Correspondence.

Leather Belting.

To the Editor of the Scientific American:

In SCIENTIFIC AMERICAN for March 8, 1884, question No. 32, in reply to J. W. in regard to the proper side of a leather belt to run next to pulley, you say *either* side, and then proceed to favor the grain side on account of uneven skiving, etc. As far as my experience goes, I find it best to put the *flesh* side next the pulley. I have had numerous arguments with other mechanics, but actual test in our shop is in favor of flesh side to pulley. We are running some belts one way and some another, and I find that running the grain side as a wearing surface has a tendency to cause it to crack.

Besides, wear on flesh side does not weaken the belt nearly as much as the same wear on grain side.

Our belts are all oak tanned, are from 4 inches to 10 inches in width, and are used without oil of any kind, in a wood-working establishment. The newest belt of all was put on with grain side next to pulley, and it has suffered more from effects of wear than any of the rest, and shows a tendency to crack, while those run with flesh side to pulley are free from cracks entirely.

I have found no difficulty from uneven skiving. The lengtbs of our belts run all the way from a 2 inch belt 7 feet long to a 10 inch belt 50 feet long. The one referred to as cracking is a 4 inch belt about 25 feet long, passing over a driver 24 inches in diameter, and pulley on saw mandrel 4½ inches.

E. J. KILMER.

Corpus Christi, Texas.

Touching the Tender Spot.

To the Editor of the Scientific American:

Seeing in your issue of February 2 a notice of a bill introduced by J. A. Anderson, of Kansas, for limiting the duration of patents to five years, I would beg to suggest to all inventors and others interested, each to write a letter in the form of a pledge, signed by themselves and as many of their friends as is possible to obtain, to the effect that any Congressman who would vote for such a bill must be blind to the best interests of their country; and for this reason the persons whose names were appended would feel it their duty to oppose all such persons, not only for re-election to Congress, but for *all offices* in the gift of the people. Such a letter sent from all parts of the country to Congressmen and Senators from their own immediate constituents would arouse them from their torpor, to state it in its mildest form.

J. F. WILLIAMS.

Reading, Pa.

A Novel Patent Act.

To the Editor of the Scientific American:

Seeing by your editorials and letters published in the SCIENTIFIC AMERICAN, that you invite correspondence in relation to the pending amendments to the patent laws (I think a more appropriate title would be "A Cowardly Thrust at Patentees"), I take the liberty to ask you to publish the following draught of a bill to be presented to Congress for their consideration:

"An act to relieve railroad corporations and others from vexatious litigation, when they happen to purchase stolen property, whether they knew it to be such or not.

"No 100,000. *Be it enacted, etc.*—On and after the passage of this act, any person purchasing any description of property, whether patented or otherwise, shall be, and is hereby, exempted from any penalty in consequence of said property having been stolen; and any attempt on the part of the owner to recover his property or prevent its use shall be deemed a misdemeanor, and fined seventeen dollars for the first offence, and, if repeated, shall in addition be liable to imprisonment for a term of seventeen years.

"*Be it further enacted:* That any person engaged in the manufacture and sale of an article patented by some one else shall be exempt from injunctions or writs of any kind, in order that he may fully enjoy the fruits of the other fellow's brains without let or hinderance, the other fellow being subject to the same penalty as the foregoing for any attempt at interference or injunctions.

"*And let it be further enacted:* That in view of the vast importance of our railroads—and the safety of the public traveling on the same—any inventions for securing safety, economy, and speed, now in existence or which shall hereafter be made, shall be free for their use, without money and without price.

"*And be it still further enacted:* That any person securing a patent, and after paying all expenses attending the same, shall keep strict account of all money received as well as paid out, deduct one from the other, and if the balance is found to be in his favor to the amount of seventeen dollars, his patent shall be public property, whether one year old or five; but in no case to be declared public property until his profits amount in the aggregate to seventeen dollars, whether it be one year or fifty.

"All laws or parts of laws that conflict with this act are hereby declared null and void."

I would suggest, also, that it would be in keeping with this act, as well as the acts that have already passed the House, that the judges having jurisdiction in such cases be members of the N. R. R. League.

CLAYTON DENN.

Frankford, March 31, 1884.

Ornamental Tree Planting.*

The judicious and tasteful planting of fruit and ornamental trees enhances the value of real estate more than an equal amount of money invested in any other way. It is not necessary to have a large extent of idle land in lawn or dooryard, or expensive drives and fancy walks, in order to give a country place an attractive appearance. A plain, neat yard, with a few trees and shrubs well selected and judiciously planted about the grounds, and properly kept, would often change the appearance of many a place from a neglected wilderness to that of a thrifty, comfortable home. It is not desirable to have an elaborate design to produce the best effect in small places. To give explicit rules for landscape gardening of universal applicability for amateurs to work by, would be impossible, but I offer the following suggestions, which may aid in perfecting a plan:

Most persons who have any fondness for trees or plants, when they once get started in horticulture operations, become very much interested. The great secrets of success in amateur landscape gardening are, first, to become interested, then to look and study and plan and contrive. A little ingenuity is also desirable, but it is not half so formidable or expensive an undertaking to lay out the grounds and plant a small lawn as many persons imagine.

Plant a few shade trees near the house, about ten feet from it, on the south and west sides, to screen it from the midday and afternoon sun. These should be rapid growers, as silver maple, or Carolina or balsam poplar. If these trees are planted about ten or fifteen feet from the house, they will give a very appreciable shade in three or four years, but they are not the most ornamental or desirable for permanent trees. Rapid growth is their recommendation, and they will be too close to the house to remain many years; therefore, plant some finer varieties about twenty-five or thirty feet off. For this, there are nothing better than sugar maple, Norway maple, horsechestnut, European chestnut, ash, *Magnolia acuminata*, red colchicum maple, sweet gum, willow leaf oak, and mossy cup oak. These trees should stand about thirty or forty feet apart, in order to have room to develop into perfect specimens; but it is often better to plant at half these distances, or plant some cheaper, rapid growing trees between them, in order to shade the place quicker, and then cut out alternate trees in a few years. There should be a vacant space directly in front of the house, affording an unobstructed view from the street or road. The trees which are necessary for shade on the front side should be trimmed up as they increase in size, so that there will be a view from the second story windows under their lower branches or between them.

Evergreen trees produce an effect in ornamental planting not to be obtained by any other means, and every large lawn should have an evergreen belt or hedge on one side at least. In exposed situations, a screen of large evergreens is of great value in protecting houses and out-buildings from cold northern winds. It is astonishing what a modifying influence a belt of tall evergreens, standing on the north and west side of buildings, will have in blustering, windy weather. The best varieties for this purpose are Norway spruce, hemlock spruce, silver fir, white pine, Scotch pine, American arbor vitæ, and *Retinospora obtusa*. It is not always essential that they should be planted in a straight row; it is sometimes preferable to plant in a curved or irregular line, or in a succession of clumps, so as to give the effect of a continuous background without the formal stiffness of a hedge row. As a general rule, evergreens do not appear to the best advantage in straight rows; they look better when grouped in clumps, or dotted about in a rather promiscuous manner. The larger varieties should not be planted any nearer to the verge of a carriage drive than fourteen feet. When planted in clumps, they are often set fifteen feet apart, with three or five trees of one variety together. At this distance they will attain their perfection in about fifteen years, and will then commence to deteriorate as the branches grow together. After the large shade trees and evergreens are planted, there will be a number of smaller evergreens and flowering shrubs needed for "filling in" the blank spaces. They should be planted in clumps of from three to ten or twelve, with an occasional single specimen in the smaller nooks.

The following are a few of the most desirable dwarf evergreens: *Arbor vitæ compacta, A. globosa*, Siberian, Hovey's golden, Tom Thumb, and George Peabody arbor vitæs. The last is a new golden variety of singular beauty, the hardiest and most distinct golden arbor vitæ yet introduced. *Retinospora plumosa aurea, R. plumosa, R. obtusa nana*, and *R. squarrosa* are not naturally dwarf trees, but they can be kept so by frequent shearing. If allowed to grow unchecked, they will attain considerable size. Irish, Swedish, and pyramidal junipers grow tall and slender, occupying but little room. The dwarf white pine is one of the prettiest small evergreens. It forms a compact, symmetrical bush, three or four feet high, and about equal diameter, presenting a dense mass of silvery green foliage. *Abies orientalis*, or eastern spruce, from the shores of the Black Sea, is a very handsome evergreen, of moderate size and very dense, compact habit. It is one of the neatest and most symmetrical of the spruce family, and appropriate for almost any situation.

Weeping trees are at present a fashionable feature in landscape gardening. The following are a few of the most desirable varieties: Weeping beech, cut-leaf weeping birch, and common weeping willow grow tall and form large trees. The Camperdown weeping elm and Kilmarnock weeping willow are dwarf trees, and never grow any higher than the point where grafted. *Abies inverta*, or weeping spruce, is the best weeping evergreen, and it is a very unique and effective tree in a lawn.

Hardy flowering shrubs develop more quickly than any other class of trees, and are therefore indispensable for filling in a new lawn, where it is desirable to get something to make a show as quickly as possible. There are also many nooks and corners that look bare at first, but which will eventually be occupied when the other trees are developed. Such places may be filled temporarily with some cheap shrubs, that can be thinned out or removed in a few years, as the trees encroach upon them. I name a few of the more recent introductions in this class of plants, all of which are hardy, free bloomers, and desirable for general cultivation, although not yet generally known because of their scarcity. They should be planted more extensively: *Cercis japonica*, or Japan Judas tree; *Cornus sanguinea*, or crimson dogwood; *Exochorda grandiflora;* purple-leafed filbert; Standish upright honeysuckle, the earliest and most fragrant variety; dwarf horsechestnut; *Viburnum plicatum*, or Japan snowball; *Weigela hortensis nivea*, or pure white monthly weigela. The purple beech is one of the most effective trees that can be planted in a lawn, particularly where it can be seen against a background of dark green foliage.

* S. C. Moon, in *Country Gentleman*.

The Economics of Disease.

There is one side of preventive medicine that may be urged upon the public with a strong chance of securing their attention, and that is the expensiveness of disease. In their individual cases they appreciate it well enough, and often howl loudly about loss of time and heavy bills at the doctor's and druggist's. But with the narrowness of view and selfishness of interest which generally characterize mankind, it is hard to get them to look at its cost in gross.

This may be estimated in several ways, and includes a number of factors. It has been calculated by statistical hygienists that of the cases of disease now current in civilized communities, about *one-third* could have been prevented by intelligent sanitation, personal or general. In our opinion this estimate is too low, rather than too high; but take it at one-third. Then the actual loss to these patients or their families is represented by one-third the whole amount paid doctors, druggists, nurses, etc., in a community, plus the loss of time, whatever that may be.

But this is only the first item in the bill of charges.

One-third of all the investment locked up in hospitals, dispensaries, asylums, homes, etc., could be placed to profitable and productive use were the laws of health observed.

Much more than this; numerous limited localities, vast tracts of fertile land, now shunned or but partly tilled, because of their ill repute on the score of health, would be doubled, quadrupled, in selling value and producing power, were they made free from the poisons which infest them. Millions of acres of the finest soil in the United States are lying idle by reason of the paludal poisons which are generated about them. Yet there is strong testimony that systematic action on the large scale can overcome these miasms.

We have spoken only of disease, but we must also take into account the sequelæ of disease in destroying ability to work, and thus casting the heavy expenses of permanent invalidism on the family or the commonwealth, or by a fatal result depriving the community of a life which would have possessed a value as capital applied to the production of wealth.

This has been the subject of calculation by political economists in England and Germany, and in both countries they have reached the conclusion that the value of an unskilled laborer, at twenty-five years of age, to his country is $1,200. In other words, this is the average sum which such a person will contribute during his life to the wealth of the community in which he lives. Now, if we suppose one-third the deaths in a community are preventable, we can readily see how much richer the community would be were it to exercise the necessary prophylaxis.

These are but a few of the practical considerations to which this subject leads, but they will serve as hints how strong a case may be made of this side of sanitation.—*Med. and Surg. Reporter.*

Refining of Shellac.

BY E. L. ANDES.

The crude shellac is refined in the following way: One and a half kilos. of soda are dissolved in 45 liters of water contained in a small boiler or kettle; 5 kilos. of the crude shellac are added in small quantities at a time. This turbid solution bas the characteristic odor of shellac and a violet-red color. The liquid is boiled for a few minutes, and, while hot, a wooden air-tight cover is cemented on the vessel. When the liquid is quite cold the cover is removed, and the thin cake of fat which is found on the surface is separated. The solution is filtered through linen, the clear filtrate slowly decomposed with dilute sulphuric acid, and the resulting shellac washed with water until no acid reaction remains. The washed resin is now pressed and melted in boiling water, when it can be shaped with the fingers. This shellac is cooled in water containing glycerol, and when hard is dried. The refined shellac forms yellowish-white, glistening tufts or bars, which, when dry, are yellowish-brown; it should entirely dissolve in alcohol.

Conflagration Dangers in Large Cities.

At a recent meeting of the American Society of Civil Engineers, in this city, a paper by E. B. Dorsey, C.E., on "The Comparative Liability to and Danger from Conflagrations in New York and London" was read by the author.

The following were among the reasons given for the comparatively smaller number of fires in London as compared with American cities, and especially with New York. The comparatively damp climate of London, which prevents sparks or weak flames from igniting wood; the much higher temperature of the winter months, and consequently the smaller number of domestic fires. Statistics were given showing that lower temperature always largely increased the number of fires. The population of New York south of 40th Street is more dense than in an equal area of London, New York averaging 208 persons per acre, and London 191½ per acre for the same area. New York averages for the same area 16⅓ persons per dwelling. Another comparison of about 750 acres of the most densely populated portions of London and New York gives for London 249 persons per acre, and for New York 352 persons. The size of the houses in London is in general considerably less than in New York. Many London houses do not exceed 15 feet wide, 25 feet deep, and 22 feet high, and a very large number do not exceed 16 feet wide, 30 feet deep, and 40 feet high. All the London houses have fireproof roofs, and in all cases there is proportionately much less wood and more brick or stone than in New York buildings. There are also fewer and smaller windows than in New York. The walls are short, low, and generally well tied together, and so built that they will not fall after the little woodwork in them has been burnt, thus rendering it easier to confine a fire to the house in which it begins. There are no wooden roofs on buildings, and but little wood in the yards, in fences, or outbuildings. The ash barrel or ash box, so frequent a cause in New York, is unknown in London, each house being required to have a vault built of masonry for ashes. Lumber yards, large stables, carpenter shops, furniture makers, wooden manufacturers, places for storage, the manufacture of combustible material, are not found in the thickly built portions of London. The river Thames and the parks divide London in such a way as to greatly aid in preventing the spread of conflagrations. The numerous railroads running into London form effective barriers against the spread of fires. These railroads, with the exception of the Metropolitan and District Underground roads, are built upon heavy viaducts of brick or earthen embankments, not less than 60 feet wide, or are in open cuts not less than 80 feet wide. There are also many wide streets in London and numerous squares, crescents, church yards, and private grounds.

Glucose in Leather.

According to the *Shoe and Leather Review*, the falsification of the weight of leather by adding glucose, or grape sugar, appears to be carried on rather extensively in Germany, and the shoe trade societies are taking steps to protect themselves from the imposition. A simple test is recommended, which consists in placing pieces of the leather in water for the space of twenty-four hours, when the glucose will be dissolved by the water, and the result will be a thick, sirupy liquid. When two pieces of the leather are placed together and left in that position for a time, it will be found difficult to separate them, as the gummy exudations will stick them together. It is stated that some samples of sole leather were found to contain as high as 30 to 40 per cent of extra weight. Another test recommended is to cut off small pieces of the leather, and, wrapping them up in a damp cloth, lay them away for a few days in a temperate place. If the leather is adulterated, the pieces will be found to be stuck together, and surrounded by a sirupy substance in proportion to the quantity of the adulterant used; and the peculiarity about leather treated with grape sugar is that, after wetting, it is difficult to dry, and resembles gutta percha or untanned leather more than the genuine article.

THE "setting of gypsum" is the result of two distinct phenomena. On the one hand, portions of anhydrous calcium sulphate, when moistened with water, dissolve as they are hydrated, forming a supersaturated solution. Again, this same solution deposits crystals of the hydrated sulphate, gradually augment in bulk, and unite together.

IMPROVED WARPING MACHINE.

Fig. 1 is a perspective view of the warping machine as constructed by Messrs. Howard & Bullough, Fig. 2 is a side elevation, and Fig. 3 a sectional plan, which indicates more clearly the improvements adopted. The presence of

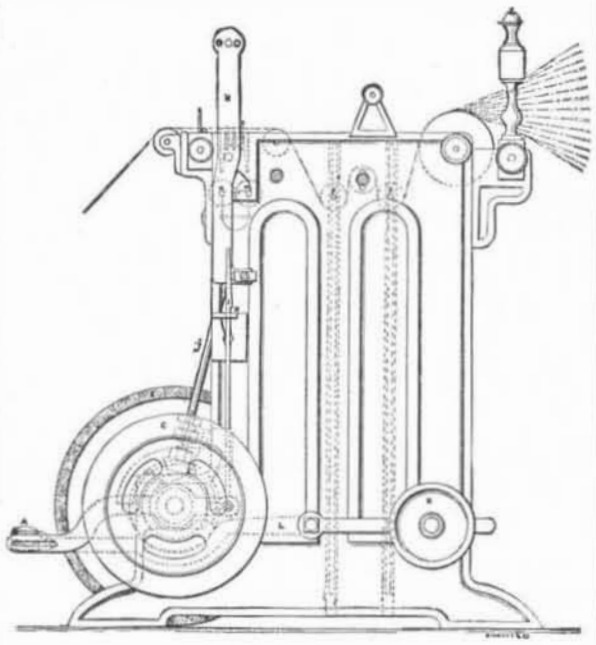

Fig. 2.—BEAMING OR WARPING MACHINE.

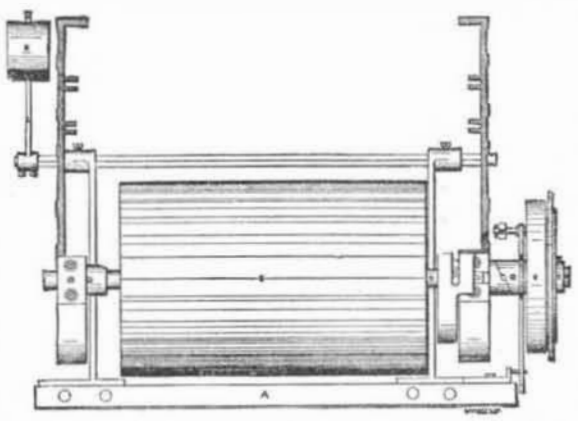

Fig. 3.—BEAMING OR WARPING MACHINE.

a stop motion renders a large number of falling rods unnecessary. Two only are required (*bb*, Fig. 2) to take up the slack due to over-running of the bobbins on a stoppage. They also serve to reduce the strain on the yarn due to the inertia of the bobbins on starting again, the tension being applied gradually as the falling rods are lifted to their normal working position. Upon the shaft, D, is fixed the surface drum, E. The warper's beam that rests upon it is not shown, but the course of the warp toward it is indicated by the dotted lines. The self-stoppage is effected as follows: The two rollers, M M, are of equal length to the width of the frame, and revolve in contact with the right-hand roller, being driven by means of inclined shaft, J, and bevel wheels from the surface drum shaft, D. The threads are about 3 inches above the rollers, as are also three slots in the table of the machine. These slots contain a set of fallers or staples of ∩ shape, each staple, I (see Fig. 2), hanging upon its own thread, and being kept up thereby. Suppose a thread fails; the staple it supports falls into the nip of the rollers and separates them, pushing the left-hand roller toward the left. The small movement due to the entry of the faller into the nip is multiplied at the foot of the lever, N, to an extent sufficient to knock the notch of trigger, I, off its support, H. When this occurs the weight, K, which is kept up by the trigger, is allowed to fall, in doing which it disengages the driving motion and causes the stop.

This motion, as will be understood, is very rapid in its action. The only time lost before the driving is knocked off is that taken up by a faller falling 3 or 4 inches, as the case may be, say about one-tenth of a second, and immediately it is in the nip the slightest revolution of the rollers causes their separation and stoppage of the warping before the broken end has reached the beam. The faller drops into a trough below, and no further notice is taken of it for the time being. When the end is pieced and the machine again started, which is done by depressing the treadle, A, the minder places another faller upon that end, and so on in every case, the fallers that from breakages accumulate in the trough being collected from time to time and used over again. The choking of the slots by the accumulation of floss is prevented by the mode of suspending the fallers. The threads run in close proximity to the top of that part of the frame containing the slots, and consequently the fallers are allowed to sink for their full depth into the slits and away from possible contact with floss, only the very tops being exposed, and the collection of fibers at these points is practically impossible, the threads rushing in close proximity to the surface, effectually sweeping them away as they fall from the yarn. The machine is driven by the belt pulley, B, which, when the machine is stopped, runs loose on the shaft. By depressing the treadle, the inclined surface of the clutch or cam forces the pulley against the friction plate, C, and causes the surface drum to be gradually setin motion, in this way also easing the strain on the yarn.

An improvement has been added to the Singleton machine by Mr. Tweedale, of the firm of Messrs. Howard & Bullough, that should be mentioned. It consists in applying a clutch (as shown in dotted lines) on the inclined shaft, J, that drives the stop motion rollers. When the machine is knocked off, this clutch is automatically disengaged at the same time. This allows the beam to be turned back for finding a lost end, when necessary, with far greater ease than in the old Singleton, because the rollers are not now turned by the operative. When the treadle is depressed and the machine started, the clutch is simultaneously put into gear. The roller on the right in Fig. 2, that the yarn first passes over after leaving the creel, is a measuring roller, 18 inches, or half a yard, in circumference, and it is made to actuate a stop motion when certain lengths have been wound. For instance, it is usual for this motion to be adjusted to stop for every "wrap" of say 3,500 yards, as an indication to the minder that this length has been wound, the warper's beam containing several "wraps" (about four or five) when full.

It only remains to add that the commonest width of machine is ⅜, or 54 inches wide inside of warp beam flanges, but they have been made on Singleton's principle in all widths up to ¼, or 108 inches wide inside of warp beam flanges, and this machine has so much merit in practice that Messrs. Howard & Bullough have made the astonishing number of 7,000, and this number is being added to at a rapid rate.—*Textile Manufacturer.*

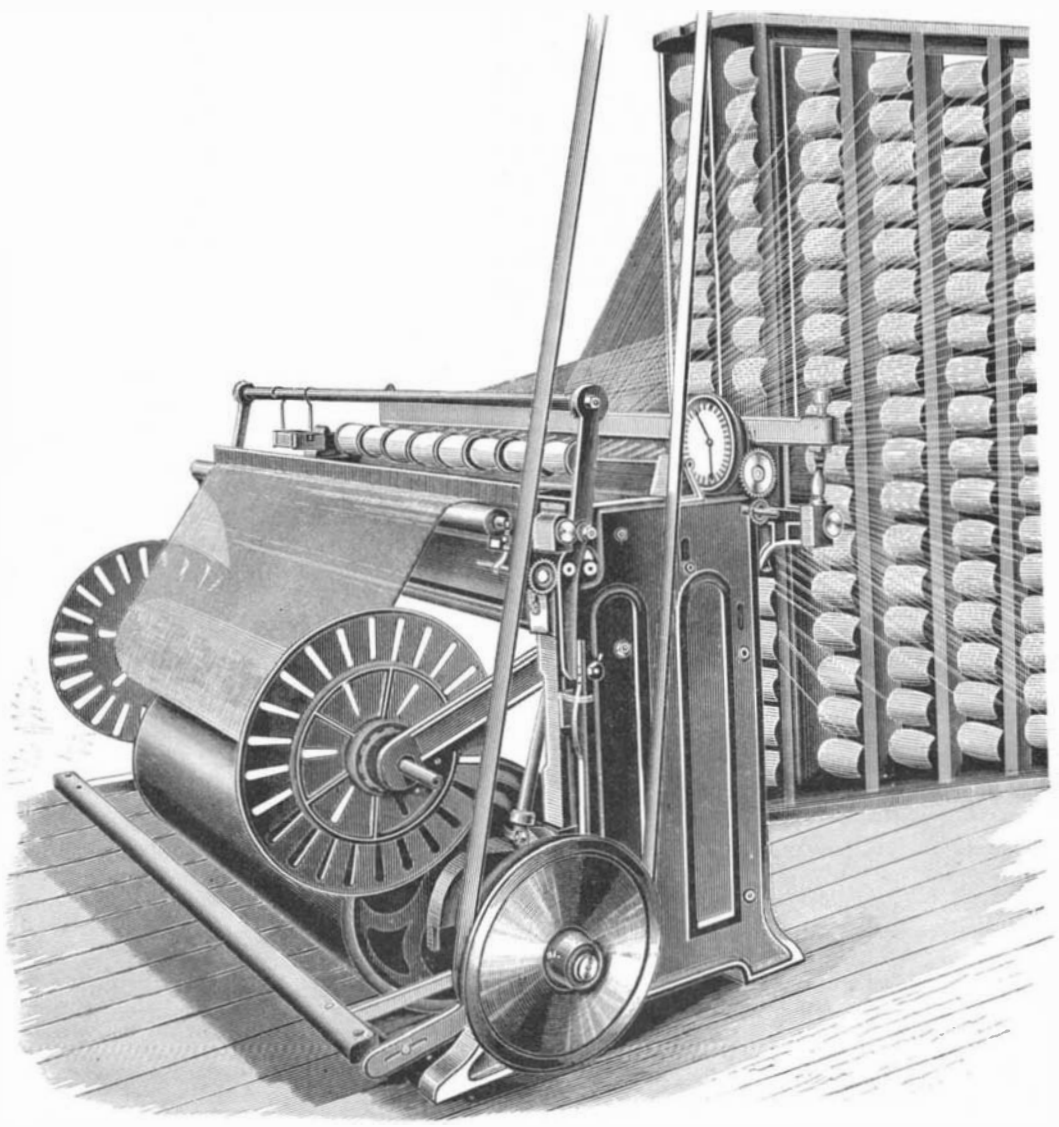

Fig. 1.—HOWARD & BULLOUGH'S BEAMING OR WARPING MACHINE.

Softening Water.

An account is given in *The Engineer* of a method of softening water followed in some industrial establishments in Germany. The principle of the process is based upon the fact that heated and hydrated oxide of magnesia readily absorbs the free carbonic acid of natural water; and by thus depriving the water of its dissolved gas,