

THE ENGINES ON THE NORTH LONDON RAILWAY.

FIG 2

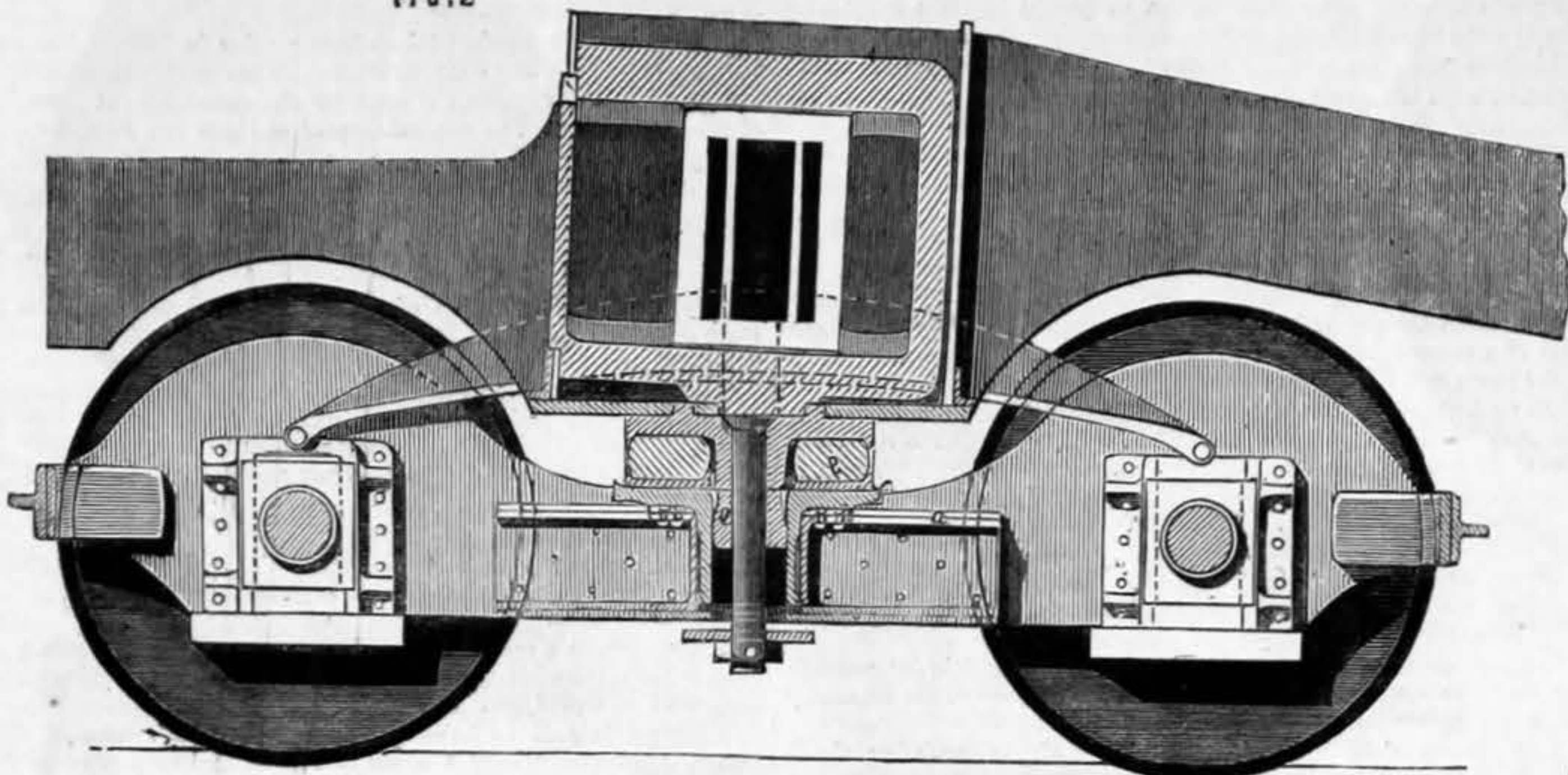


FIG 3

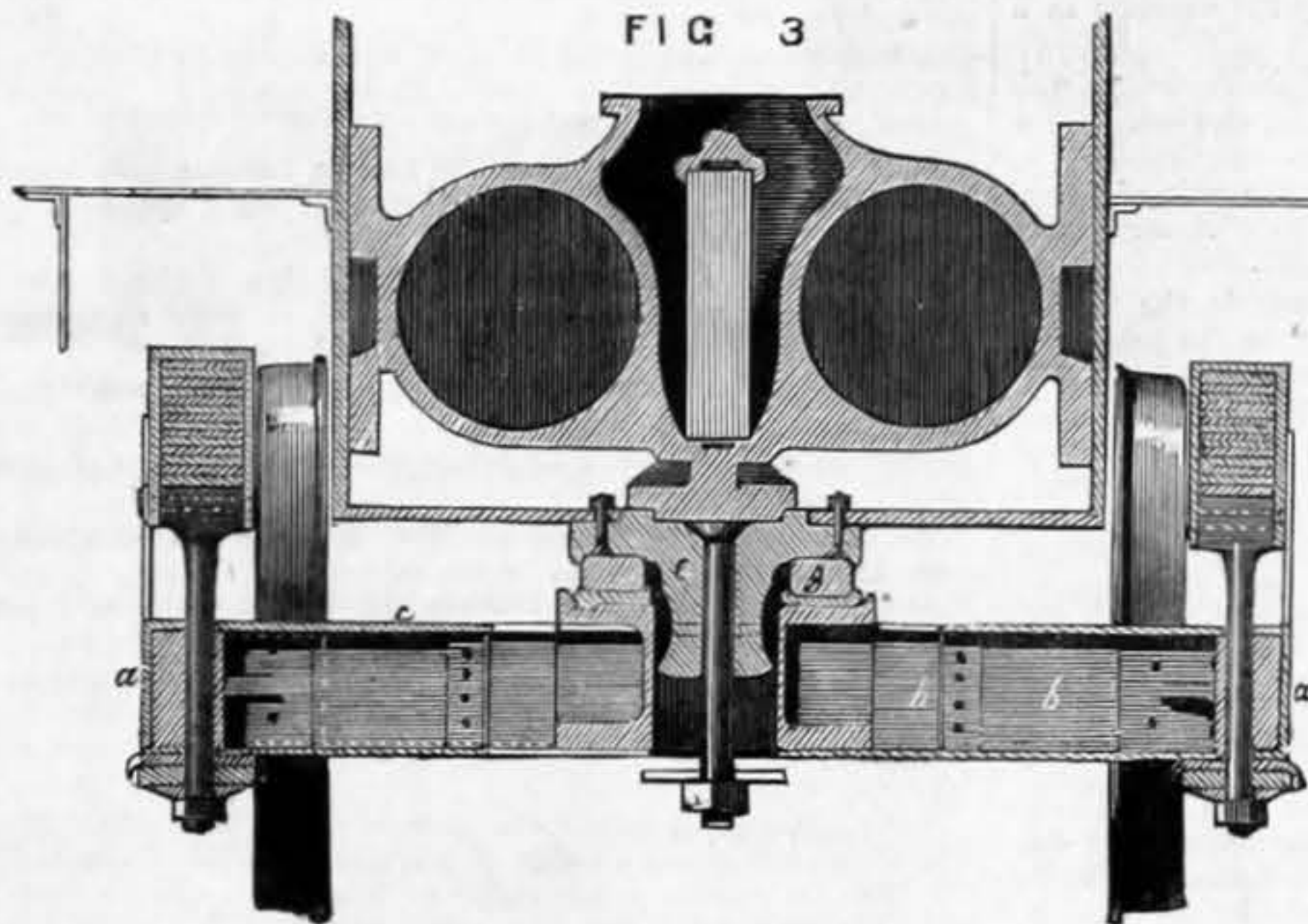


FIG 4

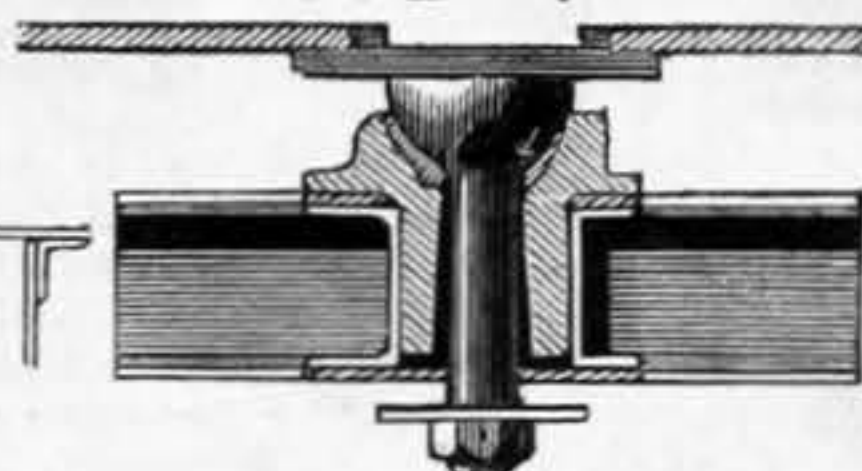
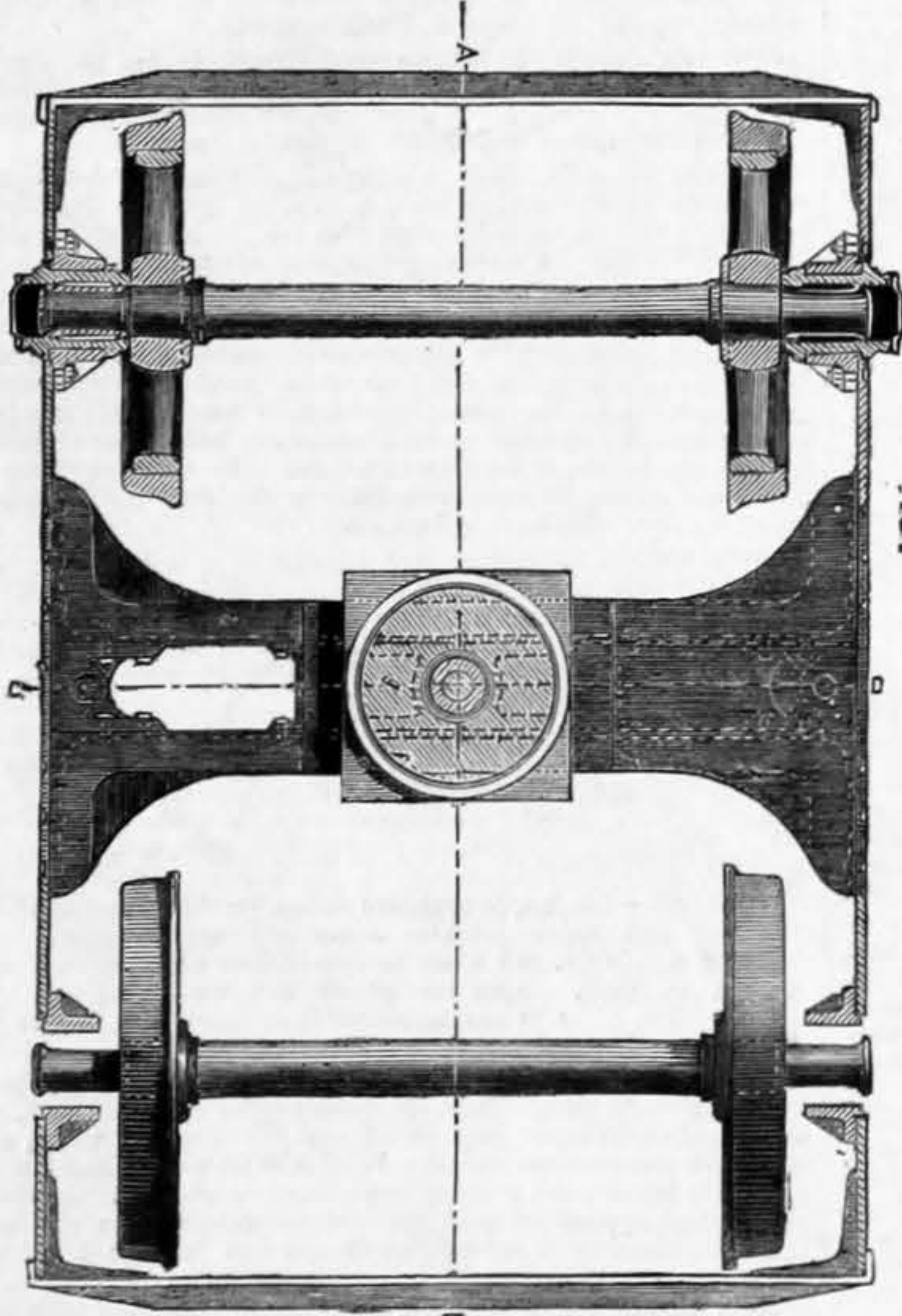
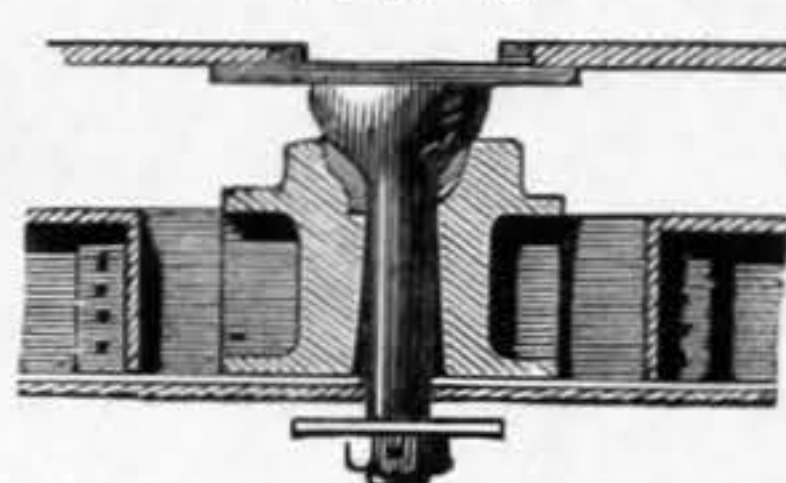


FIG 5



substantial improvement deserving some attention at our hands. The accompanying engraving will, we think, make its construction perfectly clear.

In Figs. 1, 2, 3, a, is the bogie frame, with its four wheels as usual. Across the centre of the frame, from c to d, are placed a pair of bearers or girders b, made of angle iron; the ends of the girders are connected by the top and bottom plates c, and are secured, as shown, to the sides of the bogie frame. In the centre space between the girders a rectangular sliding block d is placed, provided with a circular hole to receive the bogie pin e. The bogie pin is attached to the engine or boiler as usual, and fitted with the ordinary ball-and-socket arrangement. The play of the sliding block d is limited by stops h, h.

The lateral sliding motion, amounting in practice to about 4in. at each side of the centre on curves of four chains radius, thus provided for, we have yet to consider the means by which the tipping action, to which we have already alluded, is prevented. This is effected by placing a flat circular disc of india-rubber between the sliding blocks and the bogie pin. The surface is thus extended and stability obtained. The rubber, shown at g in Figs. 2 and 3, only carries a pressure of about 100 lb. per inch, and is therefore durable and elastic.

The advantages claimed for this bogie may be briefly summed up. The central bearing of the ordinary bogie is retained, and traversing as well as swivelling motion is given around the bogie pin. The bogie frame being relieved from all lateral strain it can be made much lighter, and, consequently, simpler and cheaper; the expensive forgings and diagonal braces used in English bogie trucks are dispensed with, and two pieces of angle iron are rivetted to the side frames, and stiffened with 7in. plates, which serve as diagonals. The india-rubber block which takes the weight yields to any twist in the rails, the same as the cup and ball generally used, but it has the advantage of bringing the bogie frame always to the level position when on a level road.

The interposition of a spring effects some saving in wear and tear, and the loosening of the rivets of the bogie frame, and the engine runs much more quietly in consequence.

This bogie appears to possess a certain advantage over radial axle boxes in the fact that the weight of the engine rests on three points, viz., the centres of the compensating levers and the bogie pins, whereas in the radial axle-box arrangement it rests on four or six points.

Now, as a three-legged stool cannot rock, so an engine with a bogie and compensating lever between the springs of the fixed wheels is little affected by any irregularity in the surface of the rails, within the range of the play of the axle-boxes, amounting to 3in. or more; whereas, in radial axle-box engines, as in engines of the ordinary construction, the weight, when on an uneven road, gets on cross corners, and tends to cause the engine to mount the rails.

It is possible that the excellent disposition of weight upon the wheels which the bogie system admits of is the reason it has met with so much favour in the United States, and not so much on account of its advantages for passing round sharp curves.

ROYAL NAVAL ENGINEERS.

WHEN the engineer officers of the royal navy prepared a statement of the disabilities under which they considered that they were labouring to be laid before the Select Committee of the House of Commons, appointed in 1863 to inquire into the subject of naval promotion and retirement, the points to which the greatest importance was attached, and which they were most anxious should be brought under the notice of Parliament, were the following, viz.:-

1. That ordinary pensions should be granted to the widows of engineers and assistant-engineers.
2. That all time served should be allowed to count for increase of full and half-pay, on attaining the rank of chief engineer.

3. That a proportionate increase of full and half-pay should be allowed annually, instead of at intervals of five years as at present.

4. That improvement should be made in the present anomalous position of the inspectors of machinery afloat as regards full and half-pay.

But as the inquiries of the committee did not embrace matters of a financial character, and as the officer selected to give evidence on behalf of the engineers was directed (*vide* Blue-Book, quest. 3387) to confine himself to such remarks and suggestions as did not include the question of pay, those points, though most important, were almost excluded from consideration; and although some of the minor inconveniences from which the engineers were then suffering have been since partially removed, and some of the suggestions made to the committee have been acted upon; yet the position of the engineers, as regards the matters above enumerated, is even less satisfactory at the present time than when the statement above referred to was prepared; inasmuch as the retrospective action of the Circular, No. 60, dated 12th October, 1863, by which the standard of qualification was very considerably raised, has left several officers who have rendered long and valuable service without the least hope of promotion to the rank of chief engineer; and further, the rate of promotion to that rank is now so slow, that those who are fortunate enough to reach it do so only after a service of from twelve to fourteen years, and consequently the disproportion between the time actually served, and the small portion of it which is acknowledged, viz., four years, is daily increasing.

No provision exists at present for the widows of the engineers and assistant-engineers of the navy, unless in the event of their husbands being killed in action, or losing their lives in the performance of an immediate act of duty; though, from the very arduous and exhausting nature of the service rendered by these officers, many come to an untimely end as though they had suffered a violent death.

In preferring the request that all time served should be allowed to count for increase of full and half-pay on attaining the rank of chief engineer, the engineers of the navy feel that they have a very strong case, inasmuch as the principle involved is very widely conceded in various branches of the public service; and since before a candidate is eligible for entry in the navy as assistant-engineer he must have arrived at manhood, and have acquired the various qualifications, educational as well as practical, requisite to fit him for the immediate performance of duty of a highly responsible character, the magnitude and responsibility of which duty is not to be measured simply by the value of the machinery entrusted to his care (costly though that undoubtedly is), but by the consideration of the fact that, from negligence or incapacity on his part an important service might be either delayed or totally frustrated, involving consequences of incalculable moment to the country at large; it is therefore submitted with great confidence that such services should not remain unacknowledged as at present, when only four out of twelve or fourteen years' servitude are allowed to reckon for increase of full and half-pay.

The request that a proportionate increase of full and half-pay should be allowed annually is submitted on account of the very great hardship experienced by those officers who, from illness or other cause, may be removed, temporarily or permanently, from active service, at a time when a large portion of the present required term of five years has been served, and who, for want of the remaining portion of the term (possibly only a few weeks or even days) are deprived of a very large fraction of their income, in some cases as much as one-fourth being thus lost to the officer. This would be remedied by a proportionate part of the increase now granted at intervals of five years being allowed for each year's service; and while the concession of this request would be considered a great boon by the officers interested, the difference to the estimates would be so trifling, when spread over the five years, as to be scarcely worth notice.

The position of the inspectors of machinery afloat is anomalous in the highest degree, and calls loudly for improvement. These officers, who are entrusted with the supervision of machinery of immense value, and upon whose judgment and talent the maintenance of a steam fleet in a state of continued efficiency almost entirely depends, are remunerated at a rate wholly incommensurate with the magnitude and importance of their duties. Of all naval officers of corresponding rank, they are by far the worst paid; and the difference between the pay of a senior chief engineer and that of an inspector of machinery afloat is so small as scarcely to offer any inducement to an officer to assume the increased responsibility; in fact, it would be possible for a chief-engineer, who may be so fortunate as to attain to the highest rate of pay, to receive a greater remuneration (including "charge allowance") than his superior officer, the inspector of machinery. A progressive scale of pay for each year's service is required to remedy this anomaly, as, at present, an inspector of machinery receives no greater emoluments after a lengthened period of service in that rank than when first promoted to it. But if the position of these officers be considered with reference to their half-pay, the anomaly becomes even more striking. Under present regulations they are allowed only the same scale of half-pay as they would have been entitled to as chief-engineers, their services in the superior rank of inspector of machinery afloat being entirely ignored; and it is quite possible that a chief-engineer, holding equivalent rank with a lieutenant in the navy, may be in receipt of a rate of half-pay; equal, and even superior to that allowed to an inspector of machinery afloat, holding equivalent rank with a post-captain.

The engineers of the navy are desirous of directing especial attention to the suggestions made in the evidence given before the Select Committee (*vide* Blue-Book, questions 3411-2) relative to the appointment of an inspector of machinery as part of the staff of each commander-in-chief, and the creation of an intermediate rank of deputy inspector of machinery to serve under each junior flag officer or commodore; which, if carried out, would open a field for promotion, and confer rewards upon talented and deserving officers. The duties which these officers would have to perform are now executed by the chief engineers of the flag ships (excepting on the Mediterranean station, in China, and at the home ports, where inspectors of machinery are already employed), who receive no allowance for the extra responsibility thus imposed upon them, and who, being frequently junior to the chief engineers of some of the other ships of the squadron, find themselves in very unpleasant positions when called upon to criticise the opinions or conduct of their seniors.

That the evils above complained of are real, not imaginary, is proved beyond question by the fact that the engineers of the merchant service, who must be allowed to be competent judges of the importance of the duties performed by engineers at sea, have shown themselves particularly averse to surrendering their freedom by enrolment in the Royal Naval Reserve. Of nearly 900 certificated engineers of the merchant navy, from amongst whom the required 300 for the Royal Naval Reserve have been sought, only two have as yet been enrolled, though there has been no corresponding difficulty in inducing officers of the executive class to join that valuable national force.

The numerous mechanical appliances for reducing manual labour, which are introduced into our present ships of war, render the services of experienced and scientific engineers of ever increasing value to the country. The engineers of the royal navy, therefore, trust that their case will receive the favourable consideration of the authorities; and that their requests, as set forth in the foregoing statement, will be granted, since they believe them to be based upon principles of justice and moderation, and calculated to promote the general interest of the naval service.

1st January, 1866.

Note.—The Blue-Book referred to in various parts of the above statement is the "Report of the Select Committee of the House of Commons on Navy Promotions and Retirements. 1863."

MR. WILLIAM ADAMS, the locomotive superintendent of the North London Railway, has for some time past laboured to overcome the defects of the ordinary four-wheel bogie as used in this country and the States. One of its principal defects lies in the fact that it only possesses the power of swivelling round a central pin. When an engine with four drivers and a four-wheel bogie are driven round a curve, it will be found that a plummet dropped from the forward buffer beam will touch the ground at a point removed outwards to a greater or lesser distance from the centre of the track, by an amount determined by the radius of the curve and the length of the engine. Again, the weight of the engine is not confined to a central point, and, as a result, at points where an incline commences on a curve, and the outer rail is raised, a sharp twisting strain is imparted to the entire machine. To avoid this the bogie pin has been made spherical in order that the truck may be enabled to accommodate itself to the irregularities of the road. This arrangement has hitherto not proved very successful—the bogie dipping in front under the influence of a thrust coming above the point of resistance at the rails.

The bogie invented by Mr. Adams, and applied to the North-London Railway locomotives, has been tested now for a considerable time with such results that we may consider the new bogie a