Aug. 24, 1954 J. P. BUTTERFIELD 2,687,192

BRAKE COOLING DEVICE

Filed Nov. 30, 1949 3 Sheets-Sheet 1

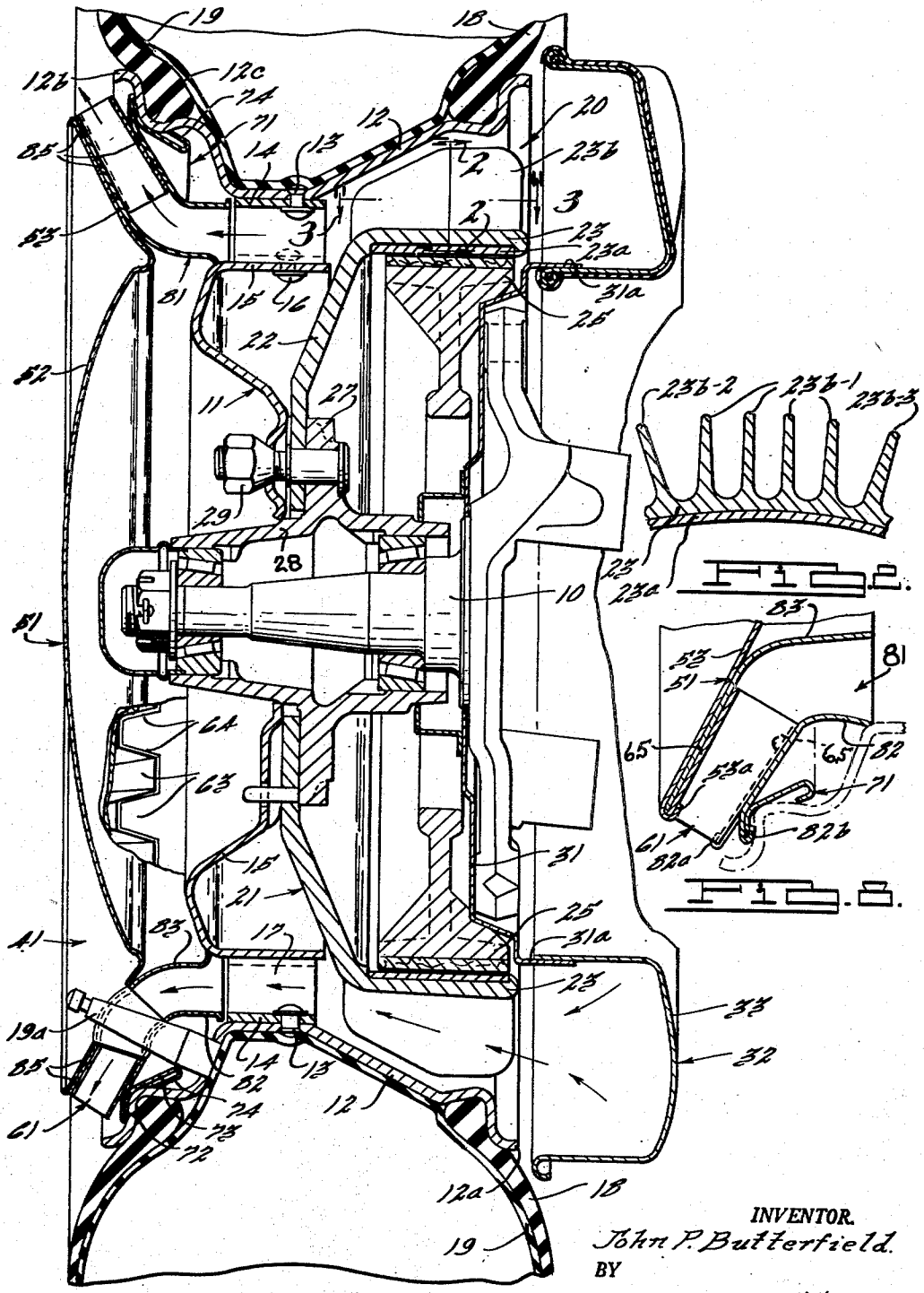


Fig. 2.

Fig. 3.

Fig. 1.

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BRAKE COOLING DEVICE

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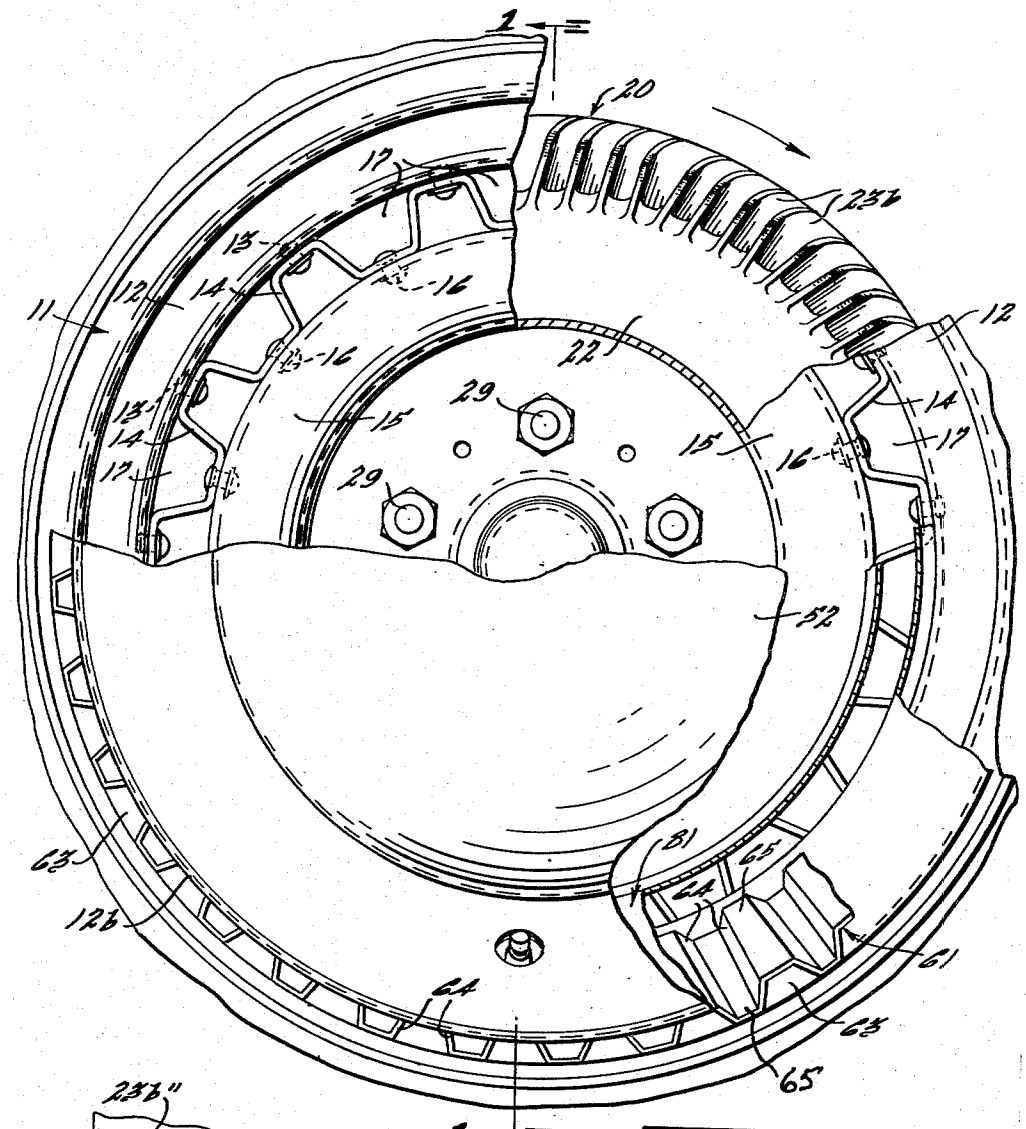


FIG. 4.

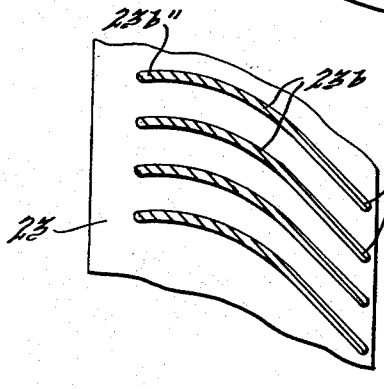


FIG. 3.

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BRAKE COOLING DEVICE

Filed Nov. 30, 1949 3 Sheets-Sheet 3

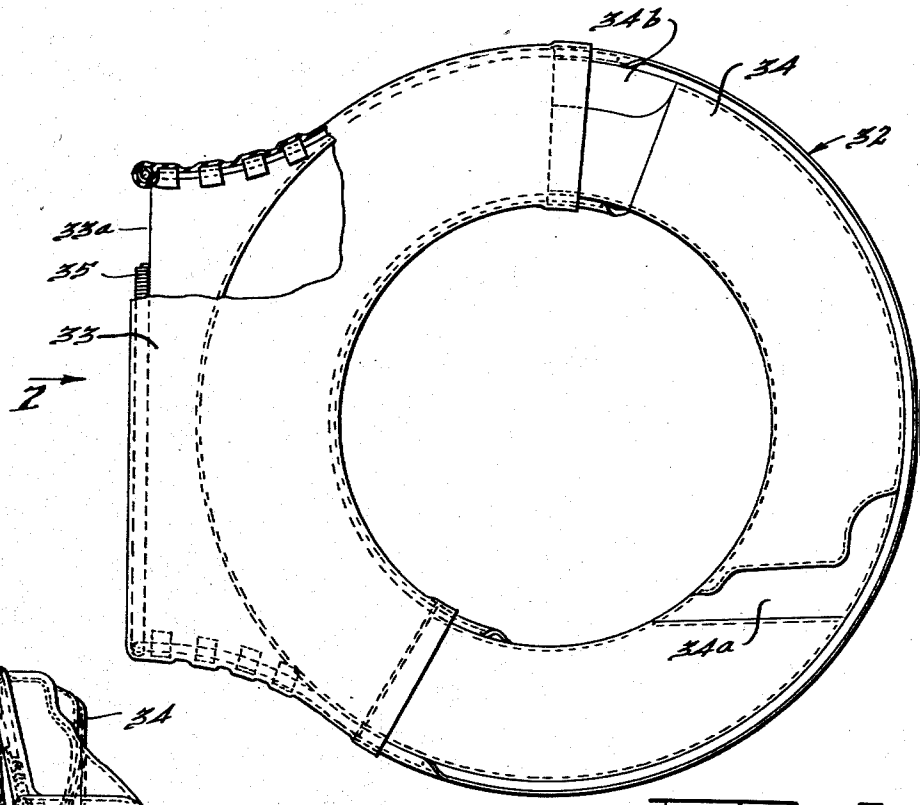


Fig. 5.

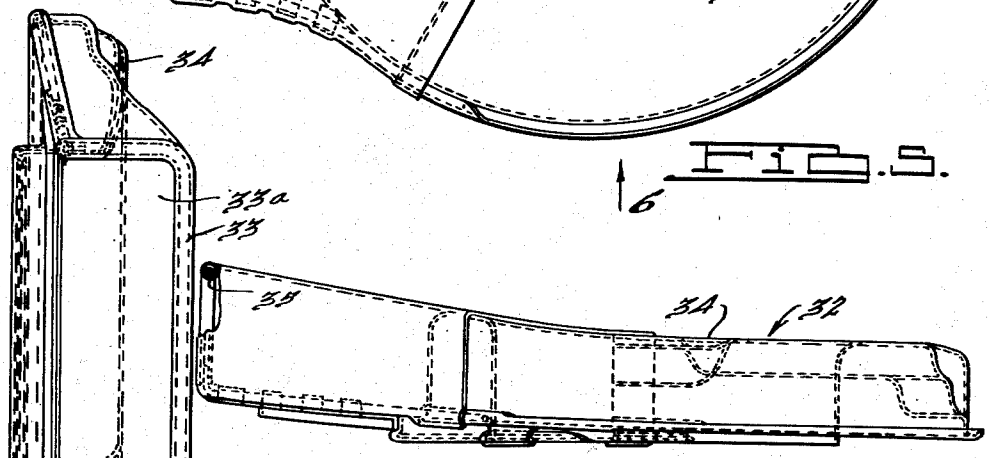


Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE

2,687,192

BRAKE COOLING DEVICE

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Application November 30, 1949, Serial No. 130,213

16 Claims. (Cl. 188—264)

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This invention relates to a device for cooling the brake drum of a motor vehicle wheel brake or the like. More particularly this invention involves the incorporation of a plurality of air circulating and cooling units in a conventional wheel assembly in a manner whereby each cooling unit cooperates with and assists the other associated units so as to provide a vastly improved brake cooling device.

It is a primary object of this invention to provide a wheel brake cooling device comprising an air scoop, a brake drum mounted forced feed fan and a wheel cover mounted suction fan wherein the several air transfer units are associated such that each cooperates with the other to improve the brake cooling effect and thereby the capacity, operability and life of the brake.

It is another object of this invention to provide a novel type of air scoop for directing air across the associated wheel brake drum during movement of the brake carrier unit wherein the velocity of the entrapped air at all points around the interior of the scoop will be substantially uniform.

It is another object of this invention to provide an improved type of brake drum mounted forced feed fan wherein the heat radiating fin surfaces of the brake drum are also utilized as fan blades. The arrangement of the fan blades is such that the air forced through the drum mounted fan is directed against the heat dissipating fin surfaces of the drum in such a manner that a maximum transfer of heat will occur. Furthermore, the fan blade arrangement is such that the air leaves the drum mounted fan in a substantially axial direction so that it can pass through the slotted wheel disc and into the wheel cover mounted suction fan with a minimum of interference and a maximum velocity.

It is another object of this invention to provide a wheel cover mounted suction fan that effectively draws air across the brake drum and through the slotted wheel disc, the suction fan including conduit means for maintaining a maximum, uniform flow of air through the wheel.

It is a still further object of this invention to provide novel means for associating the wheel cover mounted fan and air conduit means with the wheel cover.

It is still another object of this invention to provide a novel type of slotted web portion in a wheel disc wherein means are provided to assure the maximum passage of cooling air therethrough with the minimum amount of turbulence and velocity change.

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It is a further object of this invention to provide an air circulating device for a motor vehicle wheel or the like which device is so arranged that it effectively cools the wheel brake drum and also circulates air about the associated wheel tire in a manner that will tend to cool the tread surface of the tire and thereby reduce wear of the tire.

Other objects and advantages of this invention will become apparent from a reading of the following description and a consideration of the related drawings wherein:

Fig. 1 is a transverse sectional elevation of a portion of a right front motor vehicle wheel assembly looking from the front towards the rear of the vehicle, the assembly including the complete brake cooling device and certain parts of the wheel braking mechanism, the view being taken along the plane indicated by the arrows 1—1 of Fig. 4;

Fig. 2 is a fragmentary sectional elevational view of a section of the finned portion of the brake drum mounted fan element, the view being taken along the plane indicated by the arrows 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional elevational view of a section of the finned portion of the drum mounted fan element shown in Figs. 1 and 2, the view being taken looking in the direction of the arrows 3—3 of Fig. 1;

Fig. 4 is a side elevational view of the outer side of the wheel assembly, certain portions of the wheel cover and the wheel disc being broken away to clearly disclose the cover fan, the slotted wheel disc and the drum fan;

Fig. 5 is a side elevational view of the normally exposed side face of the air scoop that is mounted on the inner side of the wheel assembly;

Fig. 6 is an elevational view of the under side or bottom of the air scoop, the view being taken looking in the direction of the arrow 6 applied to Fig. 5;

Fig. 7 is a side elevational view of the front end of the air scoop, the view being taken looking in the direction of the arrow 7 applied to Fig. 5; and

Fig. 8 is a fragmentary sectional elevational view of a modified form of wheel cover construction that utilizes bent tabs to connect the several elements of the wheel cover.

It is thought to be unnecessary to specifically point out why air cooling of the brake drums of a friction type brake improves brake capacity, eliminates brake fading, reduces brake lining wear, reduces the required brake diameter, reduces the required clearances between the brake

parts, and provides a more reliable and more effective brake under all conditions of operation. While various attempts have been made to provide effective means for cooling the brake drums of friction type brakes, it is thought that the construction herein disclosed is the first to successfully provide adequate brake drum cooling means with a minimum amount of expense and a minimum amount of alteration of the conventional motor vehicle wheel assembly while at the same time providing a means for improving the appearance of the wheel assembly. As a result of the general desire to improve the visual appearance of the current motor vehicle, it has become quite prevalent to provide motor vehicle wheels with decorative wheel covers. These covers tend to substantially close off the circulation of air through the wheels and across the associated wheel braking mechanisms. At the same time vehicle speeds have increased without an equivalent increase in the size of the associated brake drum, consequently, more heat is being generated in the brake drum during braking action while less efficient forms of heat dissipating devices have been provided for cooling the drums. This invention provides an improved brake cooling device including several air circulating units and a highly decorative wheel cover with positive means thereon to circulate cooling air across the associated wheel brake drums, the several cooling means associated with this cooling device being so constructed and arranged that a maximum cooling effect is achieved. The construction herein disclosed represents an improvement on the device covered by my copending application Serial No. 103,780 filed July 9, 1949, now Patent Number 2,633,944, issued April 7, 1953.

In the drawings the numeral 11 represents a wheel disc that is rotatably mounted on a support such as the steering knuckle 10. The wheel disc 11 is formed from an annular rim element 12 connected by rivets 13 to an annular, corrugated, web ring 14 that is formed of rigid steel strip material or the like. The corrugated web ring member 14 is connected by rivets 16 to the disc-like wheel web portion 15. The corrugated construction of the wheel web ring 14 provides a ring of axially extending, open-ended, channels 17 through the wheel web portion 15, adjacent the periphery of the web portion 15. These channels 17 provide air circulation channels that conduct heat dissipating air through the wheel web portion. The purpose of the channel openings 17 will become more readily apparent from the subsequent description. A tire casing 18, provided with an inflatable tube element 19, is mounted on the rim 12 in conventional manner.

Mounted on the rear side of the wheel web portion 15 is a fan unit 20 that is supported by and forms a part of the brake drum 21. Brake drum 21 includes the dished, plate-like, radially extending, support portion 22 on which is mounted the annular, axially extending, peripheral flange portion 23. Flange portion 23 provides the braking area which is adapted to be engaged by the movable brake shoes 25. Drum flange portion 23 is preferably formed with an inner brake shoe engaging surface 23*a* composed of some wear resistant, rigid, ferrous material such as cast iron or steel. Drum portion 23 mounts a group of radially directed, axially extending heat dissipating fins 23*b* on its outer surface. The outwardly projecting, exposed fin elements 23*b* of the brake drum 21 are preferably formed of a material such as aluminum which has high thermal conductivity. The cooling fins 23*b* are designed to quickly dissipate the heat generated within the brake drum during application of the brake shoes 25 to the drum portion 23*a* during braking operations.

From Fig. 3 it will be noted that the brake drum heat dissipating fins 23*b* are arranged to extend in a substantially axial direction rather than in a direction transverse to the axis of rotation of the wheel as is the case with so many conventional heat dissipating fin assemblies. With the arrangement herein disclosed it is thought to be obvious that rotation of the brake drum 21 and the supported fins 23*b* will cause the fin elements 23*b* to function as forced feed fan blades as well as heat radiating elements. The portions 23*b'* at the inlet side of the fan blades are angled such that air will be drawn through the drum mounted fan 20 and forced across the several exposed surfaces of the fan blades 23*b* in such a manner that the surfaces of the heat dissipating fan blades 23*b* will be scrubbed with cool circulating air and a maximum heat transfer and brake cooling effect achieved. With the construction shown each blade element has all surfaces thereof clearly exposed to the air passing through the drum mounted fan 20 and therefore each blade element 23*b* is able to produce a maximum cooling effect. Such is not the case with a construction such as that shown in applicant's co-pending application Serial No. 103,780 wherein the fin elements extend transverse to the axis of rotation of the wheel. I this latter type of construction the fins do not function as fan blades and furthermore the outwardly disposed fins have a tendency to block off the air passing across the fins axially inwardly thereof so that a large percentage of the fin surface of the inwardly disposed fins is inefficient for heat dissipation. It will also be noted that the outlet portions 23*b''* of the blade elements 23*b* extend in a true axial direction so that the air leaving the drum mounted fan unit 20 is directed through the axially extending channels 17 of the wheel web portion 14 with the least amount of interference possible. This arrangement has a tendency to maintain a uniform flow of air through the wheel web portion and across the brake drum cooling fins 23*b* to thereby produce a maximum drum cooling effect.

From Fig. 2 it will be noted that the fins 23*b* of the brake drum mounted fan 20 are arranged in groups of four blades each. The blades of each group extend radially and are parallel to each other so as to permit fabrication by simple die casting methods or the like. In the arrangement shown the several fins 23*b*–1 of any one group are parallel to each other while the fins 23*b*–2 and 23*b*–3 of each adjacent group of fins are angled with respect to the fins 23*b*–1. By such an arrangement, sectional molds may be used to form each group of fins and each section of the mold may be easily withdrawn from the casting. This arrangement materially simplifies fabrication of the drum fins and reduces the cost of the drum casting operation for a permanent type of mold may be used to form the drum unit.

The wheel unit web portion 15 and the plate portion 22 of brake drum 21 are secured to the radial extending flange portion 27 of the wheel hub portion 26 by the bolt and nut connecting means 29. A dust cover 31, mounted on the support 10, extends across the open side of the brake drum 21 so as to provide means for preventing foreign matter from entering the chamber within brake drum 21. It will be noted that the area between the periphery 31*a* of the dust cover 31

and the inner edge 12*a* of the wheel rim portion 12 is not covered by the dust cover 31. This area is purposely left open to provide an entrance through which air on the inner side of the wheel may readily pass to reach the inlets to the drum mounted fan 20.

Mounted on and surrounding the axially extending flange 31*a* of the dust cover 31 is a substantially ring-shaped or scroll-shaped air gathering scoop 32. Scoop 32 is substantially channel-shaped in cross section and is (see Fig. 5) formed from a forwardly extending, flexible, Y-shaped, mouth portion 33 connected to a semi-circular or C-shaped, rigid body portion 34. The forward end 33*a* of the flexible mouth portion 33 is open to permit the entry of air to the interior of the scoop as the wheel unit moves forwardly through space in a direction normal to the mouth opening 33*a*. Flexible mouth portion 33 has its forward end portion 33*a* held in extended position by means of a flexible border spring 35. The forward mouth portion 33 is made of some flexible material such as rubber or the like so that on rotation of the wheel assembly, during a severe vehicle turning operation, the mouth portion 33 may be collapsed against any portion of the chassis frame, steering linkage or vehicle body that might be brought into contact with the scoop mouth portion 33. The air scoop for the rear wheels of a motor vehicle are not subjected to rotative movement about a vertical axis at any time, therefore the scoops for the rear wheels are preferably made as completely rigid units and the flexible mouth portions 33 replaced with rigid mouth portions. The rigid body portion 34 has certain preformed indentations 34*a* and 34*b* to receive portions of the steering linkage associated with the front wheels of the motor vehicle. In cross sectional configuration the scoop 32 is formed so that air forced through the opening 33*a* to the scoop mouth portion 33 will travel around the interior of the scoop at a substantially constant velocity. By providing a means for gathering air from the space inwardly of the wheel assembly and directing this air to all portions of the brake drum periphery at substantially a constant velocity the scoop 32 materially improves the operation of the drum mounted fan unit 20. With the rotatable fan unit 20 positioned within the boundaries defined by the wheel rim assembly, it is thought to be obvious that the fan blades 23*b* cannot move as much cooling air across the brake drum when the scoop assembly 32 is omitted as when such an air gathering device is used in association with the drum mounted fan unit. However, it is possible to successfully operate the wheel brake drum cooling fan unit 20 without the aid of the scoop unit 32 when less heat needs to be dissipated.

To further improve the circulation of air across the cooling fins 23*b* of the brake drum, there is provided a centrifugal type suction fan unit 61 that is preferably formed as an integral part of the decorative wheel cover unit 41. This wheel cover unit 41 is similar to that disclosed in my co-pending application Serial No. 103,780 previously identified. Wheel cover unit 41 is adapted to be detachably mounted on the outer or normally exposed side of the wheel unit 11 by spring clip means 71 subsequently described in detail. Wheel cover 51 is composed of four principal elements, a cover plate or disc 51, an annular fan element 61, a spring clip retaining ring 71 and an air conduit member 81. These four elements of the wheel cover 41 are assembled as a unit so that the wheel cover may be quickly and easily applied to any conventional motor vehicle wheel assembly.

The cover plate 51 has a closed, centrally located, dished portion 52 that is bounded by a flat-surfaced, outwardly diverging, ring-like edge portion 53. The cover plate 51 is of such size and shape that it substantially covers all of the outwardly disposed side of the wheel assembly 11. Mounted on the rear side of the cover plate edge portion 53 is the annularly shaped centrifugal fan element 61.

Fan element 61 is preferably a ring-like plate member having a plurality of radially extending substantially U-shaped corrugations or channels 63 formed therein. The adjacent corrugations or channels 63 open in opposite directions, consequently the flat base portions 65 of adjacent channels 63 are positioned on opposite sides of the fan member 61. These flat base portions 65 provide surfaces which may be readily connected to the contiguously arranged cover plate 51 and conduit member 81. The base portions 65 of the fan element corrugations may be connected to the cover plate 51 and the conduit member 81 by welding, or the like, as shown at 85, in Fig. 1 or by the bent tab construction 53*a*, 82*a* shown in Fig. 8 and subsequently described in detail. From Figs. 1 and 4 it will be noted that the side walls 64 of the channel-like corrugations 63 diverge radially outwardly. The channel side walls 64 constitute the fan vane or blade elements of the suction fan 61 that assists the drum mounted fan unit 20 in circulating cooling air through the wheel unit 11. The radial taper of the fan blades 64 has a tendency to improve the air flow through the fan element and wheel unit. The outer ends of the elements 64, 65 of the fan corrugations 63 terminate adjacent the outer side edge 12*b* of the rim portion 12 of the wheel unit 11. This arrangement provides a most efficient fan and one that is practically concealed from the eye of a person looking at the outer side of the wheel cover.

Mounted on the inner side of the fan element 61 is the resilient wheel cover retaining ring 71. Retaining ring 71 includes an outer edge 72, that is connected to the outer edge of the conduit element 82 by welding or a crimped connection. A body portion 73 of the ring 71 connects the outer edge portion 72 to the reversely bent inner flange portion 74. Flange 74 has an outwardly bent free edge that is sufficiently flexible to provide a spring clip fastening means for anchoring the wheel cover assembly to the step-like shoulder formation 12*c* of the wheel rim portion 12.

Mounted between the wheel cover plate 51 and the retaining ring 71, and arranged to enclose opposite sides of the fan element 61, is the air conduit member 81. Conduit member 81 consists of two, radially spaced, annular plates 82 and 83 respectively. Plates 82 and 83 are spaced so as to provide a smooth, uniformly shaped, conduit for conducting the air from the outlet of the wheel disc air channel slots 17 to the inlet to the suction fan 61. The cross sectional area of the conduit member 81 at any point between the slotted wheel rim member 14 and the wheel cover fan 61 is substantially the same and equal to the cross sectional area of the wheel disc channels 17. This arrangement provides for a more or less constant velocity air flow from the brake drum mounted fan 20 to the wheel cover mounted fan 61. By providing means for insuring a constant velocity air flow through the entire wheel assembly it is possible to pass the maximum

amount of cooling air across the heat dissipating fins 23b and thereby provide the maximum cooling effect for the brakes. Accordingly, the improvement in brake performance and brake life will be a maximum. In Fig. 1 the spaced plates 82, 83 are shown connected to opposite sides of the fan 61 by welded connections 85 or the like. Welded connections 85 also connect the outside faces of the plates 82 and 83 to the retaining ring 71 and the cover plate 51 respectively.

In Fig. 8 a different form of connecting means is used for assembling the several elements 51, 61, 71 and 81 of the wheel cover unit. In this modified construction tabs formed on the several elements of the wheel cover unit are utilized to connect the several elements 51, 61, 71 and 81 to provide a unitary structure. Cover plate 51 has spaced tabs 53a formed along its peripheral edge portion which tabs are adapted to be bent reversely to clampingly engage the outer edge portions of the conduit plate member 83 and the spaced base portions 65 along one side of the fan element 61. The outer peripheral edge of the conduit plate member 82 is provided with spaced tabs 82a and 82b. The tabs 82a are adapted to be reversely bent in one direction to clampingly engage the spaced base portions 65 along that side of the fan 61 opposite the side connected to the cover plate tabs 53a. The tabs 82b are adapted to be reversely bent in a direction opposite to that of the tabs 82a so as to clampingly engage the outer peripheral edge portions of the retaining ring 71. The arrangement shown in Fig. 8 is adapted to provide a less costly and more easily assembled unit than that shown in Fig. 1.

The conduit member 81, the fan element 61 and the cover plate 51 are each provided with suitable aligned openings to receive the valve stem 19a of the inflatable tire tube 19.

Not only does the circulation of air through the wheel assembly cool the brake drum 21 but in addition air will be circulated across the tread of the associated wheel tire 18 and this will tend to reduce tire wear.

From the above description and the related drawings it is thought to be obvious that the wheel brake cooling device disclosed consists of a novel combination of elements that cooperate in a novel manner to provide a vastly improved brake drum cooling effect and consequently an improved brake both from an operational standpoint and from a wear standpoint. Furthermore, it is well known that if the large clearances that must normally be allowed for brake drum thermal expansion and contraction can be eliminated or reduced then an improved brake can be provided at a reduced cost. This cooling device makes possible the aforementioned reduction in clearances between the various brake parts. It is thought that the arrangement of a recessed, forced feed fan on one side of the wheel assembly and a suction fan on the opposite side of the wheel assembly with a continuous, uniformly shaped air flow conduit system between the spaced fans is a new and definite advancement in the brake drum cooling art. To locate both of the rotatable fan units within the confines of the wheel assembly and associate a stationary air gathering scoop outwardly of the wheel assembly, such that an increased amount of constant velocity cooling air is directed to all portions of the brake drum mounted fan 20, is another novel feature of this brake cooling device. It is also thought that the individual elements of the combination forming this brake cooling device in and of themselves represent advancements in this field. The air scoop 32 provides for maximum air circulation by the brake drum mounted fan. The brake drum mounted fan 20 has the blading 23b arranged in a manner to secure maximum cooling and to discharge the cooling air axially so that it may be transmitted to the suction fan 61 at a constant and maximum velocity. The slotted wheel disc member 14 is designed so that the maximum amount of axially directed air conduit channels 17 will be available to transmit the air from the brake drum mounted fan 20 to the wheel cover mounted fan 61. The wheel cover carried conduit member 81 is arranged to provide a means for controlling the velocity of the air directed into the fan 61 and to insure the maximum transfer of air through the wheel assembly. The many advantages of the wheel cover unit 41 are set forth in my said co-pending application Serial No. 103,730 which covers a similarly constructed wheel cover fan unit. From Fig. 1 it is thought to be quite apparent that all elements of this brake drum cooling device have been designed to provide a maximum, uninterrupted, air flow from the intake to air scoop 32 on the inner side of the wheel assembly to the outlet from the wheel cover mounted fan 61 on the outer side of the wheel assembly. Furthermore the heat dissipating surfaces have been so positioned in this cooling air stream that a maximum cooling effect will result.

I claim:

1. In combination, a rotatable wheel, friction brake means for said wheel, including a wheel carried brake drum mounted on one side of said wheel, a first fan means comprising curved, axially extending, blades mounted on the outer periphery of said brake drum and adapted to force cooling air axially across said drum periphery towards the other side of said wheel, a wheel cover mounted on the other side of said wheel, a second fan means mounted on the wheel cover arranged to assist in the circulation of air by said first fan means, and axially extending conduit means directly connecting the discharge of said first fan means to the intake of said second fan means.

2. In combination, a rotatable wheel, friction brake means for said wheel including a wheel carried brake drum mounted on one side of said wheel, a first fan means mounted on the periphery of said brake drum comprising axially extending fan blades adapted to force cooling air axially across said drum periphery towards the other side of said wheel, a wheel cover mounted on the other side of said wheel, a second fan means mounted on the wheel cover comprising radially extending fan blades arranged to assist in the axial circulation of air by said first fan means, axially extending conduit means directly connecting the discharge of said first fan means to the intake of said second fan means, said conduit means being of substantially uniform cross sectional configuration to provide a substantially constant velocity air flow across said drum.

3. In combination, a wheel comprising a hub portion, a web portion and a rim portion, said web portion including a slotted portion formed from a corrugated ring of relatively rigid, strip material, wheel braking means secured to one side of said wheel web portion including a brake drum having an axially extending flange portion, substantially axially extending, heat radiating fins mounted on said drum flange portion, said fins being arranged to provide fan means for

passing drum cooling air across said drum and fins when said wheel is rotated, the fin arrangement being such that the discharge from said fins is in axial alignment with the openings through the slotted portion of the wheel web portion, an air collecting scoop mounted adjacent the exposed side of said brake drum and arranged to entrap and direct drum cooling air of substantially constant velocity to all portions of the periphery of the drum flange portion, and a wheel cover secured to said wheel and extending over the other side of said wheel web portion with the periphery of said cover located adjacent said wheel rim portion, said cover comprising a closed outer disc, an annular plate with radially extending corrugations formed thereon to provide a centrifugal fan, said centrifugal fan being mounted on and arranged to extend adjacent the inner side of the peripheral portion of said outer disc, conduit means in the form of a pair of spaced annular plates arranged to extend between the openings through the slotted portion of said wheel web portion and the inlet to said centrifugal fan, and a ring-like member mounted on the inner side of said wheel cover and provided with means for releasably connecting the wheel cover to said wheel.

4. In combination, a wheel comprising a hub portion, a web portion and a rim portion, said web portion including a slotted portion formed from a corrugated ring of relatively rigid, strip material, wheel braking means secured to one side of said wheel web portion including a brake drum having an axially extending flange portion, substantially axially extending, heat radiating fins mounted on said drum flange portion, said fins being arranged to provide fan means for passing drum cooling air across said drum and fins when said wheel is rotated, the fin arrangement being such that the discharge from said fins is in axial alignment with the openings through the slotted portion of the wheel web portion, and a wheel cover secured to said wheel and extending over the other side of said wheel web portion with the periphery of said cover located adjacent said wheel rim portion, said cover comprising a closed outer disc, an annular plate with radially extending corrugations formed thereon to provide a centrifugal fan, said centrifugal fan being mounted on and arranged to extend adjacent the inner side of the peripheral portion of said outer disc, conduit means arranged to extend between the openings through the slotted portion of said wheel web portion and the inlet to said centrifugal fan, and means mounted on the inner side of said wheel cover for releasably connecting the wheel cover to said wheel.

5. In combination, a wheel comprising a hub portion, a web portion and a rim portion, said web portion including a circumferentially disposed, axially extending, slotted portion formed from a corrugated ring of relatively rigid, strip material, wheel braking means secured to one side of said wheel web portion including a brake drum having an axially extending flange portion, substantially axially extending, heat radiating fins mounted on said drum flange portion, said fins being arranged to provide fan means for passing drum cooling air across said drum and fins when said wheel is rotated, the fin arrangement being such that the discharge from said fins is in axial alignment with the openings through the slotted portion of the wheel web portion, an air collecting scoop mounted adjacent the exposed side of said brake drum and arranged to entrap and direct drum cooling air of substantially constant velocity to all portions of the periphery of the drum flange portion.

6. In combination with a brake construction for a rotatable wheel assembly comprising a support, a wheel disc rotatably mounted on said support and formed from connected web and rim portions, axially extending, circumferentially spaced, openings through said web portion, a brake drum connected to one side of the wheel disc including an annular, axially extending, peripheral flange portion aligned with said openings and adapted to be engaged by friction brake means movably mounted within said drum, an air collecting scoop element mounted on said support and arranged adjacent to and encircling the drum flange on the said one side of said wheel disc so as to direct collected air about the periphery of said drum flange portion at a substantially constant velocity, axially extending, heat dissipating fin means mounted on the exterior surface of said drum flange, said fin means being arranged in a manner to function as forced feed fan blades to withdraw air from said air collecting element and to force it axially across said fin means and said drum flange and discharge it in an axially extending direction through the openings in the wheel web portion towards the other side of said wheel disc, the axially extending openings in said wheel web portion being aligned with the discharge from the drum mounted fan blades, and a wheel cover mounted on the other side of said wheel disc comprising centrifugal fan means adapted to withdraw air from said openings through said wheel web portion and to discharge the withdrawn air to the exposed side of said wheel cover.

7. In combination with a brake construction for a rotatable wheel assembly comprising a support, a wheel disc rotatably mounted on said support and formed from connected web and rim portions, axially extending, circumferentially spaced openings piercing said web portion, a brake drum connected to one side of the wheel disc including an annular, axially extending, peripheral flange portion axially aligned with said openings and adapted to be engaged by friction brake means movably mounted within said drum, substantially axially extending heat dissipating fin means mounted on said drum flange, said fin means having portions thereof arranged at an angle to the axis of the drum so as to function as force feed fan blades to force drum cooling air axially across said fin means and said drum flange and to discharge it in an axially extending direction through the openings in the wheel web portion towards the other side of said wheel disc, the axially extending openings in said wheel web portion being aligned with the discharge from the drum mounted fan blades, and a wheel cover mounted on the other side of said wheel disc comprising centrifugal fan means adapted to withdraw air from said openings through said wheel web portion and discharge the withdrawn air to the exposed side of said wheel cover, the inlet to said centrifugal fan means being aligned with said openings and the discharge from the drum mounted fan blades.

8. In combination, a rotatable wheel unit comprising a disc-like web portion with circumferentially spaced, axially extending, openings therethrough and a rim portion secured to the periphery of said web portion, a brake drum secured to one side of said wheel unit, substan-

tially axially extending heat dissipating fin elements mounted on said drum, said fin elements being arranged to provide fan blades that force cooling air across the fin and brake drum surfaces during wheel rotation, said blades being arranged to discharge the drum cooling air into the openings through said wheel web portion, a wheel cover mounted on and extending over the other side of said wheel unit, said wheel cover comprising an outer disc and a spaced inner ring-like member arranged to extend adjacent the peripheral portion of said outer disc, said disc and ring-like member having vane members connected therebetween, said vane members providing a centrifugal fan arranged to withdraw air from the openings in said wheel web portion and to discharge air to the outer side of said wheel cover through openings between said outer disc and ring-like member adjacent the periphery of said outer disc.

9. In combination, a rotatable wheel unit comprising a disc-like web portion with circumferentially spaced, axially extending, openings therethrough and a rim portion secured to the periphery of said web portion, a brake drum secured to one side of said wheel unit, substantialy axially extending heat dissipating fin elements mounted on said drum, said fin elements being arranged to provide fan blades that force cooling air across the fin and brake drum surfaces during wheel rotation, said blades being arranged to discharge the drum cooling air into the openings through said wheel web portion, a wheel cover mounted on and extending over the other side of said wheel unit, said wheel cover comprising an outer disc and a spaced inner ring-like member arranged to extend adjacent the peripheral portion of said outer disc, said disc and ring-like member having vane members connected therebetween, said vane members being arranged to provide a centrifugal fan during wheel rotation that withdraws air from the openings in said wheel web portion and discharges air to the outer side of said wheel cover through the openings between said spaced outer disc and ring-like members adjacent the periphery of said outer disc, and conduit means carried by said wheel cover adapted to connect the openings through said wheel web portion to the centrifugal fan.

10. In combination, a rotatable wheel unit comprising a disc-like web portion with circumferentially spaced, axially extending, openings therethrough and a rim portion secured to the periphery of said web portion, a brake drum secured to one side of said wheel unit, substantially axially extending heat dissipating fin elements mounted on said drum, said fin elements being arranged to provide fan blades that force cooling air across the fin and brake drum surfaces during wheel rotation, said blades being arranged to discharge the drum cooling air into the openings through said wheel web portion, an air collecting element mounted adjacent the brake drum arranged to entrap and direct air to the portions of said brake drum mounting the fin elements, a wheel cover mounted on and extending over the other side of said wheel unit, said wheel cover comprising an outer disc and a spaced inner ring-like member arranged to extend adjacent the peripheral portion of said outer disc, said disc and ring-like member having vane members connected therebetween, said vane members being arranged to provide a centrifugal fan during wheel rotation that withdraws air from the openings in said wheel web portion and discharges air to the outer side of said wheel cover through the openings between said spaced outer disc and ring-like members adjacent the periphery of said outer disc, and conduit means carried by said wheel cover adapted to connect the openings through said wheel web portion to the centrifugal fan.

11. In combination, a rotatable wheel unit comprising a disc-like web portion with circumferentially spaced, axially extending, openings therethrough and a rim portion secured to the periphery of said web portion, a brake drum secured to one side of said wheel unit, a wheel cover mounted on and extending over the other side of said wheel unit, said wheel cover comprising an outer disc and a spaced inner ring-like member arranged to extend adjacent the peripheral portion of said outer disc, said disc and ring-like member having radially extending vane members connected therebetween and arranged to provide a centrifugal fan on wheel rotation that withdraws air from the openings in said wheel web portion and discharges air to the outer side of said wheel cover, and conduit means carried by said wheel cover adapted to extend between said centrifugal fan and said openings through said wheel web portion, said conduit means comprising a pair of spaced, annular plates, one of said plates being directly connected to said outer disc and to portions of said centrifugal fan and the other of said plates being connected to other portions of said centrifugal fan and to means adapted to releasably connect said wheel cover to said wheel unit.

12. In combination, a rotatable wheel unit comprising a disc-like web portion with circumferentially spaced, axially extending, openings therethrough and a rim portion secured to the periphery of said web portion, a brake drum secured to one side of said wheel unit, a wheel cover mounted on and extending over the other side of said wheel unit, said wheel cover comprising an outer disc and a spaced inner ring-like member arranged to extend adjacent the peripheral portion of said outer disc, said disc and ring-like member having radially extending vane members connected therebetween and arranged to provide a centrifugal fan on wheel rotation that withdraws air from the openings in said wheel web portion and discharges air to the outer side of said wheel cover, and conduit means carried by said wheel cover adapted to extend between said centrifugal fan and said openings through said wheel web portion, said conduit means comprising a pair of spaced, annular plates, one of said plates being directly connected to said outer disc and to portions of said centrifugal fan and the other of said plates being connected to other portions of said centrifugal fan and to means adapted to releasably connect said wheel cover to said wheel unit, the means for connecting said plates to the several members associated therewith comprising spaced tabs formed along the peripheral edge portions of the plate members and adapted to be clampingly engaged with the associated members.

13. A wheel cover comprising an imperforate outer cover disc, an annular fan member having radially extending fan vanes secured to the inner side of the peripheral portion of said cover disc, conduit means mounted on said cover disc arranged to direct air into said fan member, said conduit means comprising duct means having axially extending intake portions located radially inwardly from said fan member at the axial region of the disc and radially extending dis-

charge portions connected to the fan member, and a cover retaining ring carried by said conduit member, the fan member comprising a plurality of fan vanes arranged to withdraw air from the axial region at the inner side of said cover disc and to discharge the withdrawn air to the outer side of said cover disc along the periphery of said cover disc when said cover disc is rotated.

14. A wheel cover comprising an imperforate outer cover disc, an annnular fan member secured to the inner side of the peripheral portion of said cover disc, an air conduit member comprising a pair of spaced, annular plates mounted on said cover disc and arranged to direct air into said fan member, said conduit means comprising duct means having axially extending intake portions located radially inwardly from said fan member at the axial region of the disc and radially extending discharge portions connected to the fan member, and a cover retaining ring carried by said conduit member, the fan member comprising a plate-like member formed with a plurality of radially extending corrugations of rectangularly-shaped cross sectional configuration providing a plurality of fan vanes arranged to withdraw air from the inner side of said cover disc and to discharge the withdrawn air to the outer side of said cover disc along the periphery of said cover disc when said cover disc is rotated.

15. In combination, a wheel comprising a hub portion, a web portion and a rim portion, said web portion including a circumferentially disposed, axially extending, slotted portion formed from a corrugated ring of relatively rigid, strip-like material, wheel braking means secured to one side of said wheel web portion including a brake drum having an axially extending flange portion, substantially axially extending, heat radiating fins mounted on said drum flange portion, said fins being arranged to provide fan means for passing cooling air across said drum and fins when said wheel is rotated, the fin arrangement being such that the discharge from said fins is in axial alignment with the openings through the slotted portion of the wheel web portion.

16. An air collecting device adapted to be mounted adjacent to and to encircle a braking mechanism or the like comprising a ring-shaped conduit member of substantially U-shaped cross section, said conduit member having a scoop-type air inlet opening formed in a portion of the conduit side walls and arranged to collect air and pass it through said conduit on movement of said device through space, said ring-shaped conduit further having discharge openings located around its periphery and arranged such that on said movement of the device through space the air collected therein and passed therethrough will be discharged through the peripherally arranged discharge openings, said air collecting device having certain circumferentially extending conduit wall portions formed from flexible material supported by circumferentially extending resilient means to permit temporary alteration in the shape of said device.

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