only the brief statement before given, it is conclusive that a charge of $5.00 per car per day was to reimburse the carrier for the loss of freight earnings sustained through the detention of cars beyond the specified free time, and the consequent inability to accommodate other shippers with the transportation for which they were urgently calling. On the same theory carriers are entitled to a penalty of $5.00 per car for each day's undue detention during periods of traffic congestion, when all available cars would readily earn $5.00 or $6.00 per day. Unless I greatly mistake the aforesaid decision, it portends that if the matter goes to the commission (as seems likely) or it be referred to congress, the result will be the adoption of a penalty of $5.00 per day for the undue detention, misuse or diversion of a car contrary to the wishes of its owner; and such rule should be made enforceable against all delinquents, whether railroads, shippers or individuals. With that expectation the probability of government interference should not be regarded with apprehension, but should be welcome, especially as the railroads have thus far shown inability to strongly assert and fully protect their rights as car owners.

In support of the belief that a charge of $5.00 per car per day for the undue detention of equipment would be upheld, we have the government on record to that extent. The United States owns and operates the Panama Railroad, and when (a year or so ago) work upon the canal across the isthmus was impeded owing to abuse (by local patrons) of the railroad company's cars as warehouses, in order to release the same, a penalty of $5.00 per car per day was imposed. The report of the officer in charge was that the penalty mentioned had the desired effect. Having established an excellent precedent as above, it is reasonable to expect the authorities would be consistent and follow it.

Lest some may feel that the reflections contained in my former circular were rather severe and that this later presentation might perhaps have been withheld, the following from a railway president, who, in addition to his influence as the active head of large corporate and commercial interests, is possessed of high legal attainments, will be reassuring:

"I am greatly interested in the establishment of this penalty, and the voice of our company was cast in its favor. Our company has suffered very much from the evils, the remedy for which you ably discuss in your Circular Letter No. 2. The improper diversion of cars from the railroad lines owning them to the uses of those lines which for various reasons may see fit to appropriate them is an enormous evil, and very little has been done toward correcting it.

"Of course the 50 cents per diem charge has had some effect, but in times of great demand for equipment the small charge of 50 cents per day has very little effect in securing the rights of the owners of cars.

"I hope you will follow this matter up energetically, and that in the end something may be accomplished to prevent the abuse which has so long continued."

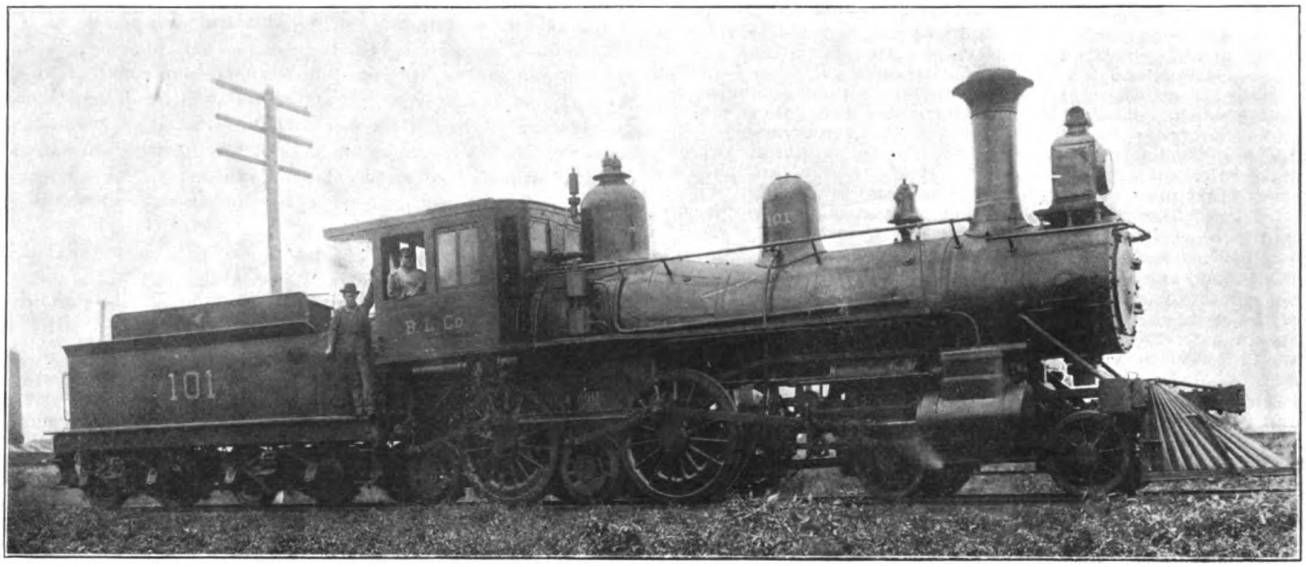
Advices similar to the foregoing have been received from others, but the quotations made will suffice to show that we are fully warranted in the course pursued.

THE BOTHWELL LOCOMOTIVE.

The accompanying engravings illustrate a locomotive which embodies a most ingenious device for permitting the working mechanism to be changed at will so that it will be adapted to the various conditions found on a road that has heavy grades. This is the invention of George A. Bothwell, who has organized the Bothwell Locomotive Company, with headquarters at Owen Sound, Ontario, Canada.

The principle involved in the design will be readily understood by reference to the engravings. It consists, first, in providing a second set of driving wheels which are of smaller diameter than those which will be used ordinarily, so that a locomotive with cylinders of a certain size can be given a greatly increased tractive power by shifting the weight from the large drivers to the small drivers when the need for exerting this extra tractive power arises. Supplementing this, the design also provides for utilizing the wheels of the locomotive truck and of the tender as driving wheels when it is desired to exert the maximum tractive power.

Assuming that the schedules are arranged so that the steaming capacity of the locomotive limits the trainload which it can handle on level track or light grades, and that the weight governs the load which can be hauled up the heavier grades, it is apparent that the maximum tractive power of the Bothwell locomotive should be at least more than double the tractive power when using the larger drivers, inasmuch as the weight available for traction is that of the entire locomotive when it is operating with the small drivers and the wheels of the engine trucks are also thrown into gear.



The Bothwell Locomotive.

The locomotive illustrated is one which has been recently rebuilt at the Hicks Locomotive & Car Works, Chicago, according to the designs of Mr. Bothwell. It has cylinders 17 by 24 inches and four driving wheels 56 inches in diameter. The additions made comprise four driving wheels 32 inches in diameter and the gears and shaft necessary to connect the axles of the small driving wheels with the axles of the engine truck and the shifting device by which the load ordinarily carried by the large drivers is thrown upon the small drivers when desired.

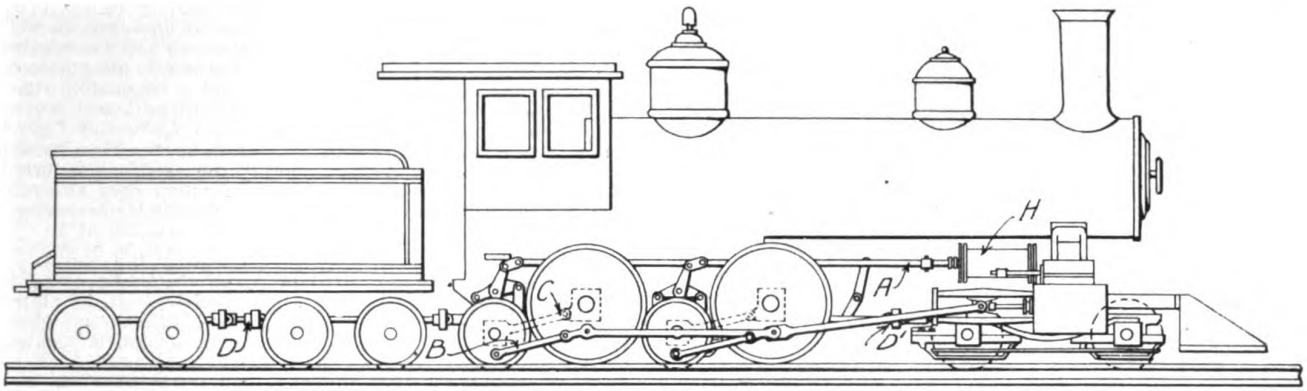
The shaft referred to is 4½ inches in diameter and is provided with a universal coupling to permit of the truck moving in a lateral plane with reference to the frame of the engine. The experimental locomotive which has just been completed is not arranged for coupling with the tender wheels, but it is apparent that it will be a very simple matter to add another coupling, as at D, in the engraving, and to place a

shaft under the tender. Each of the axles to be driven when the small drivers are used is provided with a 24-inch cast-steel bevel gear, while on the shaft are pinions, also of cast steel, 20 inches in diameter on the pitch circle. For throwing these gears into mesh a lever, operated by air or steam power, as may be desired, is used.

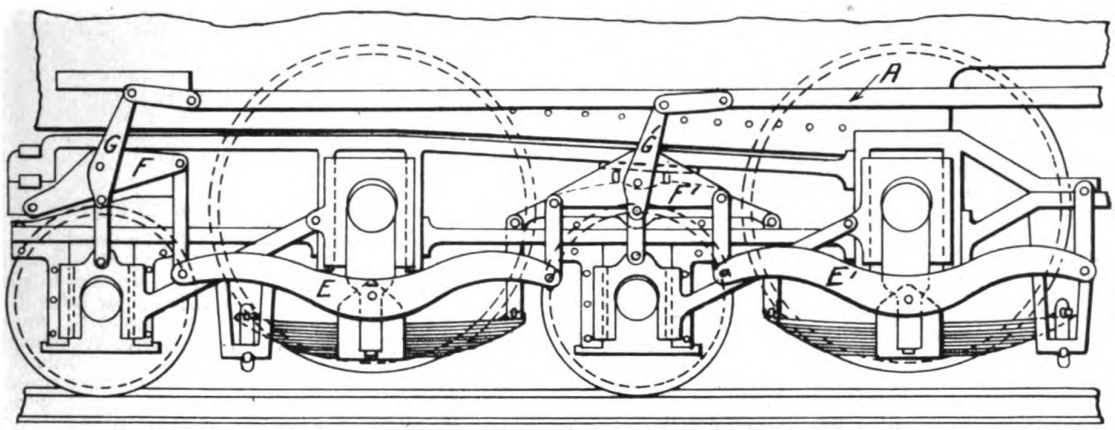
In order to provide for the shifting of the weight to the small drivers it was necessary to add a second set of equalizing bars, as shown in one of the accompanying engravings. The equalizing system for the large drivers is the same as would be ordinarily used. Referring to the longitudinal section showing the shifting mechanism it will be seen that the auxiliary equalizing system consists of the levers E and E', pivoted at their centers to the spring hangers and the levers F and F', with the necessary links to connect E and E' to F and F' and to the locomotive frame. The levers G and G' are pivoted to F and F', respectively, and from the short ends of the levers G and G' the journal boxes of the axles carrying the small driving wheels are suspended by suitable links. The long ends of the levers G and G' are connected through links to the shifting rod A. By throwing the rod A to the left the small drivers are lifted a distance of 3½ inches relative to the large drivers, permitting the large drivers to come down upon the rails and giving the small wheels 2½ inches clearance. When the small drivers are in service the large drivers are one inch above the rail. The auxiliary side rods marked B in the engraving drive the small wheels at all times. The axles for the small drivers are supported in journal boxes which by means of the radius bars C, shown dotted in the engraving, are always kept at the proper distance from the main driving boxes. These radius bars and the auxiliary side rods are always parallel, and when the shifting is done the axles of the small drivers are rotated through a small arc about the axles of the large ones.

The shifting device is actuated by a cylinder 10 by 29 inches, which is placed at the side of the frame in the rear of the engine cylinder. This cylinder is operated by steam or air as may be desired, and the shifting of the weight from the large to the small drivers may be accomplished while the locomotive is in motion, thus avoiding the necessity of stopping and acquiring headway when it is desired to mount a grade.

A representative of The Railway Age recently had the opportunity of witnessing a trial of this locomotive. Operating with the large driving wheels, the locomotive could haul a train of 25 cars up the given grade. When thrown on to the small drivers, the number of cars handled with ease was 45, notwithstanding that with this number the locomotive had to start well up on the grade and that there was a sharp reverse curve in the test track which made the conditions unfavorable.



The Bothwell Locomotive—Elevation.



The Bothwell Locomotive—Auxiliary Equalizing System.

The Bothwell locomotive is designed for service on lines which have numbers of heavy grades, 1 per cent or over.

BRUSH CREEK VIADUCT ON THE ALABAMA WESTERN—A CORRECTION.

In the drawing showing a typical tower of the Brush Creek viaduct which was illustrated in The Railway Age for July 26, page 107, there was an error in the dimensions referring to the spacing of the girders at the top of the structure. The drawing shows the distance from center to center of the present girders as four feet; instead of this it should be eight feet. Also the additional girders needed when a second track is installed will be placed eight feet from the present girders instead of four feet, as shown in the drawing. The reference to the location of additional girders in the text on page 105 should read: "One additional deck plate girder span will be added to each side of the viaduct at a distance of eight feet from the center of the present girder."