

various grades of cotton are shown, exhibiting their merits for color, fineness, and length of staple. Sugar and molasses in all forms, from the raw cane to the finished sweets. Fruits and grains are shown in great varieties. Specimens of plums and that wonderful Southern grape, the Scuppernong, are especially tempting. It is worthy to note, also, that the exhibit of wines from the Southern grapes denotes a near-by source for this great market that may cause trepidation in the distant Californias.

The arrangement of the exhibits displays artistic as well as convenient location for the visitor. To the Northern man or woman this building and its interior presents great attraction.

#### THE ELECTRIC RAILWAY STREET SPRINKLER.

Mr. L. W. Campbell is the inventor and patentee of a new design in railway street sprinklers. The accompanying illustration shows its appearance when in use. It is a combined track and street sprinkler, and the first effort with in our knowledge to combine the two ideas. It is so constructed that it will, at the pleasure of the motorman, sprinkle a single or double track alone, omitting the sides, or it will sprinkle one or both sides, including the track, if desired. It will sprinkle a street of any reasonable width, say a street so narrow as to barely allow the car to pass, to a street one hundred feet wide, without any change in the structure of the machine. The Car says the Rapid Transit Street Sprinkler Company, of Waco, Tex., are the makers.

#### Why Propeller Shafts Break.

It is getting to be pretty well understood that the frequent breaking of propeller shafts is not due to the defective material of the shafts themselves so much as to the excessive strains to which they are subjected, owing to the working and straining of the hull of the ship in a seaway. The Railway Engineering and Mechanic states that careful measurements taken on a steamer in heavy weather showed that the propeller shaft was at times sprung out of line  $1\frac{1}{4}$  inches in a length of 112 feet. Measurements on deck showed the same amount of deflection. The ship was stiffened, and the shafting gave no further trouble.

#### INGLETON'S IMPROVED TRACTION ENGINE.

Many unsuccessful attempts have been made to design a practical automatic track for use on traction engines, whereby the latter could be made to serve all the requirements of the farmer, but, apart from their being generally too cumbersome, it has frequently been found difficult to turn the engine around or make a curve within a reasonable space.

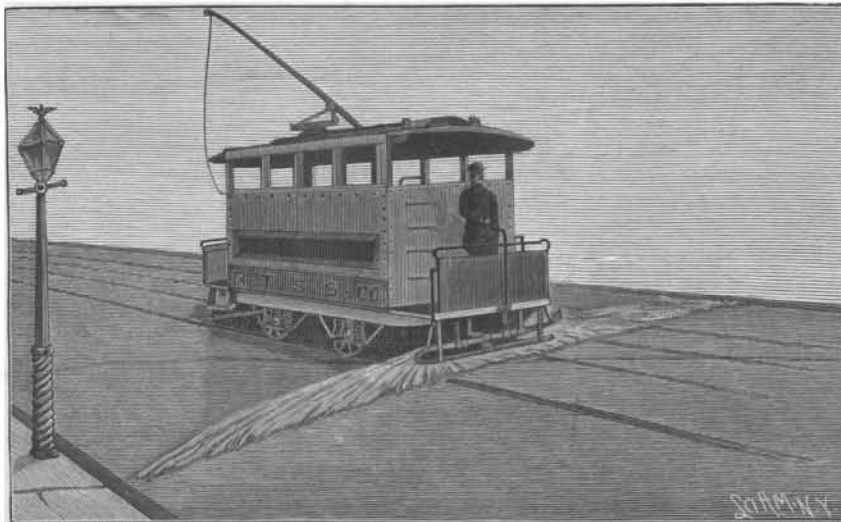
The illustration represents an improved track-laying device, which has been patented by Edward Ingleton, of the Ingleton Steam Plow Company, of Pottstown, Pa., for use on traction engines. The illustration shows the appliance both in and out of operation. The track is pivoted to the main axle of the engine, and is so fitted that it can rise or fall without altering its length. It is connected by a rod or pitman to a crank keyed on each end of the steerage roller, so that the vertical movements of the track are governed automatically by the steering of the engine and the lateral movement of the front end of the latter. The moment the engine is steered from its straight course the cranks on the steering roller come off the dead center, and allow the back end of the track to rise in the same proportion as the front, or steering axle, has turned. This brings the center of the weight back under the main axle, and the engine can swivel around in as short a space, and without straining the track, as if the track were not there. The appliance is designed to greatly increase the usefulness of the traction engine, from which it can be detached in a few minutes, as desired. The steering and adjusting of the track is done by Ingleton's steam steerage, not shown in the engraving. When not required in use, the cranks on the steering roller are reversed and the track is then held clear of the road.

The importance of being able to use a steam engine in all the laborious work of the farm, and thereby reduce the number of horses and men required in cultivation, with the attendant cost of feeding through many months when in idleness, cannot be overesti-

mated. If the thousands of horse power available in traction engines that are now idle could be successfully harnessed, it would prove a most powerful auxiliary to the farmer, as such engine, fitted with a proper track, according to the design of the inventor, should be made to plow; then, by means of a suitable machine, to seed and harrow, run the self-binder at harvest, and, lastly, do the thrashing.

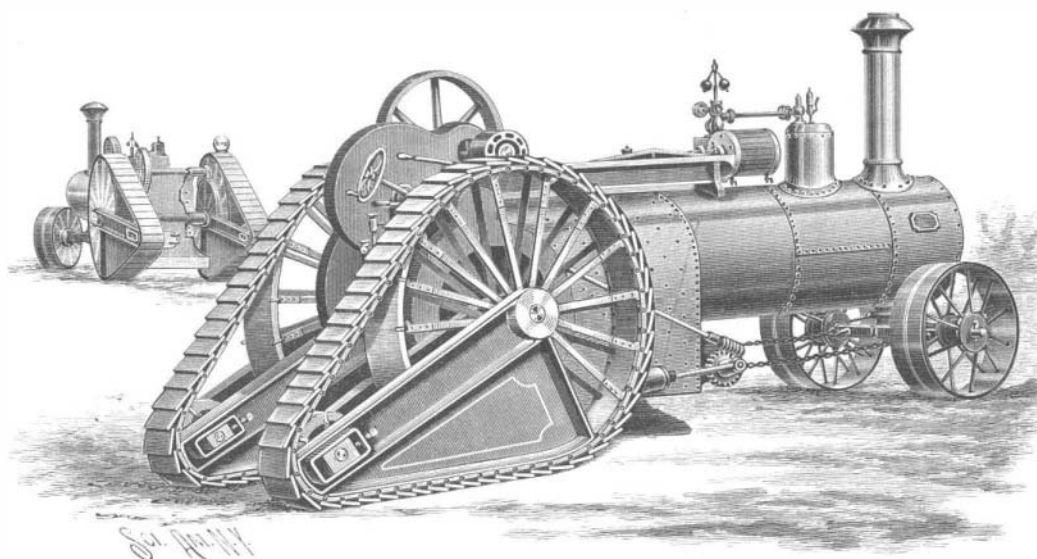
#### Progress of the Panama Canal.

It was announced recently that the French company in charge of the work on the Panama Canal is now collecting 2,000 more men from Jamaica and other West Indian islands to add to the 1,800 now at work, and that it is intended eventually to increase the force to 6,000 men. The New York Evening Post declared that it had received information which it considered trustworthy that the money to finish the work on the



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present plan has all been furnished, and that nothing can prevent the opening of the canal at the appointed time, except accidents and obstacles not now anticipated. The managers even expect that the work will be completed in six years. This is quite in line with the report made by Sir Henry Tyler, the late president of the Grand Trunk Railway, who has been visiting Panama. He says that it is proposed to construct two large dams, one across the Upper Chagres River and one on the Lower Chagres River. Two lakes will thus be formed, the upper one supplying water to the higher portion of the canal, while the lower one will be mainly used to furnish water for the navigation of the lower part. Ten locks will be built, enabling the canal to reach a height of 170 feet above the sea level. Sir Henry holds that there is no insuperable difficulty in the completion of the canal in six years, at a cost of \$100,000,000 by utilizing the work already done for a distance of sixteen miles from Colon and four miles from Panama. On the other hand, Mr. Colquhoun, the correspondent of the London Times, who has recently inspected the route, estimates that, even supposing one-third of the work to have been concluded,



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it will cost more than \$200,000,000 to complete the entire undertaking. He declares that the Chagres River and the Culebra cut of the present Panama Canal plans are insurmountable obstacles.—The Outlook.

PATENTED artificial skin is now produced in Germany. It is made by removing the outer and inner mucous membranes of the intestines of animals and partly digesting them in a pepsin solution. The fibers are then treated with tannin and gallic acid, the result being a tissue which can be applied to wounds like a natural skin, and is entirely absorbed in the process of healing.

#### An Improved Motor for Sewing Machines.

Sewing machines adapted for useful general work are invariably driven by a treadle to which either one or both of the feet may be applied. The ordinary treadle answers well for the stitching of exceptionally stout materials and for the purposes of various machines driven with the foot by men such as turners or printers, but for average sewing machine work it has the drawback of requiring more effort than is necessary. This extra fatigue is a serious consideration in the case of females employed all day long at the machine, but an ingenious modification of the ordinary treadle has now been introduced by which the labor of the worker will be greatly economized without any sacrifice of efficiency. As is well known, the ordinary treadle is horizontal when at rest and has to be forcibly depressed by the foot in order to turn a flywheel by means of a crank. In the new system the flywheel and crank are

retained, but the horizontal treadle is replaced by a vertical one which is hinged to the under side of the table on which the machine rests, and hangs down almost to the floor, where it ends in a horizontal platform for the foot. The worker's foot is not moved up and down to drive the machine by pressing the treadle, but produces the same effect with less labor by a gentle swinging of the foot backward and forward. The muscles chiefly employed are the flexors and extensors of the knee joint, and the weight of the foot and leg is, of course, supported by the platform on which the foot rests. An important advantage is that the continual movement of the thigh, inevitable under the present system, is so diminished as to be hardly perceptible. The "Hygienic Motor" is the appropriate name of the new invention; its principle is sound and the details are extremely simple. The ordinary treadle is em-

ployed to most advantage when the flywheel is comparatively heavy and the operative stands at the machine; but for seamstresses who sit all day long at the machine the to-and-fro movement of the foot is less exhausting than the alternate upward and downward movement which has hitherto been required. The new system can be readily adapted to any of the existing kinds of sewing machine.

#### The Absolute Dimensions of Stellar Systems.

In a recent number of the *Astronomische Nachrichten* (No. 3314) Dr. T. J. J. See has a very important paper on the "theory of the determination, by means of a single spectroscopic observation, of the absolute dimensions, masses and parallaxes of stellar systems whose orbits are known from micrometrical measurement; with a rigorous method for testing the universality of the law of gravitation." The ordinary determination of the orbit of a double star furnishes us no idea as to its distance from us, and hence no measure of the absolute dimensions or masses of the system. The measures of the parallax upon which we depend for our estimates of distance are extremely difficult and the results are in most cases unsatisfactory. The measures are taken from neighboring faint stars, which are assumed to be so much more distant that their annual displacement will be imperceptible. This assumption is not always safe and the resulting parallaxes can only be regarded as relative.

Dr. See shows how, by a very simple and elegant method, we may determine the absolute dimensions of the orbits of bright rapidly revolving binary stars, by single spectroscopic measures of the motions in the line of sight of the component stars. From the dimensions and other known data of the orbits, the actual masses of the stars and their distances from us can be easily calculated. But the most impor-

tant result of this method is the means it furnishes of testing the question whether the Newtonian law of gravitation applies to stellar systems as well as to the solar system. Dr. See shows how we may calculate the motion in the line of sight in all parts of the binary orbit. These calculations are based upon the law of gravitation and a single spectroscopic measure. If such measures be continued upon a number of pairs, while the stars complete their revolutions and the computed and observed motions in the line of sight agree throughout, within reasonable limits of error, it will constitute a strong proof of the universality of the Newtonian law.—H. C. W., Popular Astronomy.