TWO-WHEEL CONTRACTING BRAKES Part I

Editor's Note: This article first appeared in Skinned Knuckles *magazine in 1990. Over the years, we have spent a good deal of time discussing brake systems, primarily four-wheel mechanical and hydraulic systems, but the earlier brake systems - say 1927 and earlier - have been, if not ignored, at least minimized.*

The following article addresses both the principles and adjustments of two-wheel contracting brake systems.

On numerous occasions we have observed antique cars being operated with dragging, squealing, and otherwise badly adjusted brakes. Fortunately, vehicles equipped with two-wheel external brakes are not often operated at excessive speeds, and even when badly maladjusted the brakes will have some stopping capability. The prudent driver, however, will want to keep his two-wheel brakes at top efficiency because of the generally marginal performance under the best conditions.

The most important single requirement for satisfactory operation or adjustment of mechanical two-wheel brakes, or any mechanical brake system for that matter, is absolute freedom of movement of all parts of the brake operating linkage. This requirement is often given grudging attention only after an attempt has been made to adjust the shoes, but it is vitally important that all clevises, cams, toggles, shafts, bearings, etc. be freed up first. Clean all joints with solvent, apply penetrating oil, and then lubricate with oil or light grease.

NOTE: Before adjusting any kind of brakes, check and if necessary, adjust wheel bearings and tighten all spring U-bolts.

The second requirement before actually getting down to adjustment of the shoes is to make certain that all operating levers and cranks in the system are properly positioned to exert the maximum leverage. Here it is best to follow factory recommendations, if such are available, but as a general rule, with the brakes fully applied, all operating levers should be at right angles, or a little less, to their actuating rods. The desirability of this condition can best be understood by reference to Figures 1, 2, and 3, which show correct and incorrect lever positions for securing maximum torque or leverage.

A wide variety of equalizers are used in two-wheel brake systems, but the type shown in Figure 4 is very common. With brakes released or applied, the axis of the equalizer cross bar or yoke should be parallel to the cross shaft as shown in Figure 4. An incorrect condition as shown in Figure 5 should be remedied by adjustment of the rod lengths at the clevises. It should never be necessary to cut and re-thread or lengthen brake rods. If sufficient adjustment cannot be obtained at the clevises, it indicates that the system may have

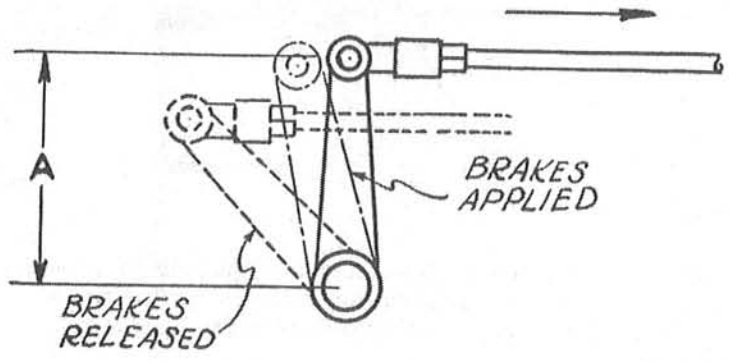


FIGURE 1 — Maximum leverage is obtained when the distance "A" is greatest. This condition is obtained when the actuating rod and the lever are at right angles; however, to provide reserve travel to compensate for wear, the optimum position of the lever when the brakes are applied is just slightly ahead of a right angle.

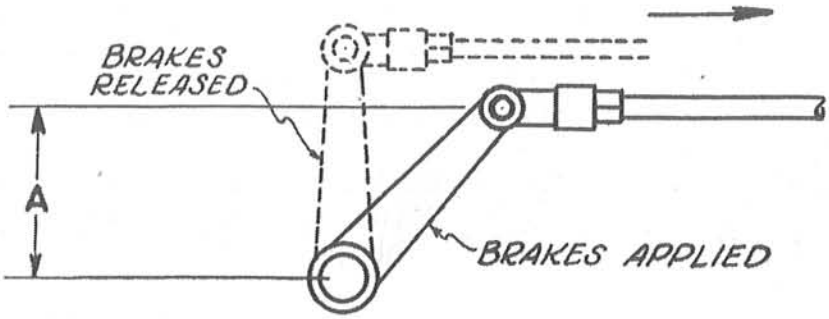


FIGURE 2 — When the brakes are applied the lever is much too far forward. This condition reduces the leverage almost a third compared to the more favorable position as shown in Figure 1.

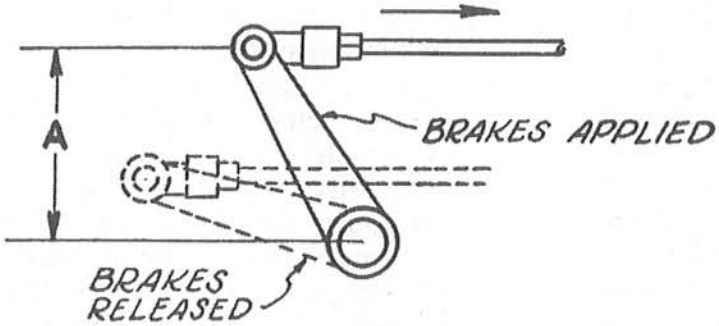
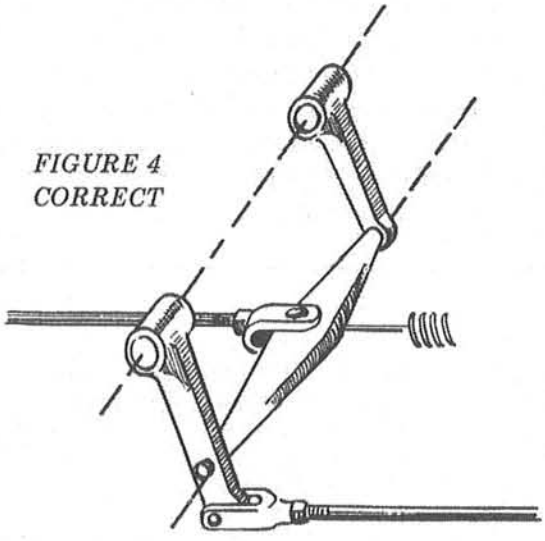


FIGURE 3 — The lever stands too far back when the brakes are applied. There is a loss of leverage comparable to the condition in Figure 2.

been altered or modified, or some of the operating levers may be bent. It is not always readily apparent if a lever has been bent, and you may have to compare it with another lever from an identical brake system to make sure.

Figure 6 shows a typical layout for a two-wheel contracting band braking system. Levers, brake rods, equalizer, and critical lubrication points. are shown. Not all two-wheel brake systems were equipped with equalizers. Now while you are freeing up the brake rods



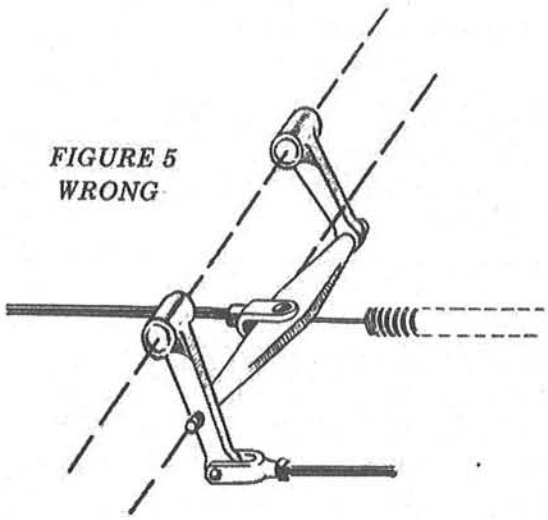


FIGURE 4 — Typical equalizer used on two-wheel brake systems. The axis of the equalizer bar should be parallel to the axis of the lever shafts. This condition should exist when the brakes are applied and also when released. FIGURE 5 — Axis of equalizer cross bar is not parallel with lever shafts. Rod lengths should be adjusted to produce a parallel condition.

and lubricating them, next month we will cover setting lining to drum clearance, testing drums for eccentricity, rounding the bands to the drums, and final brake adjustment.

Now is a good time to replace clevis pins, if they are worn and brake return springs, if they show evidence of corrosion. If your lever pin ends are worn oval or egg-shaped, the holes should be brazed and redrilled. It's almost impossible to get a satisfactory brake adjustment with worn clevis pins and lever pin ends.

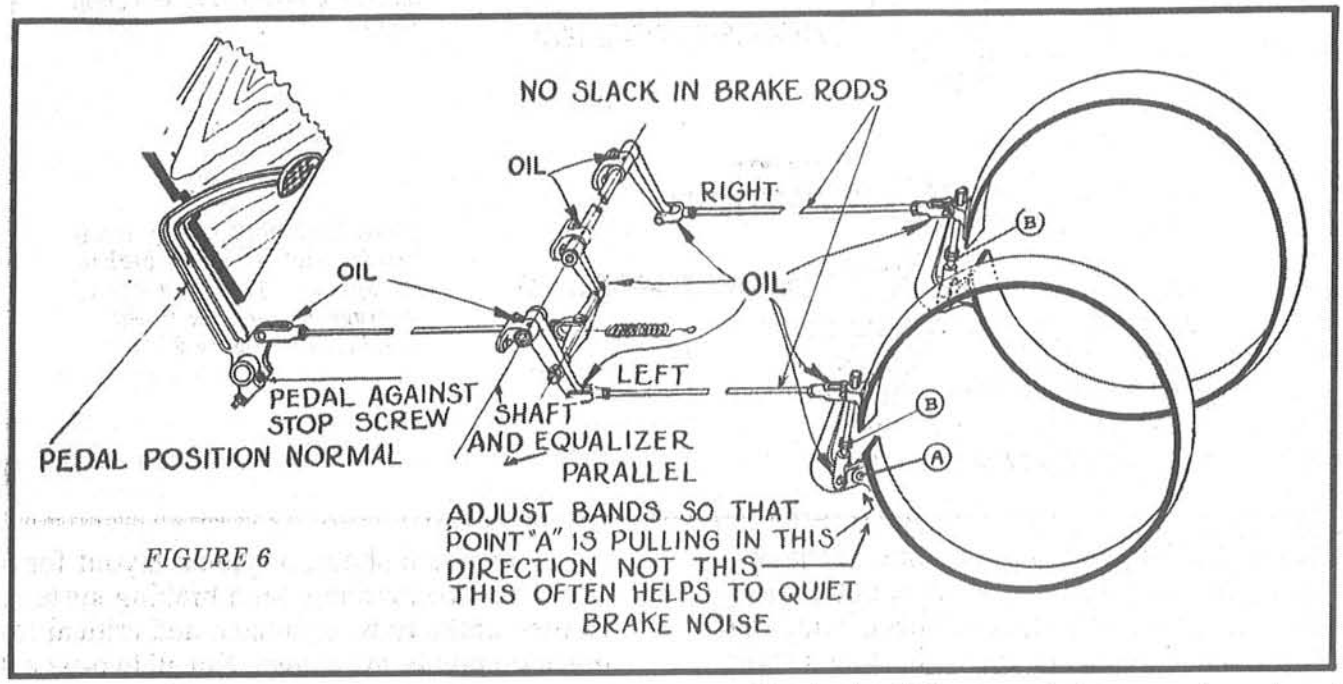


FIGURE 6

TWO-WHEEL CONTRACTING BRAKES Part II

In this article we take up the adjustment of two-wheel external contracting brakes. In Part One we discussed the principles of operation.

While we have endeavored to supply information which is generally applicable to all two-wheel external contracting systems, there are some cars which call for slightly different procedures; therefore, whenever possible, consult your owner's manuals or shop manuals for specific instructions.

Most American cars built before 1927 were equipped with external contracting brakes, at least on the rear wheels. There are some basic differences between external and internal brakes which should be well understood before attempting adjustment.

Lining to Drum Clearance

Repeated use of the brakes causes a rise in temperature of the brake drums. On an external type brake, expansion of the drum due to heating will decrease the lining to drum distance, and the brake will be more inclined to drag or seize. On an internal type of brake, the effect will be just the opposite - the drum tends to expand away from the lining. In an extreme case, the lining to drum clearance may become so great that the pedal will strike the floor and the brakes become totally inoperative.

It follows, therefore, that external brakes should always be adjusted with more drum to lining clearance than internal brakes.

Typical internal brake clearance may be about 0.010" maximum, but external brakes may call for a lining to drum clearance of 0.020 to 0.040" with 1/32" being fairly typical. [Steeldraulic internal brakes usually call for an average clearance of about 0.025" so they are an exception to the internal brake rule cited above.]

Drum Concentricity

Eccentric or slightly out-of-round drums are a frequent cause of unsatisfactory brake action. As a general rule, external band type brakes are much less susceptible to trouble from variations in concentricity of the drum than are internal type brakes. The flexibility of the band and the natural springiness of the stamped drum allow a considerable degree of self correction in the external brake. Therefore while with rigid shoe internal brakes, an eccentricity greater than 0.010" might be considered excessive, a much greater eccentricity may be allowable for an external band brake. Just how much eccentricity can be tolerated we cannot say. The popular brake manuals we have consulted are evasive on this point. They prefer to say, "The permissible amount of out-of-roundness varies with the particular system." Some of the earlier brake manuals ignore eccentricity altogether. Apparently the assumption is made that the flexible band can accommodate any eccentricity likely to be encountered.

Out-of-round drums can be reconditioned by turning or grinding; however, the typical stamped drum isn't very thick to begin with, and removal of much metal is apt to make the drum go out-of-round even worse in just average service. The safe limit for metal removal for the typical stamped drum is only about 0.040" so one turning is about the limit. Some manufacturers do not recommend any reconditioning of drums at all.

Even though we hesitate at this time to specify the maximum tolerable drum eccentricity, it is easy enough to measure it. Rotate the wheel by hand while observing the clearance between the lining and drum at the anchor as shown in Figure 1. The difference between the maximum and minimum clearance, as measured by feeler gauges, is, of course, the eccentricity. Since at least one source indicates that the allowable eccentricity for the Steeldraulic flexible band internal brake system is 0.025" it is likely that an eccentricity of this much is allowable for external band brakes.

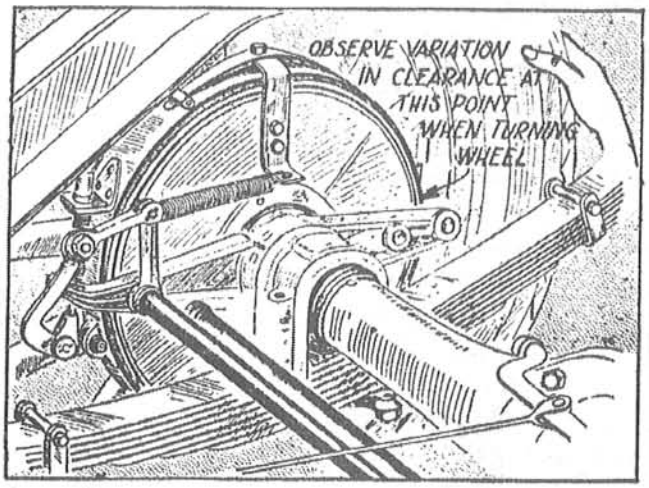


FIGURE 1 — Checking out-of-roundness of drum by measuring lining to drum clearance near the anchor as wheel is rotated by hand.

Rounding of Bands

When it has been established that the eccentricity of the drum is not excessive, the lining to drum clearance should be checked at various points around the periphery of the band. Localized high or low spots may be corrected by rounding the band as shown in Figure 2. A homemade rounding tool can be used to good advantage. A screwdriver or similar tapered tool should never be used as it would tend to twist the band.

Wrapping Action

The external contracting brake band depends for its efficiency in part on the so-called "wrapping" action, whereby a portion of the

band is dragged along by the rotating drum and thus automatically increases the contact pressure. Most external brakes have the anchor located directly across the drum from the ends of the band. With this type of construction (shown in Figure 3), the efficiency of the wrapping action is about the same whether the car is going forward or in reverse.

On some cars the anchor will be located more than half way around the drum, thus the brake will have more wrapping action when the car is moving forward than in reverse. The position of the anchor has little or no effect on adjustment, but such brakes cannot ordinarily be adjusted to stop as well going backward as forward.

Adjusting External Brakes

1) Raise rear wheels and put blocks or jack stands under axle housing.
2) Apply brake pedal on and off, and if brake linkage is sluggish, apply penetrating oil to all connections, bearings and anchor screws.
3) Check wheel bearings for looseness, and adjust if necessary.
4) Disconnect pull rods at clevises, and see that band operating levers are against their stops.
5) Turn the anchor adjustment screw until the lining drags against the drum, then back off until a feeler gauge shows a minimum clearance of 0.010" as the wheel is rotated. There should be no up and down free play of the anchor, and if there is, the parts should be repaired or replaced.
6) Turn the lower adjustment nut (No.2 in Figure 3) until the lower half of the band has a minimum clearance of 0.015" to 0.020". [On some brake systems, the operating lever is inverted so that the pinned end (bottom in Figure 3) is at the top. In this case the pinned end will be adjusted at this time.]
7) Turn the top adjusting nut (No.3 in Figure 3) so that with the brakes applied (use wrench), the lever and pins will be in the position shown in the bottom part of Figure 3. With the brakes released, the top half of the band should not have more than about 0.045" clearance from the drum.

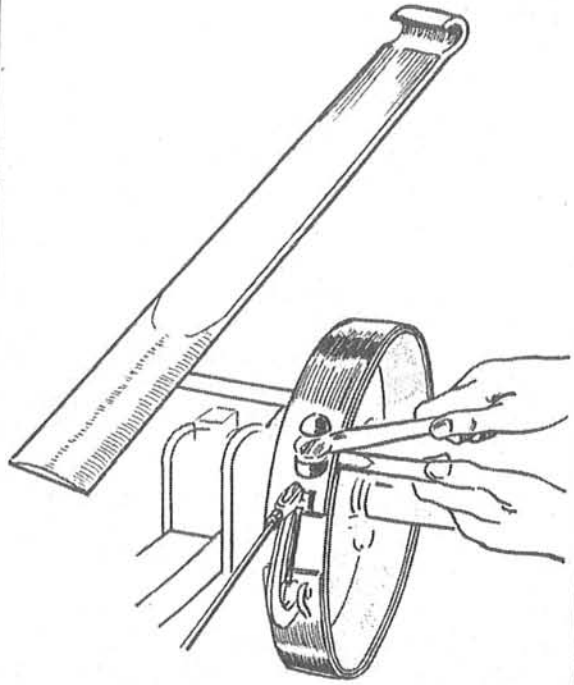


FIGURE 2 — Rounding tool and its use in correcting high or low spots in band.

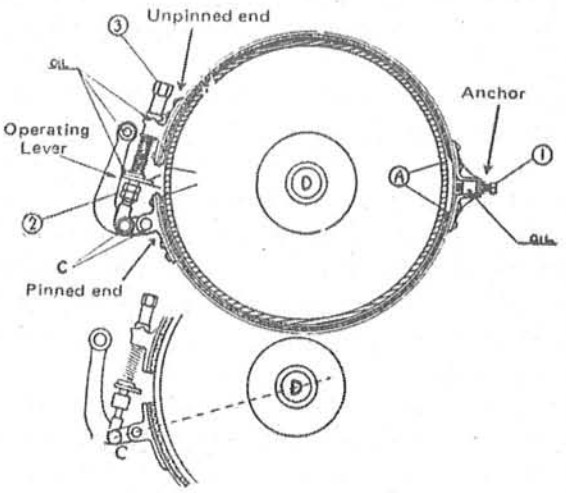


FIGURE 3 — Conventional external band brake. Adjustment is usually in sequence shown in 1, 2, and 3. Lower part of view shows that when the brake is applied, the center lines of pins C should line up with the center of the drum.

8) Repeat the operation for the other wheel.
9) With both bands adjusted to these specifications, reconnect the pull rods. Note the angles of the levers operating the pull rods. They should stand about as shown in Figure 4 with

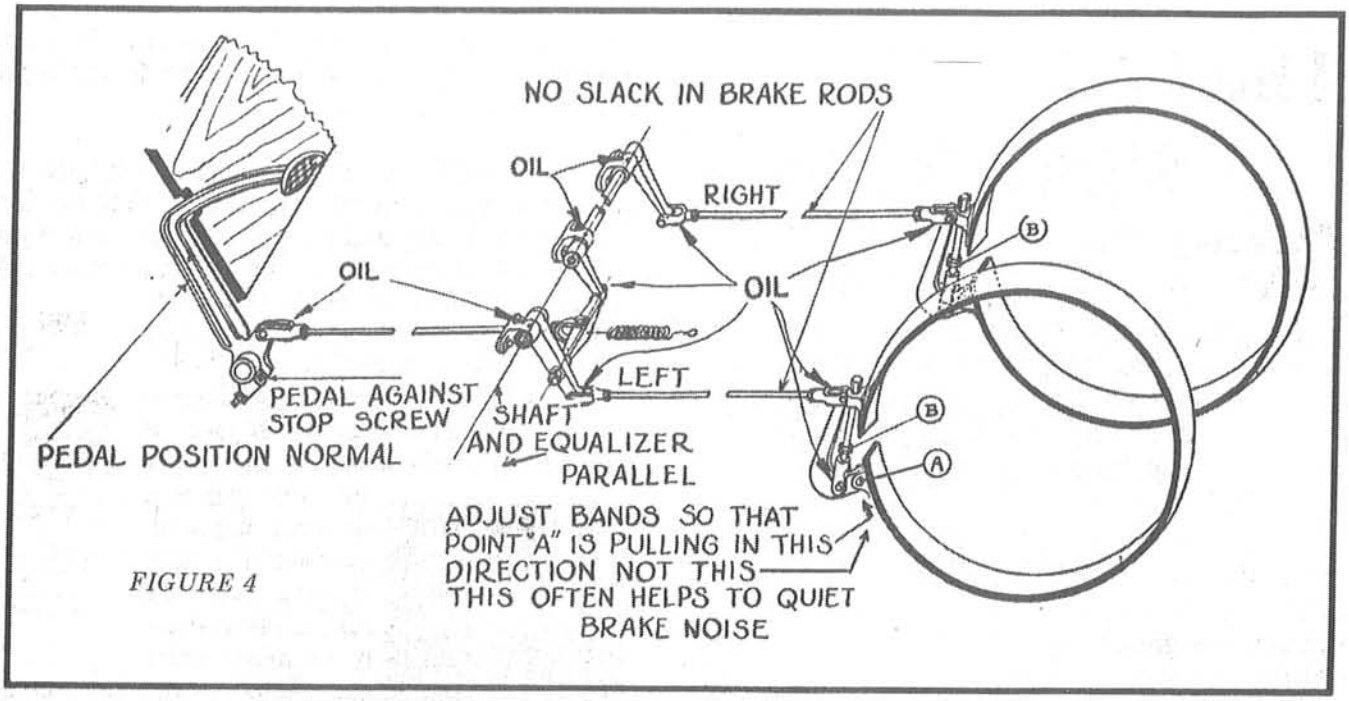


FIGURE 4

the brakes released. With these levers at the angles indicated, adjust the pull rod clevises so that the rods can be connected without pulling the operating levers away from their stops. Also be sure that the equalizer bar is parallel.

10) Try the pedal travel. Brakes should be fully applied and wheels locked before pedal travels more than ¾ way to floor. If pedal travels almost to floor, disconnect brake rods and remove all slack by clevis adjustment or replacement of worn clevises, bushings, joints, etc. Removal of slack must be accomplished without moving band operating levers from their stops.

11) Road test car for equal braking. If one wheel locks before the other, loosen the top adjusting nut (No.3 in Figure 3) and try again.

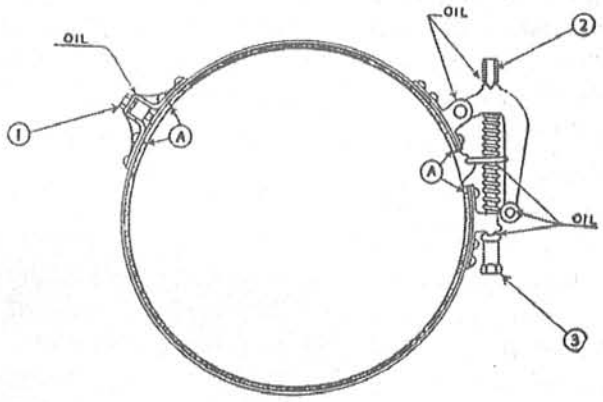


FIGURE 5 — On those few cars equipped with the inverted operating lever shown above, the procedure for adjustment is the same as outlined above except that the unpinned portion of the band is at the bottom. On this type of linkage, the sequence of adjustment is anchor first, then top nut, and lastly the lower nut.

In addition to the anchor assembly and operating lever shown in Figures 3 and 5, many external brakes will have an auxiliary spring device at the top of the band. The function of this spring is to prevent the band from rubbing on the drum due to the force of gravity. A typical device of this type can be seen in Figure 1. Ordinarily no adjustment of this spring is required, but it may break due to corrosion. In this case, replacement is advisable.

S.K.

The above articles (Parts I & II) cover the description of the contracting two-wheel brakes, and the adjustments of the brakes. Next month we will complete this series with an article on relining contracting brakes from *Skinned Knuckles*, November 1990.