CARRIAGE WHEEL.

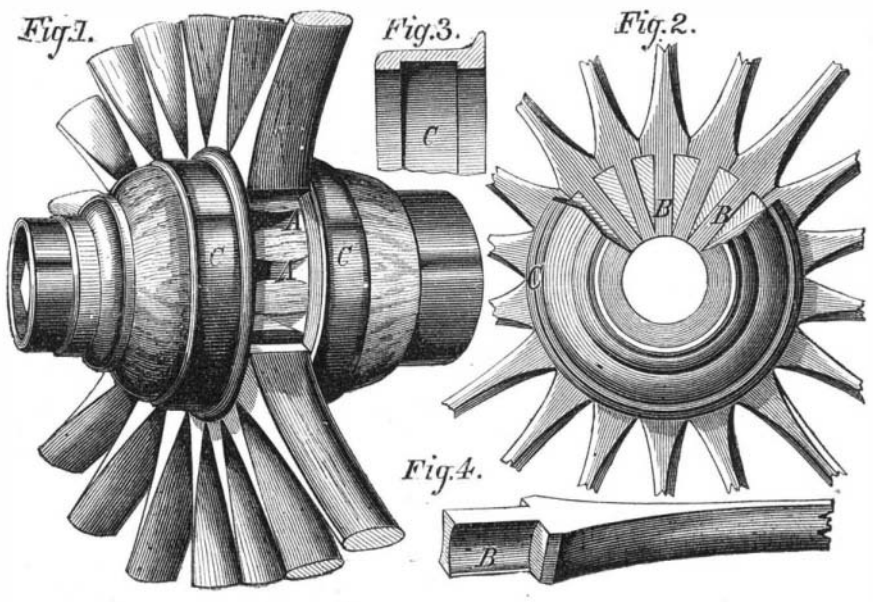
The great difficulty in effecting real improvements on the ordinary carriage wheel has lain in the seeming impossibility of retaining the elasticity which is so great a point of excellence in the common wheel. Mr. James O'Connor, of Jackson, Mo., has invented and lately patented an improved wheel which appears to overcome this difficulty. Our engraving illustrates the invention.

The first object the inventor had in view was to prevent the spokes working loose when subjected to lateral strain, which sometimes gives rise to serious accidents. This is accomplished by working the mortises in the hub of a double dovetail form, as shown at A. Fig. 1, and by shaping the tenons on the spokes to correspond, as shown at B, Fig. 4. The tenons are made slightly larger than the mortises, so as to fit tightly. In the common form of joint, the whole force of any lateral strain is exerted on the end walls of the mortises, and if the tenon is shrunk in the least, it easily works loose. In the form shown, the sides of the dovetails are made to bear a great part of the lateral strain as well as the end walls, which of course renders the hold on the spoke much more stable. The shoulders of the spokes rest on the hub on the divisions between the mortises, and may be slightly beveled so that they may fit close to and support each other, as shown in Fig. 2. The strength of this joint in resisting lateral strain has been experimentally compared with that of the old, and found to be as seven to one.

The second part of the invention consists in forming the hub band with a shallow groove in its inner face, as shown in the sectional view of the same, at C, Fig. 3, and in putting the bands on to the hubs after the metal of which they are composed has been heated. As the metal shrinks in cooling, it becomes imbedded in the wood on each side of the groove, and thereby forms a rib on the hub which fits into the groove. The bands are thus very securely fixed on the hub and remain so under all ordinary circumstances.

It is claimed that the elasticity of the common wheel is attained in this improvement, together with an increase of strength and durability, and a beauty of form, which gives it great superiority over the former. The mode of construction will apply admirably in heavy work, as the larger the surface of the tenon is, the greater will be the strength gained.

For information regarding rights to manufacture, Messrs. O'Connor & Davis, of Jackson, Cape Girardeau Co., Mo., may be addressed.



O'CONNOR'S CARRIAGE WHEEL.

BRICK AND MORTAR ELEVATOR AND DISTRIBUTOR.

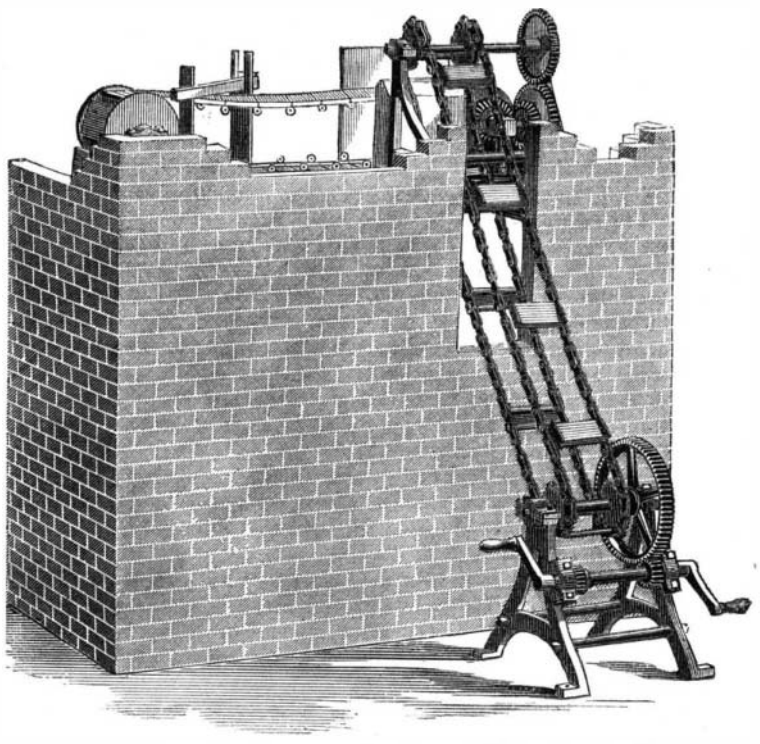
Our engraving represents a machine of considerable value for building purposes, which is designed more especially to supersede the labor of hod carrying. By its means the bricks and mortar are raised to the required elevation and then distributed among the laborers for use.

The plan, construction, and operation of the machine will readily be understood from an examination of the engraving. A frame, containing the driving drum, etc., is secured in position on the ground, and a second frame, which carries a shaft and pulleys corresponding with the drum, is secured on the scaffold or platform to which it is intended to have the bricks and mortar elevated. The drum below and pulleys above are connected by endless chains, the links of which fit between and engage with lugs which project from the faces of the drum and pulleys, in such a manner that no slip can take place. To these endless chains are attached buckets which carry up the bricks and mortar. The upper pulley shaft is geared in an appropriate manner to a drum which drives the distributing apparatus. This latter consists of the drum mentioned and another, which are placed at any required distance apart, and upon which is run an endless band by which the bricks and mortar are carried along. The band is composed of boards placed side by side and hinged together.

The operation of the machine is as follows: Upon the driving drum being operated by the winch, the buckets of the elevator, which are filled by the attendant laborers, are carried up. At the same time the rotation of the upper pulley shaft sets the drum of the distributing apparatus in motion, and the endless belt is kept moving from one side of the building to the other. When the full buckets arrive at the top, they are necessarily turned over by the action of the machinery, and deposit their contents on the moving belt beneath. A wide board is placed behind the belt at this point, which prevents either bricks or mortar falling over, and in front the descending buckets are made to pass so close to a kind of scraper set there as to insure their contents being lodged on the belt. The bricks and mortar are carried by the belt across the building, and are thus distributed among the workmen. A barrier is placed across the belt, as shown, to arrest the progress of the load and prevent any part of it being carried over the end drum.

The machine is also particularly useful in taking the material out of cellars while they are being dug, in which case it may be made to dump it directly into a cart. There is no doubt that wherever its services can be employed it will prove itself a great labor saver.

The inventor and patentee, Mr. Thomas Shanks, is willing to dispose of the whole or part of his rights, and further information on the subject may be obtained by addressing him, corner Lombard and Sharp streets, Baltimore, Md.



SHANKS' ELEVATOR AND DISTRIBUTOR.

Tunnelling by Diamond Boring Machine.

The diamond boring machine, of the company of which Captain Beaumont, R. E., M. P., is chairman, has been achieving great triumphs in the Cleveland district, in Lancashire, Cumberland, and other northern counties where it has been employed in "prospecting" for coal and ironstone. At Stanghow, in Cleveland, the borer recently reached a depth of 689ft. in two months; that could not have been got at in less than two years by hand labor. The borer is now employed at the Clifton tunnel on the Bristol Port and Channel Dock Railway. The tunnel, which is under Durdham Downs, is more than a mile long, and through hard mountain limestone. The heading is 10ft. by 8ft., into which the machine drills six holes of about 4ft. deep at a time. A core of about an inch diameter is brought out of each boring, showing exactly the material gone through. The drills made from 180 to 200 revolutions per minute, and advance about 2 inches in that time. The outside diameter of the boring is about 2 inches. Hand labor was employed at first in drilling the heading. It has been ascertained that the machine advances at about five times the speed that could be attained by as many men as could find room to work. The drill holes are in perpendicular rows, and the first blast is a wedged shaped piece taken out of the middle of the section. Dynamite is employed for blasting, and is found to answer the purpose admirably. The machine is so constructed that the drills command every part of the face of the heading, and the holes can be bored at any angle. Jets of water, under about 30 lb. pressure, are forced into each boring, and wash out the *débris*. The feed motion, which may be made absolute, is regulated by sensitive friction gear that indicates extra resistance. Compressed air is employed as a motor, but not, of course, for percussive action, as in the Mont Cenis Tunnel. The air engine has a 24 inch steam and 18 inch air cylinder, and a 4ft. stroke. The engine in the tunnel, upon which the air acts, and that, in its turn, gives motion to the drills, has a 13 inch cylinder and 12 inch stroke. The engine is worked by the compressed air, and is similar in construction and action to an ordinary steam engine. We believe that the diamond drill machine is to be employed experimentally upon the St. Gothard Alpine tunnel, and will be entrusted with the entire work should the experiment prove satisfactory, which there is little or no reason to doubt it will.—*Engineer.*

Paper Shields.

The possibility of employing paper as a material for the armor plating of vessels occupied the attention of many more or less ingenious inventors when the revolution in the construction of heavy artillery brought with it the necessity for a total change in the science of naval defence; but, in this country at least, no successful results have been attained, and the advocates of these schemes have allowed them to drop, in common with many others who, even more imaginative and less practical, have from time to time proposed to protect the sides of ships with all kinds of foreign bodies, varying from cotton bales to sugar canes, and more recently, as we have lately seen, with cork.

On the Continent, however, and especially in Italy, the idea that properly prepared fabrics may be employed successfully as armor plating material has never been abandoned, and so early as 1860, Signor Muratori, a colonel in the Italian army, commenced investigations and experiments upon the subject, which he has prosecuted ever since. In 1862, the attention of Victor Emmanuel was drawn to the results he had achieved, and which had obtained the approval of a body of officers in the Italian army. About the same time General Griffini published a pamphlet, in which he expressed his favorable opinion of Colonel Muratori's invention, and recorded all the results of the trials which had been officially conducted, and which satisfactorily proved the great power of resistance which the material offered.

In 1868 the matter was submitted to the notice of the Emperor Napoleon, who caused experiments to be conducted at Chalons, the results of which confirmed the earlier official trials made in Italy. The French report, indeed, speaks in very sanguine terms of the invention, and indicates the manner in which it could be utilized for the protection of vessels. After some delay, further trials were commenced, but before any action was taken, war with Germany was declared, and this matter, in common with a thousand others, was swept aside to make way for the pressing requirements of the time.

Colonel Muratori, who is now in England, is, we believe, making arrangements for an exhaustive trial of the armor, which has been approved of by several naval officers who have seen it, and who express an opinion that most valuable service may be rendered by it. One successful application certainly has already been made by the inventor, namely, in the construction of cuirasses, which, weighing the same as the ordinary service cuirass and costing less than one fifth as much, has nevertheless a far greater power of resistance. We have seen it turn a regulation pistol bullet fired from a distance of three feet, and it is equally capable of resisting a bayonent thrust.

By a modification of the process, fabrics suitable for military gaiters are endued with a singular power of resistance, and are thus invaluable in action, by protecting the wearers from spent balls or sword cuts.

While we refrain from advancing any opinion upon the more extended application of this process for defence against heavy guns, we speak with confidence as to its efficiency for the military purposes we have alluded to, although the Italian experiments, and later, those at Chalons, seem to point to a wider and more important use. And it appears to us as possible that this armor plating of cemented fabric may be found of service in protecting the bottoms of vessels from the explosion of torpedoes, combining, as it does, great lightness and power of resistance.—*Engineering,*

Shade Trees.

No native tree we have is better adapted to the purposes of shade and ornament than the sugar maple. Its foliage is full and dense, and its form is that of a rounded cone of beautiful proportions. It is also clean and free from insect enemies. It would be well if, in planting shade trees on our streets, there could be a suitable alternation of different kinds, some of rapid growth for temporary use, and others for permanence. Some attention should also be paid to variety. Probably the very best trees for general street planting are the different varieties of the maple. Next in value we would place the elms. For intermediate and temporary planting, the box elder and the ash may be mentioned. Here and there should be the bass wood, or linn, the tulip tree, the horse chestnut, and the buckeye.

Mechanical Table Waiters.

The dining tables of the Oneida community, Oneida, N. Y., are made double, and the central part revolves. All articles of regular use, such as bread, butter, salt, water pitcher, goblets, spoons, milk, sugar, etc., are placed on this central portion, and persons seated at the table wait on themselves, by turning the center until the thing they want swings around in front of them. These mechanical table waiters are found to be very convenient.

A friend of ours once had in regular use a little railway car on his breakfast table, which carried the sirup for the buckwheat cakes, and was propelled by strings back and forth across the table in front of all the plates. The children always derived the sweetest satisfaction from the movements of this convenient little machine.