Improved Wagon Wheel.

The chief peculiarity in this wheel is the method of mortising the hub, cutting the tenons on the spokes, and inserting the latter in the hub.

Fig. 1 shows the hub with a portion cut away to show the method of inserting the spokes. Fig. 2 shows the form of tenon on the spoke, and Fig. 3 shows the method of mortising the hub.

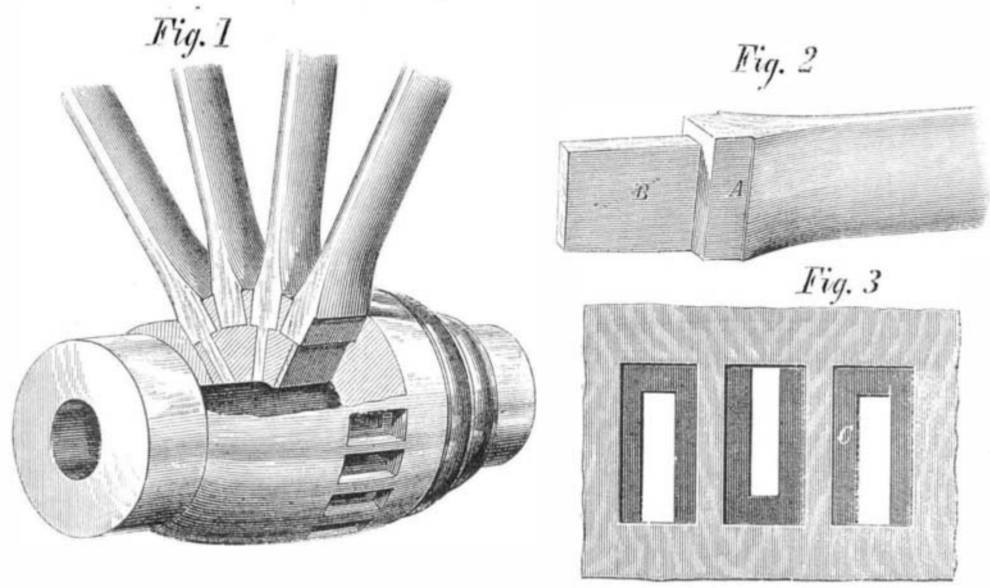
By referring to Fig. 2, it will be seen that a partition of the tenon, marked A, is cut as on ordinary spokes. Below this the wood is further cut away, as shown at B, making a smaller tenon, and leaving a shoulder on three sides of the tenon, which, when the spoke is driven home, rests upon the ledge or shoulder, C, Fig. 3, formed in the mortise to correspond with the shoulder on the tenon.

It will be observed that the shoulders in every alternate mortise are reversed in position, and the spokes are to be driven accordingly, so that they stand as shown in Fig. 1.

By this means, the hub is not cut away so much in its center, and a very small and light hub may be made to be very strong, so that it is claimed a prettier wheel, with ample strength, is secured. It is also claimed that the wheel is more elastic than the old style of wheel, and therefore less likely to break axles, so that, even for large and heavy wheels, the method is a decided improvement. Where machinery is employed to do the tenoning and mortising, the improvement will not add materially to the cost of the wheel, and even with hand work the increase of cost would be trifling.

The spoke is strong just where it needs strength, namely, at the shoulder, and the hub is strong just where it requires most strength, at the middle. The principle of construction is sound, and we have no doubt an excellent wheel may be made in this way.

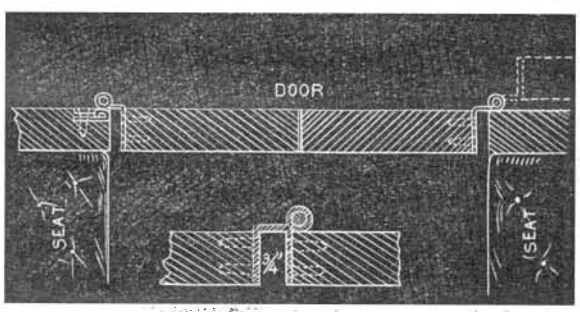
Patented through the Scientific American Patent Agency, January 2, 1872, by Christian Anderegg, of Lawrenceburgh, Ind., whom address for further information.



ANDEREGG'S WAGON WHEEL.

Car Doors.

A correspondent of *Engineering* proposes the following construction, to prevent injury to passengers by the accidental placing of their fingers on the door jambs:



It is to leave a space of three fourths of an inch between the door and the frame, so that it would be impossible for the door to tighten upon the fingers, should they be in the space. This might be done in existing carriages by cutting away the frame, or reducing the door, or both; but best of all by a new door made narrower than the doorway.

Narrow Gage.

It is now a little more than a year since the *Railroad Gazette* first took issue with the advocates of the narrow gage, and denied their main proposition, which was that "the dead weight of trains is in direct proportion to the gage on which they run." For this denial, we were assailed from all sides. We were denounced as "enemies of progress and civilization." It was said we "did not understand what we were writing about." We were requested "to revise our theories" if we "wished to promote the public service and add to our scientific reputation," and we fear we were regarded by the advocates of the narrow gage as being afflicted with what Artemus Ward was in the habit of calling "pure cussedness." Being human, it therefore gave us much pleasure to find, on reading the report of the Pennsylvania Railroad Company, that the President had taken the same ground, in relation to this question, that we have advocated. He said: "The saving, in dead weight of machinery carried, by one system over the other is not important, as the heavy engines and cars used upon the usual gage (four feet nine inches) are not due to the width of the track, but to the necessity of maintaining higher speeds and the movement of heavier loads, than is obtainable with economy and safety on the narrow gage. The equipment now used on the narrow gage is heavier than that formerly used upon the four feet nine inch lines."—*Railroad Gazette.*

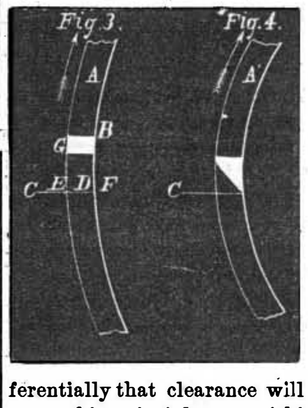
An Asiatic Railroad.

England seems to be successful in once more imparting vigor to the "sick man" of Europe—Turkey—with the same old object of counteracting the evergrowing influence of Russia; this time, however, by more peaceful measures than of yore. The project now on foot is the construction of a system of railroads through Asia Minor and the intervening countries—Persia and Afghanistan—to India. This time England seems to be in earnest, for a section of railroad from Scutari to Ismid is almost completed, being made in superb style, with steel rails and other modern improvements. From Ismid, the road is to be conducted in a southerly direction towards and across the Taurus mountains. Great difficulty appears to be anticipated in finding a convenient pass through this rugged chain, but it is also set down as the only drawback. When once the Taurus has been crossed, a branch is to be extended towards Smyrna, and to the British settlement at Aleppo, to establish the vital connection with the Mediterranean, and liberate the undertakings of the western power from the direct influence at the Bosphorus. The eastern progress of the road will naturally be slow, because its construction will be very expensive; but its importance to the commerce of the world cannot be overestimated. The road will not only bring the East Indies into much more rapid communication with the civilized world, but will open immense tracts of agricultural and mineral lands that were hitherto hardly known by aught but their names. The political significance of the enterprise cannot be without interest, even at this distance. It will be a strife who will be ahead in Afghanistan, England with her road or Russia with her soldiers. The final possession of the East Indies may depend to a great extent on the results of this race.

ROTARY ENGINES.

In our last article, we explained that the working of the abutment constituted one of the most important problems we have to deal with; it may be well to explain here that the reason, for making the piston so narrow as four inches for an engine of 150 horse power, lies in the fact that by so doing we reduce the travel of the abutment. If the velocity of piston and abutment are identical, then four inches will intervene between the abutment and the piston at the moment the first is home. Steam is admitted at the same moment, and we have four inches of clearance. The waste of steam in this space will be considerable if the engine is worked very expansively, for if we suppose the diameter of the circle described by the center of effort, to be, say, 9 feet 8 inches, and the circumference to be 29·3 feet, then, if the steam is cut off at 0·1, it will be admitted for but in round numbers 3 feet; and 4 inches would be one ninth of this, and therefore an enormous clearance; not all dead loss, it is true, but still a loss to be avoided, above all in an engine intended to be theoretically perfect. One mode of reducing the loss, as we have already explained, consists in sloping off the back of the piston so that a portion of the waste space will be filled up; by this means, the clearance can be reduced one half. The arrangement will be understood from the accompanying diagram.

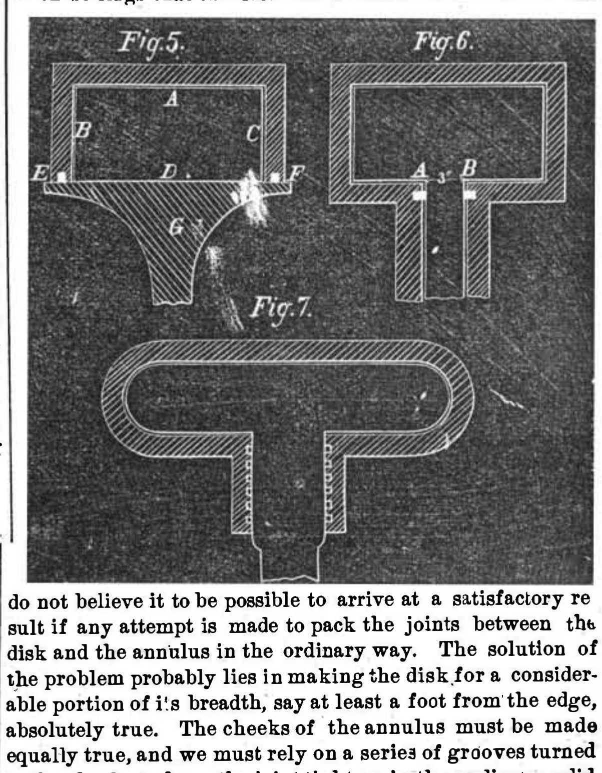
In figure 3, A is a portion of the annulus, B is the piston with sides nearly in the plane of the radius of the annulus; C is the abutment. The abutment begins to close at the moment the back edge of the piston passes the point E; but while the abutment is moving from E to F, the piston has advanced from D to G. This is the clearance space.



In Fig. 4, it will be seen that the back of the piston is sloped off at such a rate as just to keep out of the way of the slide, and thereby the clearance is reduced one half. If we also slope off the abutment and make it very thick, we may virtually get rid of the clearance difficulty altogether. It may, therefore, be laid down as a principle that it is possible so to shape an abutment working vertically and a piston working circumferentially that clearance will be done away; and further more, this principle can, within reasonable limits, be so applied that it will be unnecessary to impart a very high velocity to the abutment, because the piston may be supposed to travel a couple of feet while the abutment is moving through not more than four inches. There is a grave practical difficulty to be got over here, however, which is that as much of the outer ring of the annulus must be removed as the abutment is long—or rather thick—and as this space is not filled up when the abutment is withdrawn, the packing ring of the piston would be destroyed by flying out and catching the edge of what we may term the abutment port. Therefore, it is only safe to assume; that one half the clearance could be saved, and that by the prolongation of the piston in the rear We have said nothing as to the mode in which the abutment is to be put in motion, nor shall we enter into any particulars on the subject. Some form of cam, worked from the main shaft, suggests itself at once; and it would probably be well to compress a strong spring in the act of taking the abutment out, which, being suddenly released at the proper moment, would drive the abutment in again in the shortest possible time. The Corliss valve gear supplies an illustration of the principle involved.

We may now proceed to consider the nature of the means to be adopted in connecting the piston with the main shaft, and the method of making the joints tight without undue friction. As regards the connection of the piston with the main shaft, no better device can be adopted than a disk.

It will be seen that, make what disposition of the parts we will, there are four edges of the piston, or their equivalent, to be packed. If we adopt the arrangement shown in Fig. 5, it is true that only three edges of the piston, A, B, C, have to be packed, the fourth, D, being part and parcel of the disk, the wide flange of which is made tight at E, F, by packing rings. In the same way, the abutment will rest on a scraped face, the section of A, B, C, and will require no packing; but its inside edge must rest against the face of the flange G, and therefore, it must be fitted with the packing saved from the piston. Now on the whole, it will be found the best plan to concentrate the packing in the piston and the scraped face joints in the abutment as much as possible; therefore the annulus may be made of the form shown in cross section in Fig. 6. The abutment will then have a fixed bearing, except the small portion of its length from A to B, representing the thickness of the disk, say 3 inches. By adopting this plan we are able to dispense with a rectangular cross section and adopt that shown in Fig. 7, which gives a form of piston as easily packed as though it were made of the ordinary cylindrical form. Supposing this piston and abutment to be made tight, we have next to make the disk tight with the casing or annulus, and this is no small undertaking. The length of joint to be made tight in a 10 foot engine is about 60 feet, or as much as would be represented by the piston of an ordinary engine with a cylinder 120 inches in diameter Nothing is more easy than to make a good job with packing rings, but it unfortunately happens as a result of the action of these rings that the frictional resistance is enormous. We



do not believe it to be possible to arrive at a satisfactory result if any attempt is made to pack the joints between the disk and the annulus in the ordinary way. The solution of the problem probably lies in making the disk for a considerable portion of its breadth, say at least a foot from the edge, absolutely true. The cheeks of the annulus must be made equally true, and we must rely on a series of grooves turned in the cheeks to keep the joint tight as in the ordinary solid piston.

With first class workmanship the thing may be done; and the leakage may be still further reduced by enclosing the whole engine in a case filled with steam from the boiler. The leakage would then be from this jacket into the engine and would vary in amount, of course, as the pressure inside and outside varied. The packing of this joint constitutes, in one word, the great problem to be solved—the great difficulty to be overcome in constructing a thoroughly efficient rotary engine. The working of the abutment is a matter requiring much careful thought, but it presents no insuperable obstacle to the competent engineer. We wish we could say as much of the annulus joint. How to make this tight without excessive friction is the question, and we have no doubt that, in proper hands, its satisfactory solution would prove a very remunerative speculation. It is to say the least, highly probable that an engine, occupying no more space than a fly-wheel, and simply bolted up against the wall, would become extremely popular, especially as the engine would be eminently economical and efficient.—*Engineer.*