Oct. 15, 1935. S. SCHNELL 2,017,635

BRAKING APPARATUS

Filed July 9, 1932

Fig.1.

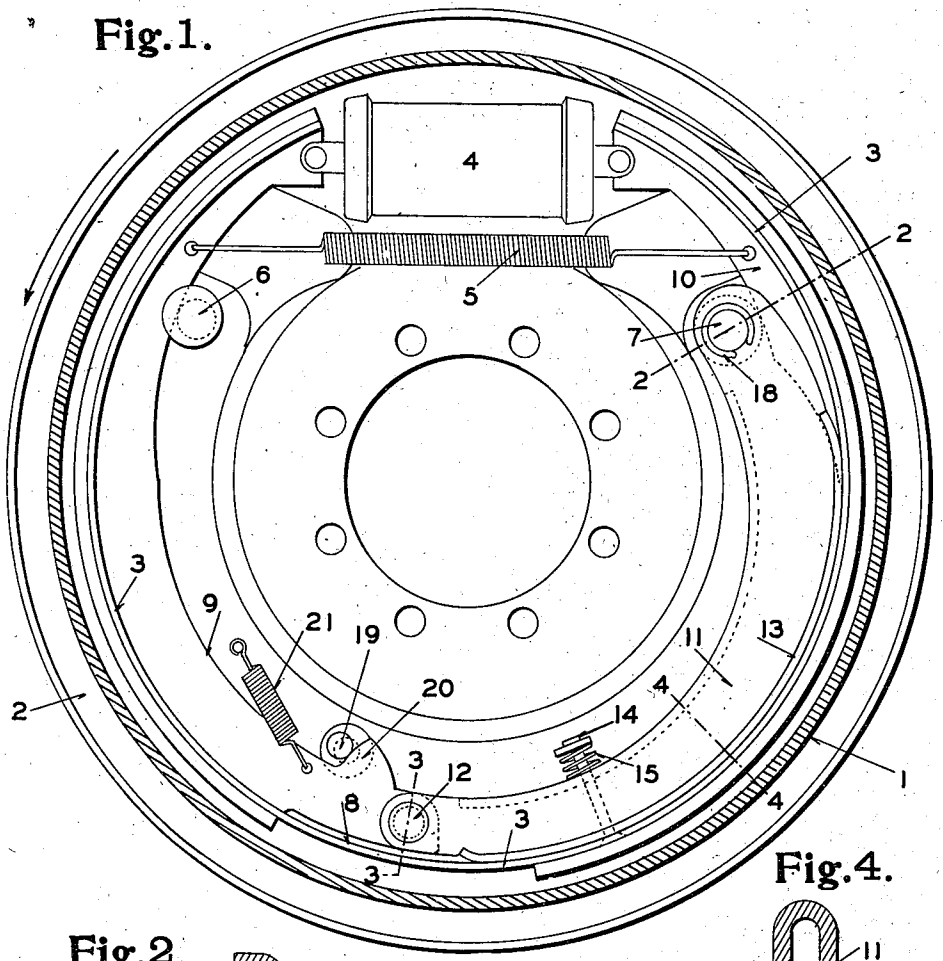


Fig.2.

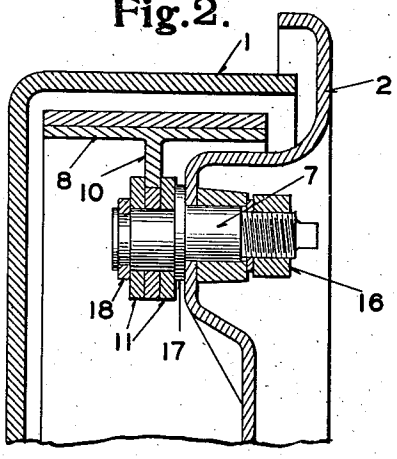


Fig.3.

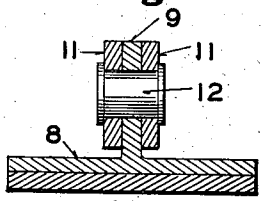
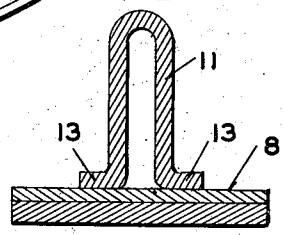


Fig.4.



Inventor
STEVE SCHNELL

By E. E. Hoffman

Att'y.

Patented Oct. 15, 1935

2,017,635

UNITED STATES PATENT OFFICE

2,017,635

BRAKING APPARATUS

Steve Schnell, St. Louis, Mo., assignor to Wagner Electric Corporation, St. Louis, Mo., a corporation of Delaware

Application July 9, 1932, Serial No. 621,590

21 Claims. (Cl. 188—78)

My invention relates to braking apparatus for vehicles, its general object being to produce a brake friction device that is stable, easily controllable and which, in operation, produces approximately uniform pressure distribution over the drum periphery, and may be caused to develop a high braking torque without tendency to wedge into or lock to the drum.

A more specific object of my invention is to provide an expansible friction element embracing the major portion of the periphery of the brake drum and circumferentially extending means for applying radial pressure throughout a substantial arc of the portion of the element to the rear of its anchor during brake application, the friction element in its preferred form being of the "band" type but having a semi-rigid "forward" portion, the radial pressure means cooperating with the relatively flexible "rear" portion.

Other objects will become apparent from the following description of one embodiment of my invention taken in connection with the accompanying drawing in which Figure 1 is a side elevation of a brake assembly (the drum being shown in section), disclosing my improved brake; Figure 2 is a cross sectional view of the anchor pin assembly taken on the line 2—2 of Figure 1; and Figures 3 and 4 are cross sectional views taken on the lines 3—3 and 4—4, respectively, of Figure 1.

Referring to the drawing, the numeral 1 indicates the drum of the brake which is secured in the usual manner to a wheel of the vehicle and is enclosed on its open side by the backing plate or support 2 secured to some fixed part of the vehicle. The friction element comprises a brake lining carrying band 3 extending over substantially the entire inner periphery of the drum and expansible into engagement with the drum by suitable means, such as the hydraulic mechanism 4. The ends of the band are biased to "off" position by the usual spring 5, the "off" position clearance at one end being determined by the adjustable stop 6 and the other end by a combined adjustable stop and anchor pin 7.

The band or "shoe" 3 is preferably of T section throughout the major portion of its length, comprising a lining carrying flange 8 and a reinforcing web, the web being omitted over a section of the band, as shown, thereby forming two spaced apart web portions 9 and 10. The section of the band carrying the web portion 9 will hereafter be referred to as the "forward" section and the remainder of the band as the "rear" section, the drum being considered as rotating in the direction of the arrow (Figure 1) when the vehicle is traveling in a forward direction. The omission of the reinforcing web from the major portion of the rear section of the band allows this portion to be flexible for the purposes hereinafter described.

An arcuate channel-shaped lever 11 is pivoted at one of its ends to the anchor pin 7 and connected at its other end by means of a pivot pin 12 with the inner end of the web 9, which inner end may be free from the flange as shown. The webs of the channel are provided with flange portions 13 which engage the lining carrying flange 8 over the flexible portion of the rear section of the band. A pin 14 carried by the flange 8 extends through the lever and is provided with a spring 15 on its outer end for biasing the lever into engagement with the flange during "off" position of the brake.

The portion of the anchor pin 7 upon which the lever 11 is pivoted, is eccentric to the main body of the pin in order to provide means for adjusting the lever with respect to the drum and also the "off" position of the end of the band. The anchor pin has bearing in the backing plate and is held in adjusted position by means of a nut 16 which clamps an integral shoulder 17 against the backing plate. A washer 18 cooperates with a groove on the end of the eccentric portion of the pin to hold the lever in position.

An eccentric adjustable stop 19 cooperates with a projection 20 on the inner end of the web 9 to prevent the lever from swinging inwardly when the band is engaged and the drum is rotating in a reverse direction. The stop is positioned to lie substantially on an arc struck with a radius equal to the distance between the anchor pin 7 and the pin 12 and having a center at pin 7. The stop contacting surface of the projection 20 lies upon an arc struck from the axis of pin 12, thus permitting the forward section of the band to rotate about the pin 12 without moving the lever when the band is initially expanded. The stop 19 also determines the "off" position of the central portion of the band, the spring 21 holding the band against the stop when the band is not engaged.

Referring to the operation of the brake, the pedal pressure necessary to initially engage the band with the drum is low since small force is required to bend the flexible portion of the band to the extent necessary for this purpose. Assuming "forward" rotation of the drum, when the band is initially engaged with the drum, it

will have a slight circumferential movement with the drum which will cause the forward section of the band to act on the end of the lever 11, thereby swinging the lever outwardly toward the drum and about the pivot pin 7. The outward movement of the lever applies radial pressure distributed over substantially the entire flexible portion of the rear section of the band and the total braking pressure on this portion consists of this radial pressure and the pressure applied by the hydraulic actuator 4. When the lever 11 comes into action, the effective anchor of the brake is at pivot pin 12 although the braking reaction is taken by the pivot pin 7.

Since the drum tends to drag the flexible rear section with it, a pull is created which is transferred to the heel of the relatively rigid forward section, causing the forward section to be swung outwardly about the pivot 12. The total braking pressure of the forward section of the band, therefore, consists of the pressure from the actuator 4, the pressure caused by the wrapping effect of the forward section, and the pressure created by the pull of the flexible section.

The adjustability of the pivot pin 7 is a very important feature of my invention for by it I am able to vary the distribution of the lever pressure on the flexible portion of the band. This controllability of the lever pressure, in association with the other features described, permits securing substantially uniform distribution of braking pressure. Also, by varying the pressure distribution of the lever, I am enabled to vary the braking torque of a selected brake assembly in instances where this may be advisable, as for example, to secure the desired relation to the torque of another assembly on the same vehicle.

Under reverse direction of the vehicle, when the brake is actuated the band is effectively anchored at its center and has characteristics similar to an ordinary band brake, except that the relatively rigid section comprising the reinforcing web 9 will have greater braking effect than if this portion were of the usual "band" type.

It will be understood that a radial pressure lever of the general type herein described, may be employed to apply pressure to other portions and forms of brake friction elements than herein shown and that I do not desire that the scope of my invention be limited except as defined by the appended claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to have its ends expanded to engage it with the drum, and a lever pivoted to the support adjacent one end of the band and connected to the band at a point intermediate the pivot and the other end of the band, said lever being adapted to apply radial pressure to the band over a substantial arc thereof.

2. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to have its ends expanded to engage it with the drum, and anchor means for said band, said anchor means comprising a member pivoted to the support and connected to an intermediate portion of the band, the intermediate part of the anchor member being adapted to apply radial pressure to a substantial portion of the band.

3. A brake comprising in combination, a brake drum, an expansible brake band within the drum, an anchor pin, and an arcuate member pivoted to the anchor pin and connected to the band at a point circumferentially spaced from the anchor pin, said arcuate member extending over and in contact with a substantial arc of the band, and being actuated by means of its said connection with the band to apply a radial pressure to the band when the band is applied to the drum.

4. In braking apparatus, the combination of a brake drum, a friction member adapted to embrace the major portion of the drum friction surface, one section of said friction member being more flexible than the remainder, and a lever pivotally supported at one end and connected to the friction member at a point intermediate its ends, said lever being adapted to apply radial pressure to a substantial portion of the flexible section when the friction member is engaged with the drum.

5. A brake comprising in combination, a brake drum, an expansible brake band within the drum and comprising a relatively rigid section and a flexible section, and means limiting circumferential movement of the band and applying a radial pressure on a major portion of the flexible section.

6. A brake comprising in combination, a brake drum, an expansible brake band within the drum and comprising a relatively rigid portion and a flexible portion, a member pivotally anchored and having an arcuate surface extending over and in pressure contact with the flexible portion of the band during brake application.

7. A brake comprising in combination, a brake drum, an expansible brake band within the drum and comprising a relatively rigid portion and a flexible portion, and a member pivotally anchored at one of its ends and connected at its other end with the band, said member having an arcuate surface extending over and in pressure contact with the flexible portion of the band during brake application.

8. In braking apparatus, the combination of a brake drum, a substantially annular brake band adapted to engage said drum, a portion of said band being more flexible than the remainder, and a lever in pressure contact with an arc of the flexible portion of the band during brake application, said lever being provided with a fixed pivot at one end and connected at its other end to the band.

9. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to have its ends expanded into engagement with the drum, a substantial portion of said band intermediate its ends being more flexible than the remainder, and a lever pivoted at one of its ends to the support and connected at its other end to an intermediate portion of the band, said lever being adapted to apply radial pressure to the flexible portion of the band.

10. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to have its ends expanded into engagement with the drum, the flexibility of said band being greater over a portion of the band intermediate its ends than over the remainder, and means for anchoring said band and applying an outward pressure on the portion of greatest flexibility, said means comprising a lever having one of its ends pivoted to the support and its other end connected to the band, its intermediate portion contacting with the portion of the band having the greater flexibility.

11. In braking apparatus, the combination of a brake drum, a friction member adapted to em-

brace a major portion of the drum circumference, said friction member comprising a substantially annular lining carrying flange and a reinforcing web extending over a portion of said flange, and a lever extending over a major part of the portion of the flange not provided with the reinforcing web, said lever being pivotally supported at one end and being connected at its other end with the reinforcing web.

12. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to engage the drum, said band comprising a substantially annular lining carrying flange and circumferentially spaced apart reinforcing web portions, and a lever pivoted at one of its ends to one of the web portions and at its other end to the support, said lever being adapted to apply radial pressure to the flange intermediate the web portions.

13. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to engage the drum, said band comprising a substantially annular lining carrying flange and circumferentially spaced apart reinforcing web portions, and a lever pivoted at one of its ends to one of the web portions and at its other end to the support at a point adjacent the other web portion and being in contact with the flange intermediate the web portions.

14. In braking apparatus, the combination of a brake drum, a brake member adapted to embrace the major portion of the drum friction surface, said brake member comprising a relatively rigid section and a flexible section, and means forming an anchor cooperating with the inner end of the relatively rigid section and about which it may rotate whereby the drag of the flexible section when applied to the drum will increase the braking pressure of the relatively rigid section.

15. In braking apparatus, the combination of a support, a brake drum, a substantially annular brake band within the drum, means to expand the ends of the band, and a lever adjustably pivoted to the support adjacent one end of the band and connected to an intermediate portion of the band, the adjustable pivot of said lever forming an adjustable stop for the "off" position of the adjacent end of the band.

16. In braking apparatus, the combination of a support, a brake drum, a substantially annular brake band adapted to be expanded into engagement with the drum, a lever pivoted at one of its ends to the support and connected at its other end to an intermediate point of the band, said lever being adapted to be forced into contact with the band when the drum is rotating in one direction, and stop means limiting inward movement of the end of the lever which is connected to the band when the drum is rotating in the other direction.

17. In braking apparatus, the combination of a support, a brake drum, a brake band adapted to have its ends expanded to engage it with the drum, a lever pivoted to the support adjacent one end of the band and connected to the band at a point intermediate the pivot and the other end of the band, said lever being adapted to apply radial pressure over a substantial arc of the band, and yieldable means for biasing the lever into contact with the band.

18. In braking apparatus, the combination of a brake drum, a friction member adapted to embrace the major portion of the drum friction surface, a lever for applying radial pressure to the friction member over a substantial arc thereof when the member is applied to the drum, and adjustable means for varying the distribution of the pressure between the friction member and drum applied by said lever.

19. In braking apparatus, the combination of a brake drum, a friction member adapted to embrace the major portion of the drum friction surface, a lever supported at one end and connected to the friction member to be actuated thereby, said lever being adapted to apply radial pressure to the friction member over a substantial arc thereof when said friction member is applied to the drum, the connection between said lever and friction device through which the lever is actuated being circumferentially displaced from the supported end of the lever.

20. In braking apparatus, the combination of a support, a brake drum, a friction device adapted to have its ends expanded to engage it with the drum, and anchor means for said friction device, said anchor means comprising a member carried by the support and connected to an intermediate portion of the friction device, an intermediate part of said member being provided with an arcuate surface adapted to contact and apply radial pressure to a substantial arc of said friction device when it is engaged with the drum.

21. In braking apparatus, the combination of a support, a brake drum, a friction device adapted to have its ends expanded to engage it with the drum, and a member having a portion anchoring on the support and another portion secured to the band, said member being provided with an arcuate surface the curvature of which is substantially the same as that of the internal surface of the frictional device and said member contacting a substantial portion of the friction device and applying a radial pressure thereto when the friction device is engaged with the drum.

STEVE SCHNELL.