

adaptation to cooling "hot" grain. The following table has been prepared from actual measurements and practice:

Total square feet iron heating surface.....	591
Total square feet iron cooling surface.....	887
Total square feet iron surface inside of cylinders.....	1,478
Total square feet grain surface exposed to air currents.....	1,212
Total cubic feet air drawn through the grain per minute.....	7,338
Total lineal feet traversed by grain during operation.....	600 to 1,200
Time of passage.....	15 to 30 minutes.
Total weight of iron work complete, about.....	19,000 lb.
Total horse power required.....	18
Cost of drying grain for one day of 24 hours:	
4 tons of coal at \$2.25.....	\$9.00
2 men, fireman and foreman, two days each, \$1.50.....	6.00
Cost of motive power at 50 cents per H. P.....	9.00
Oil, etc.....	50
	\$24.50

Results—5,000 bushels dried at a cost of less than one-half cent per bushel.

Cost of cooling "hot" grain for one day of 24 hours:	
One foreman, 2 days' time, at \$1.50.....	\$3.00
Motive power.....	9.00
Oil, etc.....	50
	\$12.50

Results—10,000 bushels at a cost of one-quarter of one cent per bushel.

It requires a space 48 feet long, 24 feet wide, and 12 feet high, but these can be reduced somewhat when necessary. In order not to injure the grain, the time required for the removal of moisture can be increased by adding a series of return conveyers, by which the grain, after it has passed through the first drier and cooler, is returned to the head of the second set, and so on until it has passed through the whole gang. Its passage can be retarded to any extent by bringing up the discharging end nearly to a level.

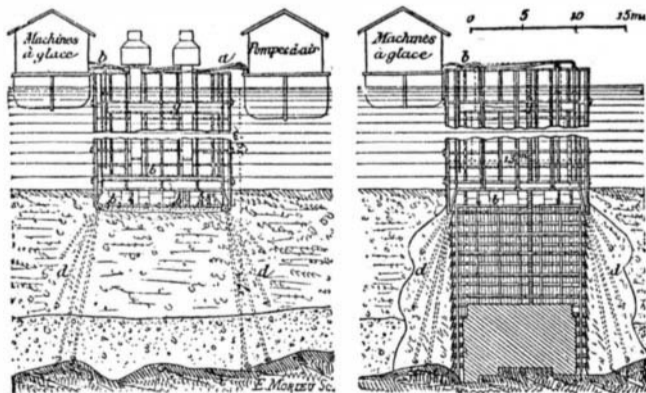
The maker claims superiority on the following important points: Economy of operation, drying and cooling in one operation, simplicity and durability, requiring no expert labor, perfect results, ability to use any kind of fuel, frictional instead of cog gearing, cool and clean operating room, and no extra-hazardous insurance rate.

Machines furnished only by the patentee, Mr. Stanley E. Worrell, Hannibal, Mo., who will supply further information upon application.

THE SINKING OF SHAFTS BY FREEZING.

The sinking of mine shafts by freezing was first practiced by Mr. Poetsch at the Archibald Mine. The method consists in driving into the earth, around the perimeter of the shaft, a series of pipes that are closed at the bottom and that contain other pipes. A freezing mixture forced into the inner pipes ascends through the annular space and is forced by a pump to a refrigerating machine in order that it may give up the heat recovered and then begin the same travel again.

Mr. Poetsch's experiment, as conclusive as it was, was performed upon a shaft of 18 feet depth, only, sunk through wet quicksand. So Mr. Haton de la Goupillere, in briefly describing the operations before the Societe d'Encouragement, expressed the opinion that it would be absolutely rash to undertake to sink very



SINKING SHAFTS BY FREEZING.

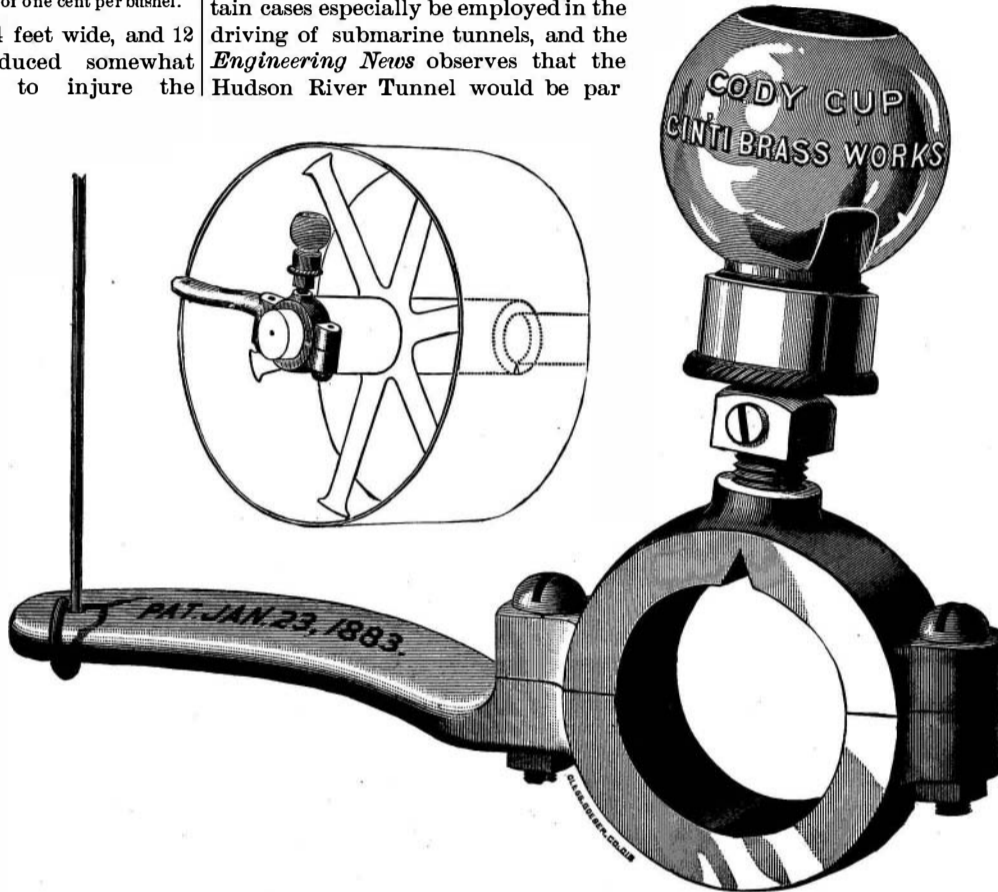
deep shafts by such a process. New attempts have nevertheless been made since with entire success at the Centrum Coal Mines at Konigs Wusterhausen. Here 108 feet of quicksand were frozen in 33 days with 16 pipes analogous to the preceding. The mass solidified around the circumference of the shaft was ten feet thick. At the Emilia mine likewise a 9 foot shaft was sunk through a 118 foot stratum of quicksand.

In these different operations, the temperature, which reached -19° at the bottom of the shaft of the Archibald

mine during the last days of the experiment, was taken only at the moment of the observer's descent. After remaining at the bottom for a certain length of time the temperature of the air gradually rose, and when several workmen were occupied permanently at the bottom it remained at a temperature of between 0.5° and 1°. So, after quite a short period of reheating of the air, the cold caused no inconvenience to the workmen, but, on the contrary, rather braced them up.

One of the most interesting peculiarities is that the congelation is sufficient to allow the quicksand and the surrounding earth to be taken out in a single block. At the Archibald mine, for example, when the stratum of lignite was reached it was found that the earth was frozen to over a yard beneath the extremity of the pipes, and the top of the stratum was so intimately cemented to the superposed quicksand that pieces could be broken from the mass without a fracture occurring at the plane of separation of the layers.

This fact proves that the Poetsch system may be applied with equal efficacy, whatever be the inclination of the strata, since the congelation converts the earth into a perfectly homogeneous mass. It might in certain cases especially be employed in the driving of submarine tunnels, and the *Engineering News* observes that the Hudson River Tunnel would be par



LUNKENHEIMER'S AUTOMATIC LOOSE PULLEY OILER.

ticularly suited for the application of it, since the stratum of sand and mud at the bottom has a very uniform composition, and would permit of working at every operation over lengths of from a hundred to a hundred and fifty feet.

A close examination of the frozen portions has demonstrated that the thickness of the block of ice increases with the depth. This is due to the fact that, through the direction given the freezing mixture, the maximum of its action is exerted at the base of the pipes. There forms, therefore, around each of the latter a truncated cone of ice whose larger base is situated beneath. These truncated cones gradually increase and finally penetrate each other, until the whole earth forms but a single block of ice.

We may conclude from the results obtained that, with a circular shaft, congealed earth over a yard thick permits of the sinking of a six and a half foot shaft without lining. The pipes are driven in different ways. When the shaft is already sunk up to the level of the water, and the stratum of wet earth is not very thick, it suffices to drive the pipes into the sand by removing the latter from the interior by means of a sand pump. In wet earth of some depth, a boring machine is employed. This puts down four pipes at once. If the strata to be traversed contain erratic blocks, the latter are avoided by inclining the hole, or, if they are too large, they are traversed by a special tool.

Mr. Poetsch proposes to apply his system to the constructing of bridge piers, and has just made a contract with the government of Roumania for the construction of the twelve piers of the great Bucharest Bridge.

According to the *Techniker*, it is his intention to proceed by two methods. The first (Figs. 1 and 2) constitutes a combination of the compressed air and freezing methods. After sinking the working chamber by ordinary methods twelve or fifteen feet beneath the bottom, the freezing pipes will be driven beneath and around its perimeter in such a way that the whole mass contained in the cavity to be formed above the rock

may be taken out in a block. The caisson will then become water tight, the air lock will be removed, and the work will be effected in the open air.

In the second process the use of compressed air will be dispensed with. After sinking an open caisson over the location of the pier, the pipes will be driven. After the freezing has been done, the water will be removed from the caisson by pumps, and the work will be performed in open air.

In order to preserve the masonry from the freezing action of the surrounding mass, it is Mr. Poetsch's intention to line the side of the cutting with a layer of straw, and to form the joints with a mortar of sand and tar or asphalt.

The experiments of Mr. L. Malo have demonstrated, moreover, that masonry with asphalt joints is susceptible of perfect cohesion.

The Poetsch method, which now appears to have entered into practice for sinking shafts in wet earth, presents the great advantage over all previous systems of allowing the cost and duration of the process to be exactly foreseen. Besides, it secures a vertical sinking of the shaft, since the operation is performed in solid earth; it completely dispenses with pumping apparatus, and does away with those special difficulties entirely that originate in the inclination of the moist strata.—*La Nature*.

AUTOMATIC LOOSE PULLEY OILER.

The great obstacle which has heretofore prevented the successful oiling of loose pulleys has been that centrifugal force kept the oil away from the bearings. The oiler herewith illustrated (shown detached and in place upon the shaft in the figures) overcomes this objection, and is simple in its construction, which will be easily understood from the engravings, durable, easily applied, and very perfect in operation. In addition, it is economical, the manufacturer stating that one ounce of oil is sufficient for several months. It requires a space of three-fourths of an inch on the shaft, upon which it is set loosely so as to bear against the hub; it is kept in place by a slip collar, unless it fills up the space between the hanger and loose pulley. To keep the oiler stationary, a hole is provided in the arm to fasten a wire, which can be attached to the ceiling or wherever convenient. On wide pulleys a slot

or groove should extend through the entire length of the bearing and terminate in a V-shaped notch. As this will cause a suction, prevent a vacuum, and freely supply oil from end to end of the bearing, the feed is regulated by means of a slotted screw working like a common stop cock.

Full particulars can be obtained by addressing the manufacturer, Mr. F. Lunkenheimer, proprietor Cincinnati Brass Works, Cincinnati, O.

COVER FOR COOKING UTENSILS.

The engraving represents a cover for cooking kettles



GOODALE'S COVER FOR COOKING UTENSILS.

or utensils lately patented by Laura M. Goodale, of Marshalltown, Iowa. Fig. 1 shows a coffee pot and Fig. 2 a kettle arranged with this cover, which is shown detached in Fig. 3. Within the lower portion of the cover,

and extending for any desired distance from its front, is a strainer made of wire gauze or perforated sheet metal. In the front side of the cover, within range or line of a spout projecting therefrom, is a slide controlled by a knob from the outside, which serves to uncover or close, as required, the outlet in the cover over the spout. By means of this combined cover and drainer, the contents of the kettle may be drained by suitably inclining the kettle. The slide allows the water and steam to escape without coming in contact with the hands, and may be more or less opened to allow steam to escape and prevent boiling over. A steaming chamber is formed between the strainer and top of the cover, in which articles may be placed. A kitchen utensil of this description will be found convenient and useful; and as the improvement is in the cover, it may be readily applied to kettle bodies of ordinary construction. In applying the cover to tea and coffee pots, wire gauze is used instead of perforated metal.

Correspondence.

Burn the Garbage.

To the Editor of the Scientific American:

In regard to your article of March 7, on "The Proposed Garbage Burning in New York," I beg leave to make some suggestions, having for many reasons given the subject more than usual attention and study, and, I think, mastered most of the matter published in your columns for many years in regard to it. Burning the refuse before decay, fermentation, or putrefaction commences, is the true solution of the difficulty. It is not my purpose to claim this as an original plan, nor to startle the public with something new; it is as old a sanitary regulation as the days of Moses, though as new in some respects to some people as the latest discoveries of European laboratories in health matters.

My suggestion is, while you are experimenting with a \$50,000 appropriation, and expending a million annually for street cleaning purposes, to get the help of your individual citizens by press appeals, and teaching, and let every family daily burn, cremate, destroy, as much of their garbage as will be found practicable. Your professional men, merchants, and mechanics know enough of elementary chemistry to understand that garbage, composed mainly of animal and vegetable matter, is converted by fire into ashes and vapory matter, and the latter, before burning, gives that weight and bulk to garbage which heretofore has rendered its transportation unprofitable and expensive. Clean ashes may be hauled and used for many economic purposes, and your crematories, when built, will have plenty of filth to keep them active without the garbage of may be two hundred thousand homes. In view of the many columns written upon the "cholera," which has not yet come and I hope will not, it may be worth taking into serious consideration, what effect would the removal of this garbage have upon the general health, what would be its cost, and what moral effect would the daily destruction by burning practiced by families for private and public good?

The plan I think is good, cheap, and must, if generally carried out, lower your very high death rate.

J. M. WORTHINGTON, M. D.

Annapolis, Md.

Formation of a New Elbow Joint.

To the Editor of the Scientific American:

I herewith transmit to you a record of one of the most brilliant operations in modern surgery, to which my attention was called upon its occurrence, and which I have watched with deep interest to its successful termination. On the 17th day of August last, John Danielson, a Swede, in the employ of Palmer & Nichols, lumbermen, a short distance from this city, while engaged in sawing a log was struck by a falling tree. The left arm was caught at the elbow, between the tree and the log, producing both dislocation and fracture at the same instant.

The bones composing the joint were broken into small fragments. Upon receiving the blow, the man probably fainted, as this was the last he remembered for several moments. This particular kind of injury has always been considered very grave, on account of the intense inflammation and swelling succeeding. As a rule, amputation is resorted to at once, and in aggravated forms is the only alternative. Mr. Danielson was at once admitted to Mercy Hospital in this city, under the care of the hospital surgeons, Drs. Groner and Burkart. The day following the accident, the patient being under the influence of anæsthetics, Dr. F. J. Groner performed the operation, assisted by his colleague Dr. Burkart. The articulating surfaces of the humerus, together with about two inches of the shaft of the bone, the head and neck of the radius, and the upper end of the ulna—all more or less crushed and splintered—were removed; the quantity of bone filling a sixteen ounce bottle. The wound was now dressed, by placing the arm in an obtuse angled splint having a hinged joint corresponding with that of the elbow, so that at the proper time the forearm could be flexed or extended, and the position changed as required.

A large douche filled with ice water was suspended above the patient, and a very small stream was allow-

ed to drop on the coverings of the wound constantly for ten days, in order to prevent supervening inflammation. The patient was placed upon a non-stimulating diet, and no unfavorable symptoms followed. In five weeks the wound was closed; and in five months the patient began to work. At the present time Mr. Danielson has a very satisfactory elbow joint, which time will render still more perfect, slightly enlarged, but exceedingly useful, and he is again in the lumber woods, and fully capable of performing all kinds of labor.

F. A. H.

Big Rapids, Mich., March 4, 1885.

Agricultural Machinery Abroad.—II.

We present herewith a second article on the agricultural industries of some foreign countries, compiled from the resident consuls' reports to the Department of State.

Silesia.—Henry Dittmar, Consul at Breslau, thinks that since the price of sugar beets has fallen from 22 c. to 15 c. a hundredweight, the thousands of acres which were transferred from the producing of rye, potatoes, barley, and oats to the growing of sugar beets will, owing to the reduced price of the latter, be devoted again to raising the variety of cereals as formerly. Steam plows have been used in sugar beet fields, and harvesters, binders, cultivators, etc., have been in almost general use since the prosperous years following the war of Germany and France. But, owing to the greater supply of cheap labor of later years, some of the labor-saving inventions, notably the reaping machine, have fallen into partial disuse, and the cheaper German imitation machines have supplanted, to a great extent, the American manufacture.

Mr. Dittmar mentions an annual machinery fair, held in Breslau, in the month of June, at which there were two hundred and forty-nine exhibitors, almost exclusively of agricultural machines and implements; but, he adds, there were fewer articles of American manufacture at the 1884 exhibition than were to be seen in previous years. He alludes to an American pulverizing harrow which attracted considerable attention, it being the first time it had been exhibited.

Allusion is made to the effort, some ten years ago, to introduce the American portable engines and steam thrashing machines, but they met with no success. The only way to get American machines introduced into Silesia, Mr. Dittmar thinks, is to send a set of agricultural machines to some responsible man, and with a privilege of hiring them out during a season; and if they worked satisfactorily, it would be a good advertisement, and enable them to enter into successful competition with the English machines which now control the market.

Holland.—Consul Eckstein, of Amsterdam, and John F. Winter, Consul at Rotterdam, both state that English agricultural machines and implements are mostly used, but, as reported in most other northern European countries, hay and manure forks, shovels, spades, rakes, and such like implements of American manufacture are in demand, and find ready sales.

In style and finish, Mr. Eckstein says, the American implements are conceded on all sides to be superior to those manufactured elsewhere; but the idea prevails that they are usually too weak for the heavy soil of Holland, and, therefore, the farmer prefers the clumsier but stronger machines of English make.

Mr. Winter adds that the Dutch farmers have different ideas about the construction of their implements from what the Americans have, and the manufacturers will consequently have to acquaint themselves with the changes that their products will have to undergo in order to give satisfaction in that country.

England.—Mr. Louis A. Lathrop, Consul at Bristol, gives a very extended report on the English manufacture of machines, which he accompanies with engravings of their style and construction, with list of prices the manufacturer sells them at. He does not think it will pay our manufacturers to attempt the introduction of agricultural machinery into England, although he thinks it possible to make some sales by sending wide-awake agents with machines to the Royal Agricultural Society's annual exhibition. Prizes are awarded for novel and useful implements in successful operation at these fairs. He warns our manufacturers against thinking they can command a market for their goods in England without the most persistent effort.

No half-hearted trial, says Mr. Lathrop, will succeed; no occasional sending of circulars or samples to an English commission agent will build up a trade in these lines. It must be a siege, not an assault; and it must be conducted with forethought, resolution, and patience.

Consul Shaw, of Manchester, confirms the opinion of Mr. Lathrop in respect to the best mode of introducing American machines, which is to exhibit at the fairs and shows in the leading agricultural centers. The English farmer wishes to see with his own eyes what a machine can do, and he is not likely to purchase on the testimony of others.

As a rule, English farmers are slow to adopt new inventions. Novelty does not captivate the average English farmer. An invention must be fully proved before

a ready sale can be relied on. "The old way" has charms for the great majority, and for this reason it is slow work to introduce useful labor-saving inventions among them.

When confidence is once established and prejudices overcome, the way is easy to success.

The English builders, adds Mr. Shaw, follow closely on the lines of American manufacturers, and it is vitally necessary for every American inventor to at once take out an English patent, so as to protect any new improvement on this side of the ocean.

Jasper Smith, U. S. Commercial Agent at Nottingham, reports that R. Hornsby & Sons and T. & F. Howard manufacture great quantities of reapers, mowers, fanning mills, harrows, plows, rakes, and other agricultural implements, many of the patterns being copied substantially after American patterns. Mr. Smith mentions especially of Messrs. Hornsby's style of reapers and mowers being eminently like those of Messrs. McCormick's and Walter A. Wood's manufacture. Mention is made of the extensive use of steam engines for thrashing and other agricultural work.

Ireland.—Consul Piatt, at Queenstown, states that in his district the agricultural tools, implements, and machinery employed, on the small farms, and even on large ones in remote districts, are of a very primitive description, consisting for the most part of the old Scotch swing plow, sowing machine, and grubber. There are no cultivators or wheel plows in use, and in these districts the most simply made and cheapest plows, harrows, and mowing machines are the only ones salable. Food-preparing and such like machinery is scarcely known, or, if known, its value in the economizing of labor, etc., is not certainly appreciated. In the more enlightened centers, however, and on the large and well managed farms, all the best machines of American and English manufacture are partially employed, and their use has been gradually extending. American and English made machinery very generally prevails in the Cork district. Plows, harrows, grubbers, mowing and reaping machinery, are imported from England, and mowing and harvesting machinery from America. In Kerry, where agriculture is perhaps more backward than in any of the other counties, there are very few American machines in use. As to how our American manufactures of machinery compare with those of other countries, Mr. Piatt says there is a diversity of opinion, except in respect to harvesting machinery, the superiority of which is conceded on all sides.

With regard to the tillage machinery, an idea prevails—and largely prevails—that though it is cheaper, it is not so good or lasting as that imported from England. The American made machines are found to be too light in construction, and not so well suited as the stronger made article which comes from England, for dealing with the hard, stony soil of Ireland. In Limerick County, where the soil is more loamy than in other parts of the province, the general run of American made machinery compares more favorably with the English than is the case in other counties.

Purchases are made by the farmers on long credit, which American manufacturers are not used to, and do not like. On the whole, Ireland does not seem a very encouraging market for American agricultural machinery.

Scotland.—Oscar Malmros, Consul at Leith, gives a very voluminous and interesting account of the agricultural affairs and products of Scotland. The principal American agricultural machines sold and used are the mower, reaper, and binder, not less than ten thousand sheaf-binding reapers having been sold in a single year. No machinery, implements, tools, etc., for use in agriculture are imported from any country except the United States.

For many years American reaping and mowing machines and sundry other machines and implements of American manufacture have had the preference with skilled agriculturists, although much prejudice existed, and to a great extent still exists, in favor of heavy, cumbersome implements, etc. But while the less skillful or less advanced farmers are gradually growing away from such prejudice, the British machinist is accommodating his manufactures to the improving taste of the farmer, and making them lighter, substituting malleable for cast iron in some instances, and introducing steel for iron in others, thus bringing the various articles in closer resemblance to those imported from the United States.

American manufactures, beyond question, compare favorably with British. No others are in competition with them.

A SOLUTION of oxalic acid has been used for removing ink stains from cotton, linen, or the fingers, but it is attended with the danger of injuring textiles and the skin. A much safer and better treatment of ink or rust stains consists in the application of two parts of powdered cream of tartar and one part of finely powdered oxalic acid. Shake up the ingredients well together, and apply the powder with a dry rag to the dampened stain. When the spot has disappeared, the part should be very well washed.