

June 18, 1957

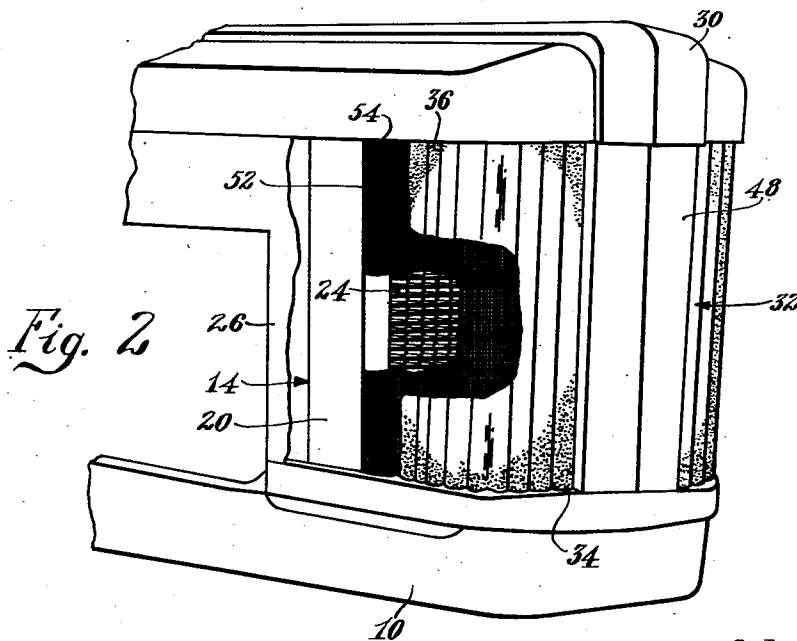
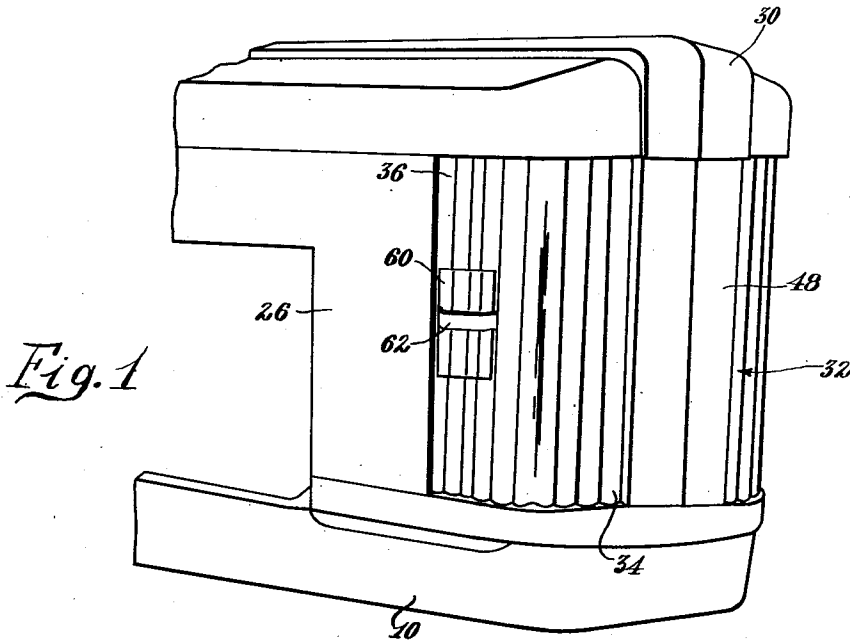
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2,796,141

RADIATOR SCREEN AND GRILLE ASSEMBLY

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3 Sheets-Sheet 1



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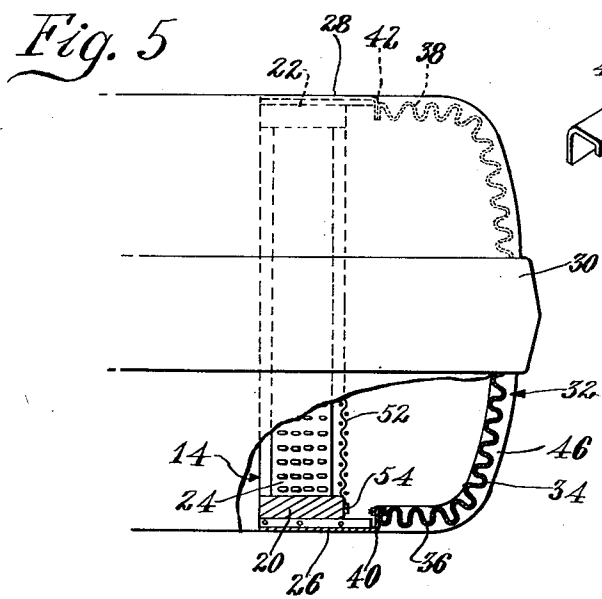
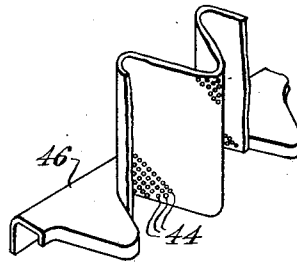
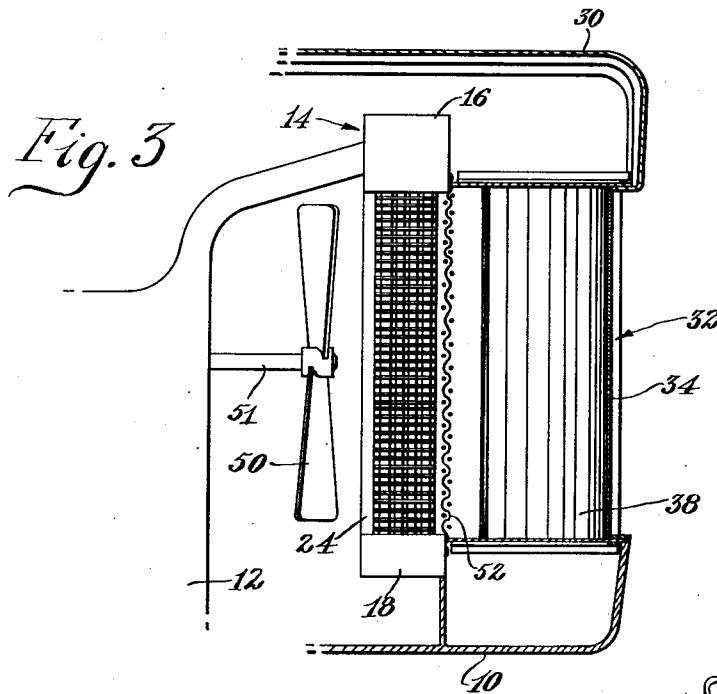
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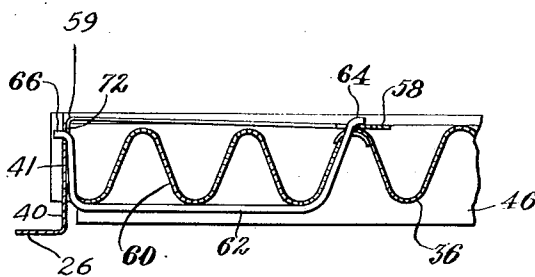
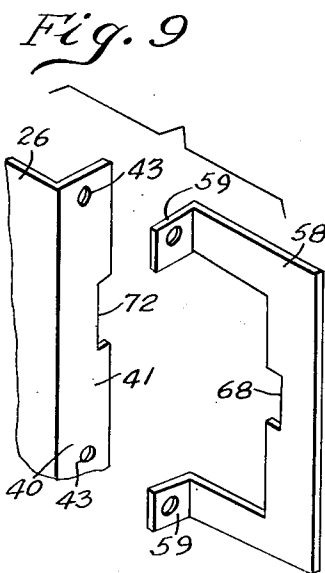
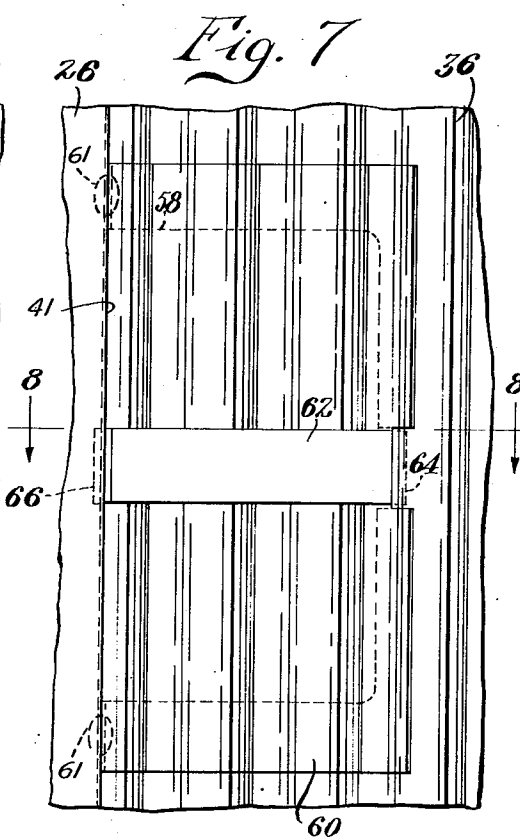
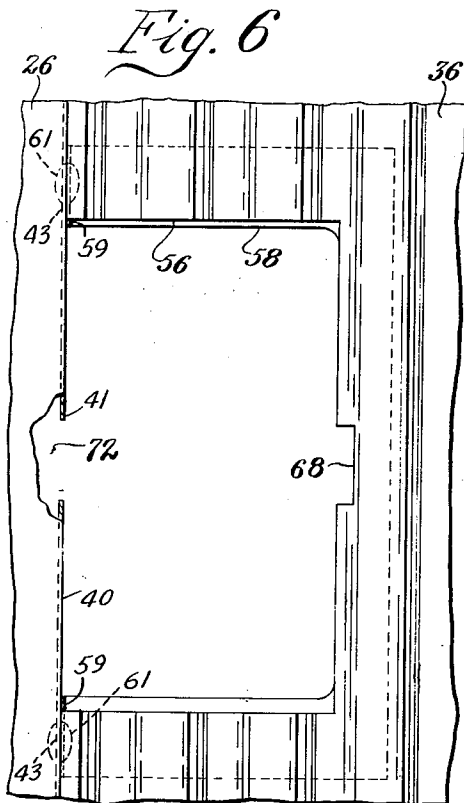
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RADIATOR SCREEN AND GRILLE ASSEMBLY

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1

2,796,141

RADIATOR SCREEN AND GRILLE ASSEMBLY

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Application July 14, 1954, Serial No. 443,200

2 Claims. (Cl. 180—68)

This invention relates to means for cleaning air that is used for cooling the radiator of an internal combustion engine and more particularly to a system of the general character referred to as used in the agricultural field wherein the cooling air is subjected to an extremely high degree of contamination by dust, chaff, corn silks, etc.

It is, of course, conventional practice in both the general automotive field as well as in the agricultural field to utilize some form of grille or screen means for filtering out air-borne particles before the air is drawn through the radiator core of the type conventionally used with internal combustion engines. In normal conditions, such as in passenger automobiles, etc., the degree of contamination of the air by foreign particles is very low, having due regard to the presence of small particles such as dust, which can be drawn through the radiator core without interference with the cooling system, because the dust particles are so small that they pass straight through the core without clogging. In those instances, clogging occurs only by the rather infrequent occurrence of leaves, for example, and by the more frequent occurrence of insects, but these accumulate at such a low rate that they may be periodically removed at rather infrequent intervals without serious effect on the efficiency of the cooling system.

However, in the agricultural field, the air is literally saturated with foreign particles in addition to dust, etc., and these particles are frequently of such size and other characteristics as to adhere either to the grille or to pass through the grille and adhere to and clog the radiator core. Of course, the larger particles that are intercepted by the grille may be brushed off from time to time but the smaller particles that pass through the grille and clog the radiator core are removed only at the expense of somewhat arduous labor.

According to the present invention, an improvement is provided, as in a conventional tractor equipped with a radiator and a frontal grille or primary screen ahead of the radiator, in the form of a secondary screen that lies across and in relatively close proximity to the front face of the core of the radiator. It has been found through actual operation of a vehicle equipped as just described that particles such as corn silk and the like that find their way through the perforations in the grille either accumulate on the secondary screen or straighten out parallel to the path of air flow and find their way through the core, as distinguished from operation of a vehicle without the secondary screen in which such corn silks in some manner turn transverse to the path of air flow and therefore collect and accumulate on and in the radiator core. In such instances, it is difficult to clean the core from the front face thereof, because the fins of the core provide a relatively rough surface that is more conducive to accumulation of foreign particles than it is to being cleaned, thereby necessitating cleaning of the core by air or water pressure applied at the rear face thereof. With the use of the secondary screen, a substantially smoother

2

surface is afforded and even though particles may tend to accumulate thereon, these particles may more readily be brushed off than is the case without the screen. As a further feature of the invention the frontal grille, which encloses the radiator from the front and from opposite sides, has an access opening therein which carries a removable cover so that the user may, after removing the cover, reach through the opening and easily brush off the accumulated particles.

The invention has for another object the provision of an inexpensive secondary screen usable in combination with conventional radiator and grille structure with a minimum of modification and expense.

The foregoing and other important objects and desirable features inherent in and encompassed by the invention will become apparent as a preferred embodiment of the invention is disclosed in detail in the following specification and accompanying sheets of drawings, the several figures of which will be described immediately below.

Fig. 1 is a front perspective view of the radiator grille structure of the representative vehicle.

Fig. 2 is a view similar to Fig. 1 but having a portion thereof broken away to expose the inner screen and to further expose a portion of the radiator core behind the inner screen.

Fig. 3 is a longitudinal sectional view through the structure shown in Figs. 1 and 2.

Fig. 4 is an enlarged fragmentary perspective view showing the configuration of the grille structure.

Fig. 5 is a plan view of the structure shown in Fig. 1, with a corner portion thereof broken away to show the relationship between the component parts.

Fig. 6 is a fragmentary elevational view, on an enlarged scale, showing that portion of the side of the grille in which the access opening is provided.

Fig. 7 shows the same structure with the closure member in place in the access opening.

Fig. 8 is a sectional view as seen along the line 8—8 of Fig. 7.

Fig. 9 is an exploded view illustrating the relationship between a side panel and a U-shaped frame element of the frontal screen.

The structure illustrated in Figs. 1, 2, 3, and 5 represents the forward portion of a well known agricultural tractor. The numeral 10 designates fore-and-aft extending supporting structure such as the frame or lower front body part of a tractor. This supporting structure includes an internal combustion engine, represented generally by the numeral 12, ahead of which is a conventional radiator 14. This radiator is upright and transverse to the fore-and-aft extent of the supporting structure 10 and has a top 16, a bottom 18, and right- and left-hand opposite sides 20 and 22. The expressions "right-hand" and "left-hand" are used with reference to the parts of the machine as seen by an observer standing behind the machine and looking forwardly. As is customary, the radiator 14 includes a radiator core, designated in its entirety by the numeral 24.

The engine is enclosed by the usual hood, a forward portion of which appears as opposite side panels 26 and 28 and an upper or bonnet portion 30. The top 30 of the hood extends forwardly ahead of the radiator 14 and is in vertically spaced alinement with a forward portion of the body 10 (Fig. 3). These forward portions of the body and hood carry therebetween a frontal grille 32 that is, in general cross section, of U shape, as viewed from above, having a transverse upright frontal portion 34 and right- and left-hand fore-and-aft extending upright side portions 36 and 38. The side portions are joined respectively to the flanged upright edges of the hood side panels 26 and 28, as at 40 and 42, respectively.

As best seen in Fig. 3, the frontal grille portion 34 is

spaced appreciably ahead of the front face of the radiator core 24 and the grille side portions 36 and 38 encircle the forward portion of the hood and supporting structure and thus enclose the radiator from the front, with the exception that the grille comprises a primary screen and is therefore perforated throughout, having several perforations 44, as best shown in Fig. 4. As also shown in that figure, the grille throughout is vertically corrugated not only to impart to the grille considerably more vertical rigidity than would otherwise be obtained but to increase the general area throughout which the perforations 44 may exist, a design which per se forms the subject matter of the U. S. patent to Dreyfuss 2,542,238. As disclosed in that patent, the vertical corrugations permit the bridging across the grille of relatively large fragments of stalks, etc., which bridging fragments do not interfere with the air flow through the grille, since they leave uncovered the perforations 44 in the "valley" portions of the corrugations. Smaller fragments that may accumulate in the valley do so without covering the "peaks" of the corrugations. The arrangement is such that the accumulations may be readily removed by the operator who does so merely by running his fingers down the corrugations.

The corrugated grille 32 may be mounted at its upper and lower ends to the forward extensions of the hood 30 and body structure 10 by means of a sinuously flanged support, such as that shown at 46 in Fig. 4, which details are immaterial except as an expression of how the grille is constructed and mounted.

As perhaps requiring some explanation is the presence of a vertical element 48 that divides the grille into right- and left-hand halves. This element is, in the particular tractor structure illustrated, part of a supporting casting for mounting implements and for other purposes but which as a practical matter may be ignored here.

To the extent described, the structure may be considered conventional and its conventional characteristics include means in the form of a rotary engine fan 50 mounted on a fore-and-aft extending axis, as by a shaft 51, just ahead of the engine 12 and just behind the rear face of the radiator core 24. The fan operates, of course, to draw air through the core 24 via the grille 32. The grille operates, as described generally above, to screen out certain airborne particles so that theoretically acceptably clean air is drawn through the core 24. However, in actual practice, it is found that relatively fine, elongated particles, such as corn silks, that do not accumulate crosswise in the corrugations in the grille 32 "worm" their way through the grille and travel toward the core 24. For some reason, probably because of turbulence in the space between the grille 32 and the front face of the core 24, these corn silks occupy positions transverse to rather than parallel with the line of air flow and consequently fail to pass through the core, ultimately accumulating on the core to such extent as to require shut-down of the engine in order to avoid dangerous overheating. Moreover, removal of the accumulated corn silks from the core is difficult because even though access may be provided through the grille 32, as by removal thereof, the corn silks are so "hair-pinned" about the tubes and fins of the core as to require removal thereof only by air or water pressure applied at the rear face of the core.

As already indicated, the present invention eliminates this difficulty by the provision of a secondary screen 52. In a preferred form of the invention, this screen may be a square section of ordinary household screen that is secured to the front face of the radiator as by cap screws 54. As best seen in Figs. 3 and 5, the position of the screen is such that it is relatively closely spaced ahead of the core 24. Experience in actual operation with a vehicle equipped with the combination of the grille 32 and screen 52 has demonstrated the accrual of at least two major advantages. In the first place, corn silks that accumulate crosswise of and on the screen may be readily removed therefrom by brushing the corn silks off of the front face

of the screen, as distinguished from the application of air or water pressure from behind the screen. In the second place, it is found that corn silks that tend to "hair-pin" on the crossed wires of the screen will ultimately straighten out and because of the close proximity of the screen to the core will, while thus straightened out and lying parallel to the air flow, pass directly through the core without further clogging or "hair-pinning." In brief, the screen either intercepts clogging material in such manner that the material may be easily removed or permits the passage of such material therethrough as well as through the core, in either case materially increasing the efficiency of the cleaning system.

One thing that must be recognized in the operation of internal combustion engines in the agricultural field is that clogging is bound to occur to some extent in even the best conditions. However, clogging in the present case is limited to the screen 52 and one of the features of this invention is to provide means making it easy to periodically clean this screen. For this purpose, the right-hand side portion 36 of the grille 32 is formed with an access opening 56, here of rectangular shape as best shown in Fig. 6, one side of the opening being defined by the front flange 40 of the panel 26, as at 41. Because of the vertical corrugations in the grille, the grille has considerable vertical rigidity but at the same time has a recognizable amount of fore-and-aft flexibility. Because the grille 32 may be considered as being weakened by the provision of the opening 56, reinforcement is achieved by the use of a rectangular structure afforded by a U-shaped frame 58 rigidly secured, as by welding, to the inner surface of the grille side portion 36 so that the opening is bordered on three sides by the frame 58 and on its fourth side by the included panel portion 41 of the flange 40, the elements 58 and 41 thus making up a frame surrounding the opening. The frame 58, as best shown in Fig. 9, has apertured ears 59 for affixation by suitable fasteners 61 to apertured portions 43 of the panel flange portion 41. The portion of the grille removed to provide the opening 56—or some comparable portion—may be used to afford a closure member or cover 60, which thus has corrugations and perforations comparable to those originally provided in the grille. The closure member will likewise have considerable strength in a vertical direction but also has flexibility in a fore-and-aft direction. However, the member 60 is rigidified in a fore-and-aft direction by the provision of a clip 62 which has front and rear end elements 64 and 66 that serve as releasable means engageable with the frame 56 to mount the cover or closure member 60 removably in place during normal operation of the vehicle. As best shown in Figs. 6 and 8, the frame 58 has in a forward portion thereof a notch 68 in fore-and-aft alinement with an opening or notch 72 in the panel flange portion 41. The notch 68 and opening 72 respectively receive the end elements 64 and 66 of the clip 62. The clip 62, although considerably more rigid than the flexible closure member 60, is sufficiently flexible to permit fore-and-aft compression thereof so that the elements 64 and 66 may be respectively withdrawn from the notch 68 and opening 72, whereby the closure member may be easily removed and installed.

As will be seen, the construction achieved by the present invention is of simple and inexpensive design and may be readily used to convert conventional vehicle radiator grille structure such as that shown in the Dreyfuss patent, as well as lending itself to original equipment for installation on agricultural tractors that are used quite frequently in conditions in which corn silks and the like are apt to be encountered. The access opening enables the operator to clean the screen 52 and the arrangement thereof is so convenient as to impose no particular burden on the user.

Various other features of the invention not categorically enumerated will undoubtedly occur to those versed in the art, as will many modifications and alterations in

5

the preferred embodiment of the invention disclosed, all of which may be achieved without departing from the spirit and scope of the invention.

What is claimed is:

1. In combination: fore-and-aft extending supporting structure; an upright radiator mounted on the supporting structure and having a top, a bottom and opposite sides and including a core; means on the supporting structure behind the radiator for drawing air through the core from front to rear; a radiator-protecting grille carried by the supporting structure and having opposite upright side portions extending forwardly respectively from the sides of the radiator and an upright transverse portion cross-connecting the side portions and spaced appreciably ahead of the radiator core, said transverse portion being corrugated to afford alternate peaks and valleys transverse to the air flow and said peaks and valleys having perforations therein substantially throughout their extent, said perforations being of such relatively small size to admit relatively fine airborne particles of string-like nature and the peaks serving to cause airborne particles of leaf-like and similar nature to bridge across said peaks and the valleys enabling the string-like particles to aline themselves with the air flow and pass through the perforations and subsequently to turn transverse to the air flow behind the grille; and a transverse secondary screen mounted behind the transverse grille portion and closely ahead of the radiator core to intercept certain of the string-like particles, the perforations in said second screen being relatively small and the frontal surface of said secondary screen being relatively smooth so that string-like particles hairpinning thereon will be ultimately straightened by the air flow so as to slip through said secondary screen, and the spacing of said secondary screen ahead of the core being such that the straightened string-like particles remain straight and pass immediately through the core.

6

2. A radiator protecting grille of the character described, comprising: an upright fore-and-aft extending side portion and an upright transverse portion joined thereto, said side portion having vertical corrugations therein and also having an access opening therethrough, said vertical corrugations affording vertical rigidity but fore-and-aft flexibility to said side portion; an internal frame carried by the side portion and surrounding the opening to reenforce said side portion against said fore-and-aft flexibility; a closure member of a size to fit the opening and mountable on and dismountable from said side portion externally thereof, said closure member having corrugations therein comparable to and matching those of the side portion; said closure member because of said corrugations having fore-and-aft flexibility; and releasable means on said closure member including fore-and-aft spaced apart frame-engaging elements biased apart by the flexibility of the closure member and respectively into engagement with fore-and-aft spaced portions of the frame, said elements being releasable from said frame portions upon forcible fore-and-aft distortion of the closure member against the bias of said flexibility.

References Cited in the file of this patent

UNITED STATES PATENTS

1,981,093	Conarroe	Nov. 20, 1934
1,981,971	Steiner	Nov. 27, 1934
2,083,340	Merker	June 8, 1937
2,173,338	Morris	Sept. 19, 1939
2,542,238	Dreyfuss	Feb. 20, 1951
2,549,524	Rich	Apr. 17, 1951
2,665,783	Pryne	Jan. 12, 1954

FOREIGN PATENTS

857,645	France	Apr. 22, 1940
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