revolution may be confidently looked for in the manner of doing things agriculturally and otherwise in that section of the country. Brain and brawn have in part made the North what it is to-day. The South needs the same elements.

Railway Matters.

At the recent annual dinner of the Manchester Association of Employers, Foremen, and Draughtsmen, held at Manchester, Mr. F. W. Webb, of Crewe, the president, spoke at length on matters connected with the management of railways.

Alluding to the increased use of steel, he claimed that the London and Northwestern Railway Company had been the first great firm to recognize the importance of the improvements of Bessemer and Siemens. Steel had been substituted in nearly every portion of the locomotive which formerly was made of iron. At present the company had 1,679 engines with steel boilers, and so far they had every reason to be satisfied with the result. The company was also one of the first to use Bessemer steel plates for its passenger vessels. It now had four first-class steamers constructed of this material running regularly between Holyhead and Ireland, and from the examination made from time to time of the hulls of these vessels it was found that the material admirably answered its purpose. The plates had been manufactured under his superintendence. They had the misfortune last year to get one of their steel vessels on a sunken rock at the entrance to Carlingford Lough. Had it been built of iron he felt certain it would have become a total wreck. As it was, ninety feet of her keel passed over the sunken rock, which bulged it in some places to the extent of five or six inches, but there was not a single crack in the plates, and no water got into the vessel.

Notwithstanding improvements in material the quantity of rails annually required for repairs and renewals on the London and Northwestern Railway was now 20,000 tons. For every mile run, the actual loss of rails was about one-third of a pound of steel, so that on the London and Northwestern Railway 15 cwt. of steel disappeared from the rails every hour of the day. The collective wear and tear of locomotives on the London and Northwestern Railway necessitated a new engine being put into the traffic every five working days. The question of the future permanent way was a very important one, and one that sooner or later would have to be dealt with, as with the immense consumption of wooden sleepers going on all over the world we would be sure in a short time to find ourselves on the very verge of a terrible famine. They had tried to solve the problem themselves on the London and Northwestern Railway by introducing a sleeper made of iron or steel, the chairs themselves being made of steel, worked up from the crop ends of rails. Most of the schemes which had been adopted had failed for want of elasticity from the facts that the bolts and nuts had been used to a large extent. In the chairs on which several miles had been laid down on the London and Northwestern Railway they had tried to avoid all these defects, and certainly they had every promise of success. Between the surface of the chairs and the rail, and also between the rail and the sleeper, a sheet of bitumenized brown paper was placed before the chairs were riveted by hydraulic power to the sleeper itself. This was intended to obviate the grinding away of the metal surfaces. The wooden key had been retained, and placing it outside, as they did, they got a most perfect cushion between the rail and chair, and as far as they had tried it, in consequence of the key swelling into the hollow made in the chair bracket, stamping up. They had not had a single instance in which the key had worked back. If iron or steel could be introduced successfully for sleepers the world would be able to find for iron and steel industries work equal in amount to that required for the making of rails.

The constantly increasing weights of passenger trains, and the question of how to provide more powerful locomotives than existing ones without having more weight upon a pair of wheels than a road will carry with economy, was a problem yet to be solved, as also was the question of further economy in the working of the locomotive. Thinking the compound principle, if simply carried out, would do something toward this end, he had designed an engine in accordance therewith. The engine had two pairs of driving wheels, one pair being driven by the high-pressure cylinders, and the second pair by one low-pressure cylinder, the use of coupling rods, which gave trouble at high speeds, being abandoned. He had been enabled to do this without complicating things, thanks to the valve motions brought out by Mr. David Joy. This system did away with the old eccentrics; not that the old eccentrics had been a bad contrivance, but on the narrow gauge there was no room for wide bearings for them, so as to allow the engine to run without hot brass. He had called the engine "Experiment," but from her performance he thought it was an experiment they would repeat. Last week he had the engine out for its first run in the traffic, starting from Crewe as the assisting engine with a very heavy train to Euston. Next morning he ran the engine with the 7:15 Irish mail from Euston to Holyhead, arriving there at 1:40, and leaving again at 3 o'clock with the boat express.

The engine maintained its steam to the point of blowing off the whole journey, and only consumed 23·54 pounds of coal per mile for the whole trip, including that for raising steam. Seeing that the engine was new, and the men strange to one of this construction, he thought it showed that something might be done in still further economizing the fuel in locomotives. The fact that a new compound engine ran during its first round trip upward of 528 miles, and was as cool at the end of its journey as when it started, promised well for the future.

Another problem which had been before them for the last few years was the question of continuous brakes. There were many inventions in the field, but out of over a thousand patents for brakes which he had examined, one taken out by Messrs. Swinburne & Laining, in 1865, had the germ of a good many of them. Most of the leading engineers had been against the automatic action, firmly believing that these machines would be more liable to cause mischief than to help in avoiding it, and this belief had been verified by more than one unfortunate accident. On looking at one of the engineering papers, which were supposed to deal impartially with these questions, he was really surprised to see the remarks made in one of them relative to the Blackburn accident. The paper went so far as to state that a snubbing had been given by the president of the Board of Trade to one of their oldest and most respected officers. The fact was, there was not so much snubbing in it, after all. The appendix to the report states things very clearly. It is essential the defects in the automatic brake should be provided against, and every precaution taken to insure the brake acting only when required. So far as the principal English railways were concerned, they were arriving at a solution of the difficulty, and they had to thank in some degree Messrs. Gresham & Craven, who had rendered considerable assistance, and who had made the manufacture of the necessary details a specialty.

Manufacture of Clog Soles and Wooden Shoes.

The works of the Mersey Wood Working Company, Bedford place, Bootle, is the occasion of the following particulars in the Bootle *Times:*

The principal manufacture carried on at these wooks is that of wooden soles for what are called in Lancashire "clogs," in France "sabots." Familiar as are the "wooden shoon," few persons would conceive how ingeniously the manufacture of the soles is conducted and how vast are the quantities which are issued daily, weekly, and hourly from these works. The yard was first visited where there is usually stored from two to three thousand tons of timber. The native timber is first stripped of its bark, the foreign logs being already barked when imported. The logs are then raised from the yard by a crane and cut up by circular saws into segments averaging about a foot long. These segments are next cut into planks of convenient size, a dozen saws working at once and the planking being effected with marvelous rapidity, about sixty tons of wood being cut up into clog soles every day. On the side of each plank a metal gauge is laid, and a girl with a pencil roughly outlines the size and number of soles which can be cut from it. The planks pass on to a band saw, where they are cut up into blocks with the required curvature for a sole. Thence they pass to the roughening machine which roughly shapes them. Another machine cuts the sides; another shapes the shanks; yet another rounds the heels; and yet another shapes the toes. They pass next to a revolving cutter, which roughly hollows the upper side of the sole, and subsequently this hollowed surface is smoothed in another machine. They pass next through the various finishing machines, where the bottoms, sides, shanks, heels, and toes are successively rendered perfectly smooth by friction with swiftly revolving bands covered with a mixture containing ground glass and other attritive materials which scour them in the same way as if with sand or emery paper. They next go to the gripping machine which bevels the edges, leaving a "grip" to which the leather boot uppers can be fastened.

It will thus be seen that the sole of each wooden shoe, from the time when the log of wood is first cut into segments to the time when the edges are beveled by the gripping machine, passes through fifteen distinct machines, and as the required sections are marked by hand, and the right and left sides of toes and heels are separately shaped, each sole passes through the hands of eighteen different workpeople. Perhaps the advantages of the "division of labor" have never been exhibited in any manufacture with more remarkable results. The motive power for these various processes is supplied by a pair of sixty horse power compound high and low pressure condensing engines. The waste wood is also manufactured at these works into a valuable commercial product. It is chopped up by machinery, treated with chemicals, steeped to a condition of softness, and all knotty pieces having been removed, the softened woody fiber is drained and compressed between a series of rollers until it is transferred into sheets of pulp, or rather half made paper, which is supplied to paper manufacturers, and being mixed with other materials is transferred into some of the best qualities of paper. Lord Hamilton was shown a sample of fine rose-tinted note paper which was made chiefly from the waste cuttings off wooden clog soles.

The works include a chemical laboratory and joiners', fitters', and grinders' shops. The extensive cellars are stored with clog soles, which are kept there for the time necessary to season the wood before being finished, and vast quantities of finished goods are passing daily from the warerooms to English, continental, and colonial markets.

MECHANICAL INVENTIONS.

Messrs. Theophilus Tanner and Hermann H. Fischer, of Osage, Neb., have patented an improvement in post-hole diggers, in which a cogged cylinder is attached to the auger shank and follows it downward as it is rotated by the gearing. Racks and pinions are used to raise the auger and its load of earth.

Mr. Nelson Arave, of Hooper, Utah Territory, has patented an improved fruit-stoning machine, which consists of a series of circular knives supported in a frame and revolving in vertical planes, and converging to a common center, with their edges far enough apart to permit the passage between them of the fruit stones, the knives being designed to draw in the fruit and to slice and strip the flesh from the stones.

An improved speed regulator for horse-powers has been patented by Mr. Barnard L. Olds, of St. Albans, Vt. This invention relates to devices for insuring regular and uniform motion to horse-powers, and preventing sudden increase of speed in case of accidents, such as the belts slipping from their pulleys; and it consists in an equalizing lever, combined with centrifugal weights and a winding drum for operating on the brake.

An improved moulding machine has been patented by Mr. James Anderson, of Boston, Mass. This improvement relates to machines for forming spiral mouldings upon stairway posts and similar articles. This is accomplished by automatic mechanism and by devices which allow variations in the character of the ornamentation.

An improved rock-drilling machine has been patented by Mr. August Pirch, of Denver, Col. The object of this invention is to combine a number of drills in such manner that they can be operated singly, or two or more, so that a hole may be drilled of any size desired and according to the nature of the material operated upon.

An improved saw frame has been patented by Mr. Charles H. Bennett, of Blossburg, Pa. The invention consists of externally inclined clamps, one of which has an inside stud passing through the other clamp and through the saw, and the triangular yokes on the inner ends of adjustable screws, the adjustable screws passing through opposite ends of a curved saw frame.

A cheap and efficient sand guard for the wheels of carriages, wagons, etc., has been patented by Messrs. John P. Schoeni and Allen A. Link, of Hubbardston, Mich. It consists of a folded or plicated cup adapted to fit upon the axle, in combination with an overhanging rim or flange to be secured upon the hub of the wheel.

Messrs. William W. Wallace and John A. Kramer, of Frankfort, Ind., have patented an improved clay crusher and separator, which consists of two rolls set side by side and parallel with each other in suitable housings, each roll having formed on its face a right-hand groove, thread, or screw, extending from the center to one end, and a left-hand screw or groove extending from the center to the other end. The rolls are then set in their housings with the right-hand thread or screw on one roll in opposition to the left-hand groove, screw, or thread on the opposite roll, so that when the clay is introduced between the rolls through a hopper fixed centrally over them the stones in the clay are carried in the screws or grooves to the one or other end of the rolls and there ejected, while the clay passes through between the faces of the rolls, and is thereby crushed or pulverized to the desired condition.

A simple, durable, and easily applied friction clutch for pulleys, gear wheels, etc., has been patented by Mr. John J. Daly, of Boston, Mass. This invention cannot be clearly described without engravings.

A novel water cart has been patented by Mr. John G. Littlefield, of Milton, Mass. The object of this invention is to provide for filling the tanks of water carts, especially street watering carts, rapidly and conveniently in situations where water under pressure is not to be had, the cart horses being used for that purpose.

A combined lathe and drilling machine, patented by Mr. John F. Rakes, of Greenup, Ky., consists in a novel arrangement of a reciprocating drilling machine, by which provision is made for converting the frame of the drilling machine into the frame of a lathe, and for driving the lathe by the wheel used for operating the drill.

An Underground River.

Mete Green, not long since while out with his cattle, made a most startling discovery and one that may possibly take its place among the grand wonders of Idaho. He was riding along early in the morning on the divide between Indian Creek and Snake River, when his horse sprang aside, snorted, and otherwise gave evidence of having seen or heard something unusual. The spot was on a little knoll on the comb of the ridge, and Mete, who had been almost asleep, taking a sweep around with his eyes to learn the cause of his horse's behavior, finally rested his vision on what seemed to be a hole in the ground a few paces distant. Dismounting he was soon looking into a funnel-shaped orifice fifteen or twenty feet deep by ten or twelve at its rim in diameter. At the bottom of this funnel—the soil giving out there—was a rift in the rock two or three feet in width by four or five in length, which seemed to open into the very bowels of the earth. Through this aperture came up from the depths below a terrible roaring, as if a leaping cataract, a mighty rush of waters, tumbling over rocks. The ground trembled, and the subterranean noise continued uninterruptedly. Mete remained some time, and the longer he listened the more convinced he became that what he heard was running water, but how far down to the stream he could not even conjecture—it might have been a few feet or half way to China. And as the fissure was large enough to take him in should his foot slip or "head swim, his observation was not an extended one. The principal thing he did while there was to listen low and strong and think loud—at a safe distance from the brink of the hole.—*Idaho Democrat.*