

Woven Electrical Wires.

A novel method of covering wire used for many electrical purposes has been devised by Professor A. E. Ayrton. The process is merely a modified form of weaving. The wire, which may be German silver, platinum, silver, etc., or simply copper or iron, if great cheapness of construction be desired, is wound bare on the shuttle and used as the weft, being woven backward and forward between parallel fibers of silk, cotton, or any suitable material employed as the warp. Or the wires may be arranged as the warp and the insulating material employed on the shuttle. The web, whether composed of a warp of wires and a weft of insulating material, or a warp of threads of insulating material and a weft of wire, may, if desired, be steeped in or passed through a bath of bitumen or melted paraffine wax or of other similar liquid, and an extra security of insulation and solidity is thus secured. It may be rolled or twisted up sideways to be placed in the bath. The web or ribbon, in the flat state as woven, can be easily painted with any fluid compound if desired, an ordinary paint brush being employed for the purpose, or the web or ribbon may be covered with gutta percha, or with some similar substance, by being passed through a die where the compound is under pressure.

Safety Car-Couplings.

Inventors and owners of car-coupling apparatus will be interested by the announcement of the State Railway Commissioners of Connecticut that they will give a public hearing upon the subject of safety couplings in the State Capitol, in Hartford, Nov. 29.

A bill is before the General Assembly of the State, the design of which is to compel all railway companies operating within the State to provide their cars with automatic coupling apparatus.

A Remarkable Arctic Voyage.

From a statement published in *Lloyd's List*, it appears that, during the past summer, Captain Adams, of the steam whaler Arctic, in his search for whales, not only succeeded in reaching Melville Bay, the usual limits of a whaling voyage to Baffin's Bay, but passed through Lancaster Sound, entered Wellington Channel as far as the water has been penetrated by any expedition, turned back and steamed up Barrow Strait, then took a course down Peel Sound, and reached within a few miles of the spot where the Erebus and Terror were lost. Retracing his path he visited Beechy Island, thence steamed down Prince Regent Inlet, and got as far south as Cape Nordenskjold on the west side and within fifteen miles of Fury and Hecla Strait on the east side of the Gulf of Boothia. It was only in this gulf that he met with success in getting whales, and that was not much.

Presuming that the course is described without exaggeration, though no mention is made of Queen's Channel or Franklin Strait, it is undoubtedly the most extraordinary voyage that has ever been performed in the polar regions, *via* Davis Strait, in one season. Having the advantage of the experience of his predecessors, knowing where to go, and the probable difficulties from the ice, yet to have accomplished so much in one season proves him one of the most daring and skillful of Arctic navigators. It is in a sense no small triumph for engineering, for without the power of steam no ship could have done so much in so short a time. Capt. Adams

has given previous proofs of his enterprise. It was with him that Captain Markham, R. N., made his "Whaling Voyage in the Arctic Regions," during which the Arctic rescued a portion of the ill-fated Polaris Expedition.—*Engineering*.

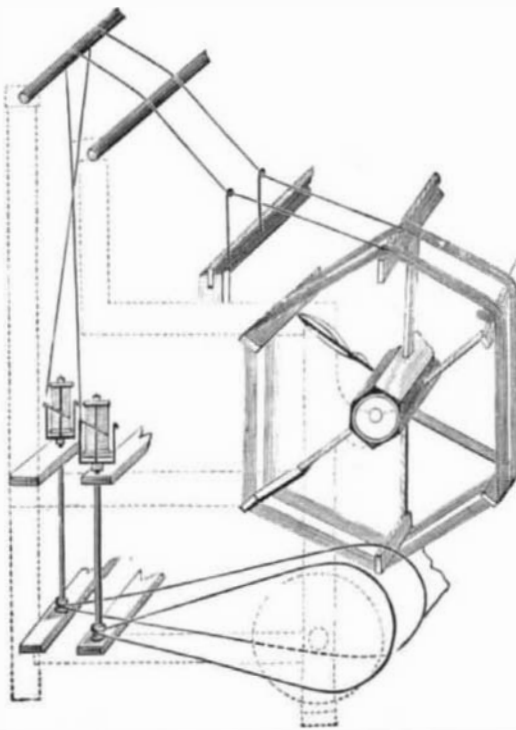
THE BIRTH RATE IN FRANCE.—The *Continental Gazette* notes that the birth rate in France is steadily diminishing; so is that of marriage, but in a lesser degree, the number of children resulting from these marriages having declined.

IMPROVED TWISTING REEL.

This machine, of which we present a perspective view in Fig. 1 and a section in Fig. 2, has been invented to simplify the process of twisting and reeling, which it successfully accomplishes by combining both operations in one machine. It is simple in its arrangement, and calls for little description on our part, nearly all the details being fully shown in the drawings.

Mr. Thomas Unsworth, London, is the maker. Our en-

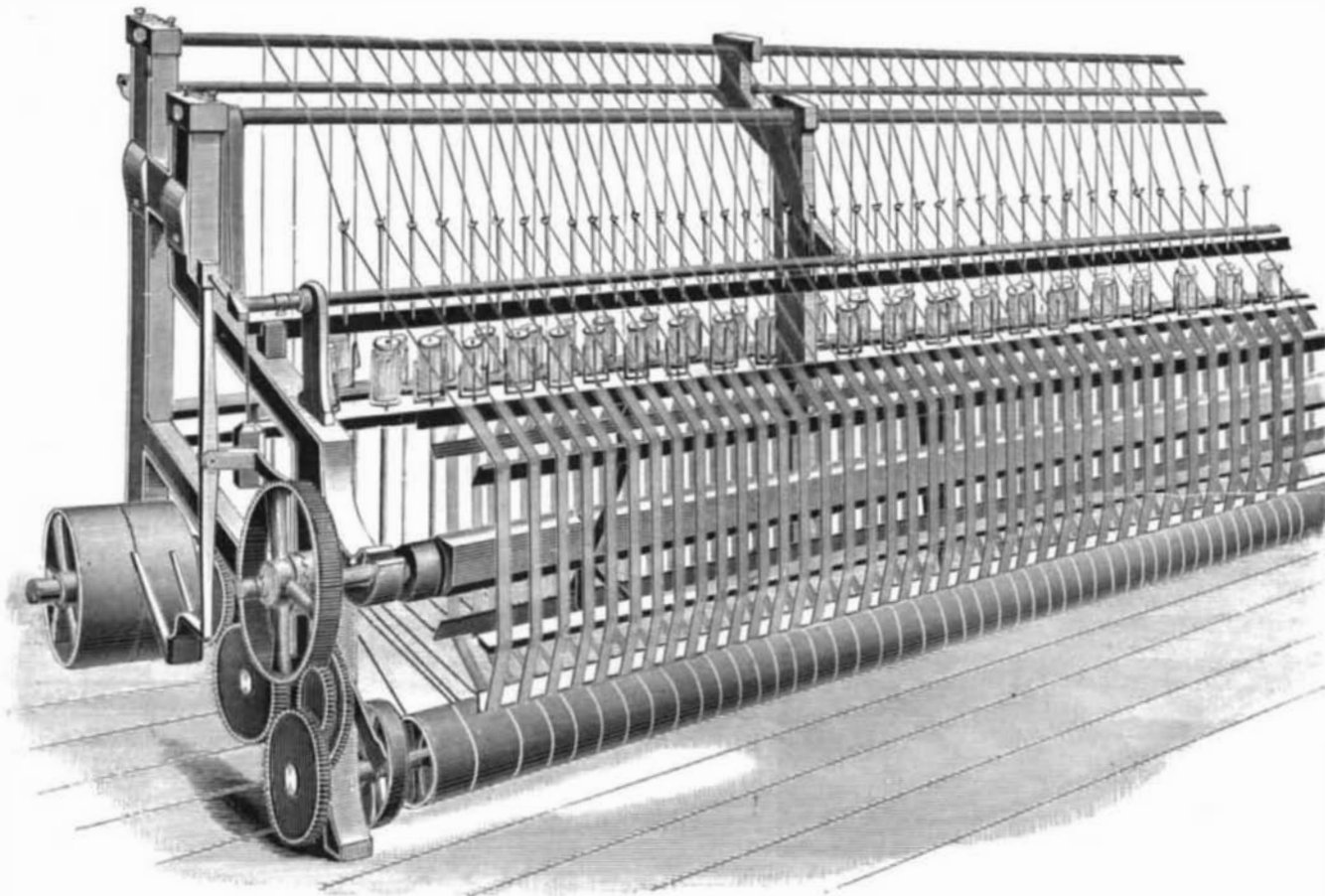
Fig. 2.



gravings are from the *Textile Manufacturer*. The bobbins, instead of being mounted in a creel as usual, are placed upon the revolving spindles, and within the arms of inverted fliers, with which they are mounted. The doubled threads are then carried vertically upward and over the carrier rails, which bring them to the front of the machine.

Here, descending, they pass through guide wires, and are then attached to the reel. This reel is arranged so as to make several steps or movements in a lateral direction, by which means the hank can be subdivided into less or any other required length with perfect ease.

Doffing is facilitated by the reel being made to col-



UNSWORTH'S IMPROVED TWISTING REEL.

lapse, and the attachment of an ingenious arrangement at the end of its axle, by which the doffing can be passed off with a minimum risk of staining the yarn with oil. The speed of the spindles and the reel is capable of being regulated in relation to each other, by means of a change wheel, one of the train shown in the illustration, so that more or less twist can be put in as may be desired. As will be gathered from the above, it is exceedingly simple, but though this is the case, it is said that it effects important economies.

MECHANICAL INVENTIONS.

An improved carpenter's square, which will be found very useful to builders and others, has been patented by Mr. Jeremiah C. K. Howard, of Edgerton, Montana Territory. The invention consists of a carpenter's square containing a table for determining the length of rafters for pitches and spans of roofs, and a rule finding the length of rafters for spans of one-fourth, one-third, or one-half pitch. The square has columns of figures on it, divided by inch graduations, and representing the various pitches and spans of roof, arranged in such relation to each other as to indicate the length of rafters corresponding to each combination.

An automatic sampler for flour and other substances, the object of which is to facilitate the taking of samples at regular intervals of time, has been patented by Messrs. James S. Hillyer and George H. Hillyer, of Faribault, Minn. The invention consists in an automatic sampler, composed of a stationary cylinder having an upper receiving aperture in its side, a rotating interior cylinder provided with pockets, which are brought, one at a time, at regular intervals under the receiving aperture in the exterior cylinder, for reception of the flour or other samples, a spring driving and stop mechanism applied to the interior cylinder, and a stop bar, controlled by the hand of a clockwork, for liberating the interior cylinder to move the distance of a pocket at stated periods. By this device a mill superintendent will be furnished with samples on his return after an absence of work done, and in case of the stoppage of the mill, that fact will be made known to him, also the time when and for about how long the stoppage continued, so that he can fix the responsibility where due.

An improved treadle for sewing machines, lathes, and other purposes, capable of being more conveniently worked and with less strain on the operator than ordinary treadles, has been patented by Mr. Jonas Michael Hultqvist, of Stockholm, Sweden. This treadle has its footboard raised a short distance above its shaft, which latter is situated about one-third the length of the footboard from its heel end. It may be connected with its shaft by brackets, and is provided in front with an arm, projecting downward and outward, to which the rod for driving the crank is attached. By this construction of treadle the front of the foot is not required to be bent downward, thereby avoiding cramps, and, by depressing the heel part a very short distance only, a considerable stroke is obtained.

Mr. Horace L. Kingsley, of Racine, Wis., has patented an improved oscillating gear for platform spring wagons, the object of which is to prevent that twisting and straining of the gear and springs which usually results when the gear is rigid. In this improved gear, the center bar and the bar which rests thereon are hinged together by hooks or clips, and have

a convex and concave bearing one upon the other. This effectually provides for the rocking of the upper one of said bars upon the lower one, thereby keeping the wagon bed level. The center bar, which is hung on the king-bolt, has a plate for the latter formed on it. A short bar permanently secured to crossbars, which are riveted or bolted to the bar that rests on the center piece, assists in forming a support for the wagon bed.

An improved releasing attachment for mechanical alarms, for use as a protection against burglars and in case of fire, etc., has been patented by Mr. Harvey A. Holoman, of White Rock, Texas. The invention consists in a wire attached to the anchor or escapement lever of a clockwork for ringing or sounding an alarm bell. This wire has a hook at

its outer end, which is passed into a loop, ring, or hook at the end of a wire connected with the key-bolt or knob-bolt of a lock, or with a wire leading to places a considerable distance from the alarm. The invention, which is very ingenious, admits of numerous modifications to adapt the alarm to different applications or places in which it may be used.

Messrs. Alfred Gurney and Robert H. Piper, of Newburyport, Mass., have patented an improved leather chamfering machine. The object of the invention is to facilitate the

operation of chamfering the edges of shoe soles and promote accuracy in the work. The invention consists in a leather chamfering machine constructed of a stock faced with metal plates, an adjustably secured knife, a spring guard, also preferably made adjustable, for holding down the leather while being cut, and an adjustable gauge for regulating the depth of the chamfer. This gauge it is proposed to construct so that it can be set back when it is desired to chamfer the sole to a feather edge, and set forward when it is required to chamfer the sole to a square or mock-welt edge. By this machine the operator can chamfer the soles quickly and to any desired depth without nicking and spoiling the edges of the soles.

An improvement in grain binders, which exhibits great ingenuity and possesses more than ordinary merit, has been patented by Mr. Frederick P. Rosback, of Springfield, Mo. The object of this invention is to facilitate the removal of cut grain from a harvester platform and the binding of the grain into bundles. The invention consists in providing the platform of a harvester with a hollow journal having a cavity of sufficient size to receive a gavel, a supporting drive wheel revolving upon the hollow journal and carrying the tying mechanism, and curved contracting flanges to guide the grain end foremost into the cavity of the said hollow journal; and also, in the combination, with the wheel and hollow journal, of a mechanism for carrying the cord around the gavel and holding the ends of the cord while the gavel is being tied, a mechanism for forming the knot loop, a mechanism for slipping the loop upon the cord and drawing the knot tight, and a mechanism for cutting off the ends of the cord.

Mr. George A. Bazé, of Havana, Cuba, has patented a very serviceable machine for shredding sugar cane. The object of this invention is to thoroughly tear apart and separate the fibers of sugar cane, and thereby reduce the latter to a condition which is best adapted for the extraction of its juices. Mounted upon a horizontal cylinder is a feeding hopper for the cane, provided with a lower inclined grating that projects into the cylinder. Within the cylinder are several series of hook-shaped knives arranged spirally around a revolving drum to which they are secured. These knives work between the bars of the grating and engage over the cane and break it down into the cylinder, where the cane is further subjected to the action of these knives and any number of adjustable radial knives arranged within the cylinder for the revolving knives to intermesh with. The knives not requiring to cut, but only to shred or tear, their edges should be left blunt.

North Carolina Gems.

Recently while mining for the new gem, hiddenite, Mr. Hidden struck a cavity which proved a perfect treasure house. The walls of the cavity were frosted with crystals, some of them of very large size. Among them were what are described as the finest emeralds ever discovered in the United States. They were nine in number, in color a clear grass green. The largest was eight and a half inches long, and had an average diameter of one inch; others were six inches, three inches, and two inches long. The largest emerald found in the mine previous to this last discovery was less than two inches in length and was not quite three-quarters of an inch in diameter.

The color of the emeralds found so far has not been quite satisfactory. They are clear, but more or less flawed and pitted, and have a succession of parallel lines drawn across the prismatic faces close together, and the basal plane is also often pitted with minute depressions. But crystals are rarely found pure with perfectly smooth and brilliant faces. The emerald color is often strongest on the surface, and fades gradually to a colorless central core. It is the belief, based upon experience of the output of the mine, that the color of the emeralds will improve as the mine is sunk deeper and deeper, and the results of the deep-rock mining are looked forward to with interest and high hopes by those interested in mineralogy.

Dassori's Safeguard.

We are rarely enabled to chronicle so rapid an introduction and so complete a success of a new invention as the above, which was patented through the SCIENTIFIC AMERICAN Patent Agency. The object of the invention is to prevent the shifting of grain cargoes in ships. It does away with the necessity of bagging the grain, and greatly promotes the safety of the vessel at sea. The improvement consists of an inwardly inclined ceiling arranged at the top of the hold of the ship.

The inclined ceiling prevents the loose grain from going into the wings of the vessel, and has the effect of throwing back the loose grain on the center of gravity of the vessel. It has been proved that all vessels having the safeguard arrived at their destination without the slightest list, although they had very severe weather and the cargo of many vessels had so settled in the hold that a man could easily walk over it. In the last two years a great number of vessels with the safeguard ceiling have crossed and recrossed the Atlantic laden with grain in bulk, and not one arrived with the cargo shifted, and by the avowal of the several masters three vessels at least, with their crews and cargo, have already been saved from total loss, which is the greatest satisfaction that the inventor could expect. Large numbers of vessels now use the improvement, and the principal insurance companies are warm in their praise of its advantages

Progress and Prospects of Cotton Milling in the South.

One of the fruits of the Atlanta Cotton Fair has been a greatly increased attention to the work that has been going on in the South, of late years, in the direction of cotton manufacture.

The hopeful expectations of those who have engaged in the work, with some of the more salient reasons for their hopefulness, have been discussed at great length by the correspondents of the daily papers, among them a very intelligent writer for the *Times*, who finds that manufacturing in the South is the one subject upon which men there speak with entire confidence. Most of them, he says, have some qualifying doubts as to agricultural progress, the cheapening of cotton production, the raising of home supplies, immigration, mining, and the many other new ambitions and enterprises which have engaged so much attention since the opening of this new era of industrial development. But concerning the future of manufactures, particularly of cotton, all men of intelligence and business experience speak with the assurance of inspired prophecy.

Some of the statistical grounds for this hopeful feeling are given below, and are worthy of consideration at this time.

"In 1860 there were but 159 mills, running 290,359 spindles and 6,713 looms, in the Southern States, out of a total for the whole Union of 1,091 mills, with 5,235,727 spindles and 126,313 looms. A fraction over 5½ per cent of the spindles were in the South. The census of 1880 gives a total of 10,921,147 spindles, of which 608,286 are in the South—still about 5½ per cent. In doubling the number of spindles in these twenty years, the South barely maintained its relative proportions. It employs now 18,223 operatives, against 163,405 employed in Northern mills; that is, for every operative in the South there are nine in the North. The era of growth in manufactures has only just opened in the South, however. The census of 1890 will greatly disappoint the people of this part of the country if it does not show that instead of a beggarly 5½ per cent of the manufacturing of the country the South has 20 or 25 per cent.

"The reasons set forth for this confidence are many and of unmistakable weight. At the outset every Southern man is sure to prove to you that it is a dead waste to ship raw cotton to a mill fifteen hundred miles away when it could be made into yarns or fabrics much cheaper in factories distant from the cotton field only a short half-day's journey for a mule. There is force in this reasoning. The money expended upon each bale of cotton in preparing it for and shipping it to the distant market makes a very considerable sum, which the manufacturer must deduct from the price of his raw material or add to the price of his product. Let us look at the items. Planters usually reckon that bagging and ties cost them nothing, as they are weighed with the bale and sold for as much as was paid for them. This reasoning is misleading, for the manufacturer reckons bagging and ties precisely as he does any other waste. These two items may be set down as \$1. Then follow ginning and baling, \$3; storage and insurance, 75 cents; drayage, 20 cents; samplings—say two pounds in all—20 cents; compressing, 75 cents; commissions and brokerage, \$2; freight to New England and insurance, \$5; waste by stealing, careless handling, dirt, storms, etc., not less than \$3—in all, \$14.90, or almost exactly the 1½ cents a pound which it is usually estimated that the New England manufacturer pays for his cotton above the price received by the grower. The aggregate of these charges upon the entire crop is something startling. The crop of 1879, according to the census returns, was 5,737,257 bales, of which Mr. Edward Atkinson's report shows that 195,389 bales were manufactured in the South. Upon the 5,541,868 remaining bales, presumably shifted to distant mills, the amount of these charges, at \$14.90 per bale, was \$82,573,823, which is really far below the true amount, for nearly three-fourths of the cotton which leaves the South goes to England, involving an additional expense of a cent or two per pound. \$100,000,000 is not too small an estimate for the annual tax laid upon the cotton crop. The crop of 1879 was worth not far from \$250,000,000. Two-fifths—40 per cent—of the South's income from its great staple, therefore, goes for baling, transportation, and the services of middlemen—things which add not a cent to the value of the product, and are made necessary only by the awkward fact that the plantations are from one thousand to three thousand miles from the factories. But the advantages are by no means confined to the elimination of unnecessary charges for baling and transportation. Power and labor are unquestionably cheaper in the South than in the North. The water power of the Southern States is almost without limit. The available power of Georgia's streams is reckoned at several million horse power. On an average it costs about \$6 per horse power per annum for water to run mills in the South, while the steam for the Fall River mills costs \$12 per horse power. The Augusta canal supplies water at \$5 50 per horse power. This canal is 9 miles long, 150 feet wide, and 11 feet deep. The main canal, between the first level and the Savannah River, gives more than 14,000 horse power, of which only 1,960 are used. At Lowell, N. C., water power is offered free of charge to new mills. All over the two Carolinas and Georgia there are natural streams with ample fall for manufacturing purposes, and on many of these streams granite foundations for mills are to be had. The Southern water courses never freeze over nor do they dry up, droughts being much less frequent there than in the North; both ice and drought are recognized sources of loss

in New England manufacturing. In another respect the climate of the South is more favorable for cotton manufacturing. The humidity of the Southern atmosphere is a very even quantity, from 65 to 70, a condition which is demanded for spinning and weaving cotton. In the drier Massachusetts air the manufacturer must employ steam to moisten the air and make the lint work smoothly. The Atlanta Cotton Mill, with 20,000 spindles, is run by steam, as Atlanta has no water power, though a canal which will bring the waters of the Chattahoochee to the city is projected. Coal costs here \$3.25 per ton, but even at this disadvantage, as compared with the mills of Augusta and other neighboring cities, the Atlanta Cotton Mill, running night and day, clears \$1,000 per week, or over twenty per cent profit on its capital of \$250,000. There are, besides, a large number of other factories, flouring mills, etc., in Atlanta, all run by steam, but paying good returns on the capital invested, and new mills are building all the time."

In another letter, the same writer describes the practical working of certain representative Georgia and Carolina mills.

"In the city of Augusta about 80,000 spindles are now running. The Augusta mill has grown up around a small manufacturing property bought in 1858 for \$140,000, to which the purchasing company added \$60,000 for repairs and extensions. By stock dividends of two shares for one, the capital was subsequently increased to \$600,000, and on this sum the mill has paid since the war dividends amounting to 22½ per cent, or at the rate of 15 per cent per annum, and the money value of the property owned by the corporation is not less than \$1,000,000. The mill now runs 24,200 spindles and 800 looms. It makes plain sheetings, drillings, and yarns Nos. 12 to 14. For the year ending June 30, 1878, the gross earnings of the mill were \$130,447, and the expenses \$56,878, allowing for quarterly dividends of 2 per cent, besides \$25,000 carried to the surplus fund. The mill has never paid less than this. In 1880 it turned out 15,161,491 yards of sheetings and drillings, and paid four dividends amounting to \$120,000—20 per cent on the capital stock. It has been pointed out—and the fact is exceedingly suggestive as showing the effect upon his profits of the saving which the Southern manufacturer makes in purchasing his raw material—that at the estimated saving of \$7 per bale, compared with Northern mills, on the 11,819 bales of cotton used by the Augusta factory, in 1878, the stockholders realized \$82,733, more than 63 per cent of their gross savings, without which the expenses of the mill would have exceeded its receipts by \$9,164. The Langley Mill, at Augusta, was started in 1870, with a capital of \$300,000, which was increased to \$400,000 the next year. In 1872 the mill began work with 9,600 spindles and 300 looms. In the next five years it earned \$293,725, exclusive of \$25,000 paid out in interest. The net earnings for 1877 were 37,255; for 1878, \$45,000; for 1879, \$81,277. The total earnings for the eight years were \$457,000. Add to this the amount paid out for interest on the borrowed capital, and the actual earnings come up to fully 15 per cent per annum on the \$400,000 invested. The Vaucluse and Graniteville Mills, in Georgia, both owned by one corporation, earned \$194,574 in 1880, and their expenditures were \$51,045. After paying \$18,000 in dividends, \$125,000 was set aside for extending the mills.

"At Lowell, Gaston county, N. C., the Woodlawn and the Lawrence Manufacturing Companies, making cotton warps, Nos. 10 to 24, and yarns and sheetings, have paid dividends of from 12 to 15 per cent. These companies own a large tract of land, mostly improved, near Lowell, for which they are seeking settlers. There are now about 30,000 spindles run at Lowell, and water power is offered free to new mills. The Atlanta Cotton Mill, now in the hands of ex-Governor Bullock as receiver, not from pecuniary failure, but on account of disagreements among the stockholders and management, is running night and day, and earning dividends at the rate of 20 per cent. The factories I have selected for mention are not exceptional. The July dividends of the forty-five mills in Georgia were at the rate of from 10 to 35 per cent, and averaged fully 12 per cent. These facts show not only that manufacturing is a very profitable business in the South, thus giving an idea of the opportunities to be found here by the capitalist, but they prove that the Southern people have in their midst an unequalled field for the investment of their savings."

A California Enterprise.

Eagle Lake is located in Lassen County, Cal., 100 miles north of Reno, and near the projected course of the Nevada and Oregon Railroad. It is 30 miles long and 10 miles wide, and contains 116 miles of water surface. It has no known outlet. Marker and Merrill own the lake and many thousand acres of timber and farming land adjacent. They are now running a tunnel, which will be over 7,000 feet long, to tap the waters of the lake at a point 12 feet below its bed. When the lake is reached the fall of water obtained will be used to run a sawmill and flume, which will be built from the mill to Belfast, 26 miles distant. The timber cut in the mill and cordwood will be floated down the flume, and its waters will further be utilized for irrigating the thousands of acres near Belfast, which need but their fertilizing touch to swell with an abundant harvest. The timber around the shores of the lake is mostly spruce, yellow pine, and sugar pine. The trees are not as large in girth as those at the Truckee and Bigler woodlands, but are unusually tall and straight. The majority of the pine trees will yield four 16-foot logs before a limb is met.