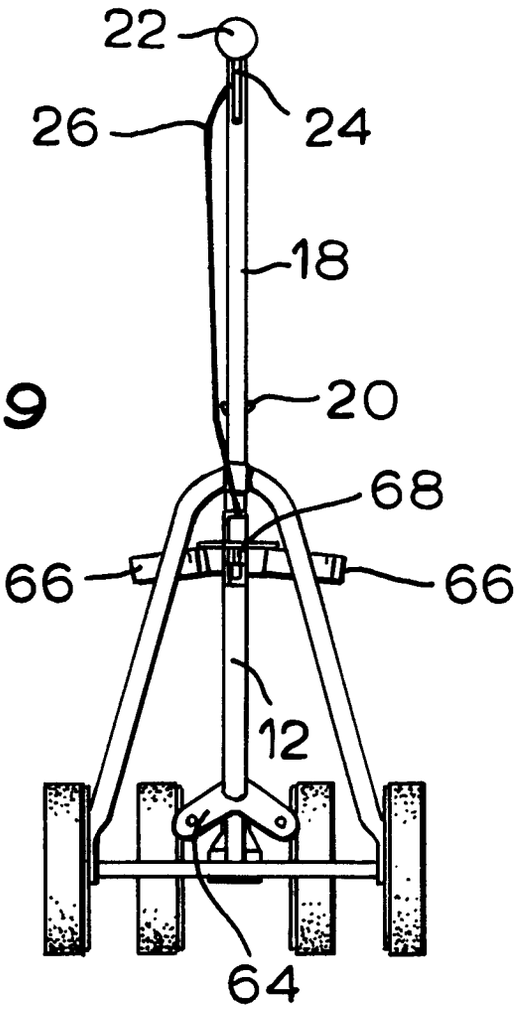


FIG. 10