ture of the yolk and albumen. Immense quantities of eggs are preserved in the spring of the year by liming. Thus treated they are good for every purpose except boiling. It is a common trick for some dealers to palm off eggs so treated as fresh, so that imposition is easily practised. In the desiccating process, however, the difference becomes apparent, as from four to five more limed eggs are required to make a pound of eggs crystalized than when the fresh eggs are used, and eggs in the least taintedwill not crystalize at all.

Some of the most experienced egg dealers declare that there is no profit in raising poultry to compare with producing eggs. A single hen will lay from twelve to fifteen dozen eggs per annum, selling at an average of thirteen cents per dozen, and the birds thus occupied can be housed and fed for less than fifty cents for the whole period. In the East the price per dozen is much higher. Here we buy them by the dozen. Step into an eastern produce or grocery establishment, and they sell so many eggs for a quarter of a dollar. There is no reason why the crystalizing process should not become quite general, and egg production stimulated as never before, and the food supply receive large accessions from this source. The already great and increasing consumption of eggs in England and France shows growing appreciation of this form of food compared with any other. It is thought the annual sales in the United States alone must aggregate nearly $20,000,000. In Lima, Peru, eggs sell at one dollar per dozen, equal to four dollars per pound crystalized. It is thought that this new process of preserving for utilization the industry of our hens and pullets may be very acceptable as well as beneficial in a business and domestic point of view.—*Cincinnati Commercial.*

An American Surgeon in England.

Dr. Sayre seems, from all accounts, to be having quite an ovation among our British cousins; and probably no American surgeon ever before received such marked attention on their part. The *Lancet* for July 14 announces his arrival in London, and offers him a cordial greeting, and, in the issue for July 21, gives an extended account of the principal points insisted on by Dr. Sayre "in his forcible expositions of pathology, diagnosis, and treatment of spinal curvature." All the late numbers of the *British Medical Journal* contain references to his visit. That of July 14, in speaking of his demonstration at University College Hospital, gives the details of his method of treatment of Pott's disease and lateral curvature, and those for July 21 and July 28 contain reports of his demonstrations at St. Bartholomew's and Guy's Hospitals respectively.

His first demonstration of his method in London was at University College Hospital, by invitation of the surgical staff, before an immense audience.

Tuesday, July 17, he delivered a clinical lecture at St. Bartholomew's Hospital, at the invitation of Mr. Callender, and the same week he also appeared at the London Hospital. Wednesday, July 25, he visited Guy's Hospital, by invitation of Mr. Durham, and "put up" two cases of Pott's disease and one of lateral curvature, before a large number of the profession. The first of the cases of Pott's disease was the daughter of Dr. Gooding, of Cheltenham, and the second a child of eleven, who had never stood, and the worst case, Dr Sayre said, which he had ever seen. In less than half an hour he had the satisfaction of making her walk, which, of course, created the greatest enthusiasm among the audience. On the day following, he "put up" four cases at the Royal Orthopædic Hospital, of which he had previously had photographs taken.

Dr. Sayre then made a visit to Birmingham, at the request of the branch of the British Medical Association located there, and, by invitation of Mr. West, senior surgeon, gave a demonstration in the amphitheatre of the Queen's Hospital, which was crowded to its utmost capacity. He lectured for one hour, during the course of which the plaster jacket was applied to two cases of Pott's disease, and one of lateral curvature, and at its conclusion, Mr. West made a fine address, and moved a "hearty welcome and thanks to the great American surgeon." The sequel is thus described by an eye witness: "Mr. Furnieux Jordan seconded the motion with such a glowing tribute, and in such fervid eloquence, that Dr. Sayre became completely overcome. He spoke of the millions of human sufferers, heretofore tortured by rack and screw, and even then left miserable and misshapen, which would now be made easy and comfortable, and restored to perfect health and perfect form. He thanked God that the days of the hunchback had passed away, and that the instruments of torture would never again be resorted to. At the conclusion of his remarks there was not a dry eye in the house, and there probably never was such a scene in any medical meeting before. Tears of gratitude got the better of Dr. Sayre's ability to speak, and he broke down completely in his first attempt to respond. In a few minutes, however he sufficiently recovered himself to express his appreciation of the sentiments just uttered, and shortly afterward so electrified the audience with his enthusiasm that one would have thought the roof would go off the amphitheatre."

On the 6th of August, Dr. Sayre was to go to Manchester to be present, as a delegate from the United States, at the annual meeting of the British Medical Association; after which he expected to devote himself for a time to the preparation of a work on the treatment of spinal disease, which will be immediately put in press by Messrs. Smith, Elder & Co., of London. During his stay in England he has been the recipient of much generous hospitality. Among the pleasantest of the entertainments which he has attended were a delightful breakfast, attended by all the principal men of the place, which Mr. West gave him at Birmingham, and a magnificent dinner in the Royal Hall of St. Bartholomew's Hospital, at which there were nearly four hundred guests present.

Rennet and its Preparation.

The manufacture of cheese depends upon the peculiar property possessed by casein of being curdled by acids. On the addition of an acid to milk, the casein, or cheesy portion, which constitutes three fourths of the nitrogenous matter present, is separated from the liquid, and this separation of milk into curds and whey is the first step in cheese making. Curd may be formed either by the addition of an acid, or by the juice of certain plants, or, as is the universal practice in this country, by the use of rennet, which is prepared from the fourth stomach of the young calf. Its peculiar action in coagulating the casein of milk is due to the presence in this stomach of minute cells contained in the gastric juice, and the process is one of fermentation, rapidly effected by minute microscopic bodies, of which the liquid composing the steepings of rennets is full. Over one thousand of them have been counted in one five hundredth part of a drop taken from a gallon of water in which a single rennet had been soaked; hence at this rate a good rennet would contain two hundred thousand millions of them. It is claimed that this active agency in rennet may be multiplied and carried from one lot to another of milk, the same as leaven in bread making, and hence rennet is really a true yeast.

It is only the fourth, or true digesting stomach of the calf, from which rennet can be prepared out of the inner lining or mucous membrane. They are usually in their best condition when the calf is from five to ten days old, but do not vary materially in strength while the young animal lives entirely on milk. As soon as the calves begin to live on solid food the strengths of their stomachs as rennets grow feeble. The calf should be perfectly healthy, must have suckled the cow four or five days, and to within a short time of killing. If it has been without food for any length of time the stomach becomes inflamed and congested with blood, and especially so if the calf has been driven or carried much of a distance, since then it is of no value for rennet. The stomach should be taken out and well cleaned at once after the calf is killed, by careful wiping with a moist cloth or sponge, or by rinsing, but in no case should water be poured upon it. As soon as cold, let it be lightly salted and left to dry on a dish for a day or two, then stretched on a hook or crooked stick, and hung up to dry in a place where the temperature is moderately warm. The Bavarian method is to blow up the rennet like a bladder, and tie one end to keep out air, first putting on it a little salt at the place were tied; the skins, being thus made very thin, will dry rapidly and keep well; sometimes they are suspended in paper bags.

Rennets lose their strength if kept too warm, but they are much improved by alternate freezing and thawing if kept open to dry air; they should not be allowed to gather dampness, since their strength will evaporate if thus exposed. Their quality improves by at least one year's age and they part with the strong odor so common to green rennets. This prepared stomach or rennet, when steeped in water, produces a decoction which possesses the power of thickening milkor of decomposing it and separating the casein from the liquid or whey. The most convenient way to prepare the rennet for use is to place the stomach in a stone or earthen jar containing a brine sufficiently strong to prevent it from tainting, with not exceeding two quarts of cold water: allow the whole to stand for five days; then strain and put it into bottles; or the rennet may be soaked over night in warm water, and next morning the infusion may be poured into the milk.

In from fifteen to sixty minutes the milk becomes coagulated, the casein separating in a thick mass. The rennet possesses the chemical property of producing lactic acid, by acting upon the sugar in the milk; the acid unites with the soda in the milk, which holds the casein in solution, when the casein separates, forming the curd. Showing the wonderful power of this agency, by taking a single ounce of this membrane or rennet thoroughly washed and dried, and placing it into eighteen hundred ounces of milk, heated to 120° F., complete coagulation of the whole quantity will shortly follow. Remove the rennet from the curd, again wash, dry and weigh it, and it will be found to have lost but one seventeenth part of its weight. Thus it may be proved that one part of the active matter of the stomach may coagulate about thirty thousand parts of milk.

It would be seen from these facts that but a small comparatively small amount of rennet would be required by our cheese factories; but such is not the case. The desire to hurry cheese off to market in ten or twenty days from the hoop requires far more of the rennet than is absolutely necessary in the more moderate operations of private dairies in former days. The home supply from the millions of calves which are slaughtered in this country is wholly inadequate to meet the demand for rennets, hence they are largely imported from Europe. It is to be hoped that the enterprising chemists and investigators of the age will discover some method of extracting the active agent in rennet, and in a state of absolute purity and fredom from objectionable animal matter, with a degree of uniformity in strength as well as concentrated form. While American cheese making has made wonderful progress during the past twenty years, their yet remains a wide field for careful study and intelligent progress.

To Find the Contents of Boilers.

To find the contents of cylinder boilers multiply the area of the head in inches by the length in inches and divide the product by ·1728; the quotient will be the number of cubic feet of water the boiler will contain. Example: Diameter of head, 36 inches; area of head 1017·87 inches; length of boiler, 20 feet or 240 inches. Now multiply 1017·87 by 240 and the product will be 24,428,380; divide this by ·1728 and the result will be 141·37 cubic feet, which will be the contents of the shell.

In flue boilers, multiply area of the head in inches by the length of the shell in inches; multiply the combined area of the flues in inches by their length in inches, subtract this product from the first and divide the remainder by ·1728; the quotient will be the number of cubic feet of water the boiler will contain.

Proper Speed of Circular Saws.

Nine thousand feet per minute, that is nearly two miles per minute, for the rim of a circular saw to travel, may be laid down as a rule. For example: A saw 12 inches in diameter, 3 feet around the rim, 3,000 revolutions; 24 inches in diameter, or 6 feet around the rim, 1,500 revolutions; 3 feet in diameter, or 9 feet around the rim, 1,000 revolutions; 4 feet in diameter, or 12 feet around the rim, 750 revolutions; 5 feet in diameter, or 15 feet around the rim, 600 revolutions. The rim of the saw will run a little faster than this reckoning, on account of the circumference being more than three times as large as the diameter. Shingle and some other saws, either riveted to a cast iron collar or very thick at the center and thin at the rim, may be run with safety at a greater speed.

PRACTICAL MECHANISM.

BY JOSHUA ROSE.

NEW SERIES—NO. XXII.

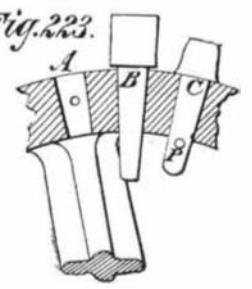
COGGING.

The term cogging is applied by pattern makers and wheelwrights to the process of furnishing wooden teeth to iron wheels, in the rim face of which are cast mortises to receive the wooden cogs. The term cog is applied to the piece of wood out of which the tooth is formed. This includes the shank fitting into the mortise together with the tooth projecting from the face of the wheel. The term tooth denotes the part forming the tooth independently of the part fitting into the mortise.

The object of using cogged wheels is to avoid the jar and noise incidental to the use of large cast gear wheels, which it is found impracticable to cast true. If the wheel is cast from a wooden pattern, this pattern is liable to warp. Furthermore, the rapping of the pattern in the mould tends somewhat to destroy the truth of the mould. Even if these elements of error are eliminated in making the mould by using a moulding machine, the unequal shrinkage of the casting induces untruth. After a gear wheel is cast, the face is then be turned true. While in the lathe a circle may be made for the bottom of the teeth, and another for the

Fig. 224.

Fig. 223.

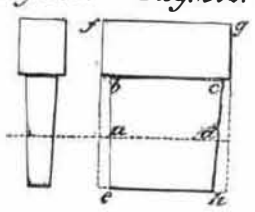


pitch line. Other circles may be made as are deemed neces sary ase guids for adjusting the instruments used to form the outlines of the teeth. The wheel may be marked off as carefully as can be, and the teeth after marking may be chipped and filed to the lines; but it is not found in ordinary practice that by any such means a degree of truth sufficient to avoid jar and noise is attainable. This is especially the case with large wheels, and cogging is resorted to. It is usual to cog the large wheel of a pair that run together, and to make the wood teeth thicker across the pitch line than the iron one. If two cast wheels are made to run together, there is usually given a certain amount of clearance between the spaces and the teeth, whereas, when a cogged wheel is employed, this clearance is dispensed with, and back lash is avoided. The woods generally used for cogging are hornbeam, hickory, button wood or sycamore, maple, and locust. The blocks for the cogs should be cut out and kept so as to thoroughly season before being used. There should, when there is likely to be a demand for them, always be kept a spare set of cogs, so that they will be ready for use, well seasoned and less liable to shrink and thus come loose in the mortises.

When the cast wheel arrives from the foundry it is taken to the machine shop, bored and turned across the face. The mortises receive a little attention, burrs and sprue fins are removed, the rough places levelled, etc. If it should be found that any of the mortises are "blind," that is, stopped by the arms of the wheel, as shown at A, Fig. 223, a cir-

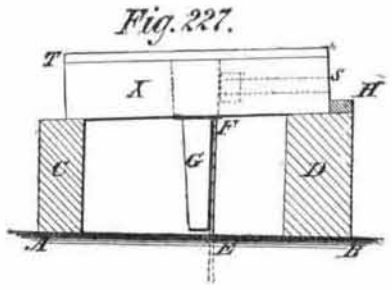
cumstance which is avoided as much as possible in the designing of the wheel, a small hole must be made through the rim to admit of the passage of a wire or screw. The first step taken toward getting out the wood teeth is to obtain the exact size and shape of the mortises. For this purpose, if the wheel is a spur, we must cut out two pieces of thin wood, as templates to fit the mortise, one representing the length of the mortise, as in Fig. 224, and the other its width. The templates must be tried in several holes, so as to insure their being the correct size. *a b c d*, Figs. 225 and 226, represent one of these templates. From it we get the size of the rough cogs. Add above *b c* the height of the finished tooth, and from a quarter to half an inch more, according to the size of the wheel, to allow for turning off. Make a good allowance in this direction, as also at the other end of the piece, for the wood may be bruised by the hammer in driving the cogs in and out. The size of the cog is shown at *c f g h*, the length, *f g*, being that of the finished tooth and not less than $\frac{1}{8}$ inch allowed on each side for turning. To obtain the thickness, take that of the finished tooth, shown at C, Fig. 223, at the thickest part and allow about $\frac{1}{8}$ inch of a side for trimming.

Fig. 226. Fig. 225.



Having now the full size and thickness, cut out the number of cogs required, with three or four spare ones, as some may be split or possess some defect. To avoid damaging the teeth a broad, flat-faced heavy hand hammer should be used to drive them with.

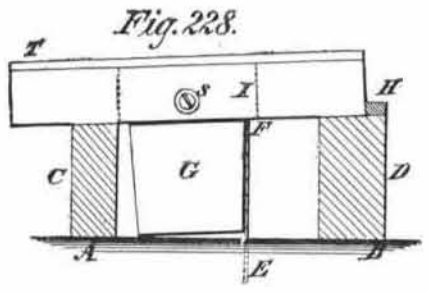
Fig. 227.



It is taken for granted that a circular saw bench is accessible, for without this cogging is made with difficulty. Have the saw in good order, and mount upon it a simple contrivance for shanking the cogs. It is composed of a box and two guides. These are illustrated in Figs. 227, 228, 229, and 230. The parts throughout being marked with the same letters.

Make A C perpendicular with E F. Let E F be the height the saw stands above the table, which should be a little higher than the length of the shank of the cog. To the line, E F, apply the form or template, *a b c d*, of the width of the shank. Produce the top line of this form and it is the top of the guides. Make the guide, C, at such a distance from the saw as to admit of the passage of the cogs the widest way. Make a box composed of two pieces, one piece being of sufficient thickness to take in the whole rough tooth of a cog in a mortise cut through the center of it, as indicated by the dotted lines in Figs. 231 and 232, and shown in full in Fig. 234; the thin piece, T, forms a backing to stop the cog in the mortise, it also, by being placed with

Fig. 228.

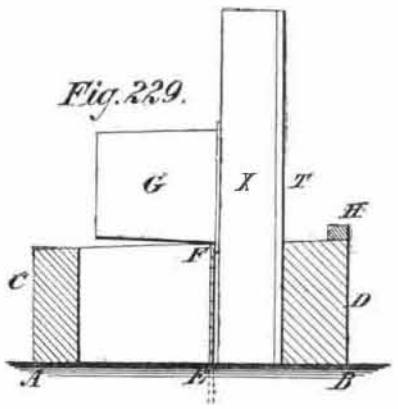


the grain in an opposite direction to that of the box and screwed firmly, adds much to the strength of the box and enables it to resist the strain of the binding screw, S, by which the cogs are held while being sawed. Having the thickness of the box, lay it off upon the opposite side of E F, and draw the guide, D; if, as at G, in Fig. 234, the size of the top of the shank be laid down, then the distance from it to the sides and ends of the box must be equal to E F, the height of the saw above the table. Having the size of the box, we can now mark the position of the guide, H.

Eight movements with the box over the saw shanks the cog, two movements, as in Fig. 231, make slits through the width of the stuff and bring it to the right thickness; at Fig. 232, two movements, with the box held in the direction shown, brings the shank to the width. The box is now to be held with one of its edges on the table and passed between the guide, D, and the saw. It is to be passed through four times. A slab is detached each time. Figs. 229 and 230 illustrate two of these positions, and after turning the box upside down the other two movements may be performed.

Having now completely shanked one cog, it must be compared with the templates and tried in the mortises. Care and patience at this time may save hours of labor in fitting. Proceed now to fit the cogs to the mortises, as at B, Fig. 223, driving them tightly and leaving them with their shoulders, say, $\frac{1}{8}$ inch above the rim at the widest part. Use raw linseed oil to lubricate the surfaces while driving. All the cogs being now driven into their places, take a little instrument, shown in Fig. 224, called a fork scriber, and with this

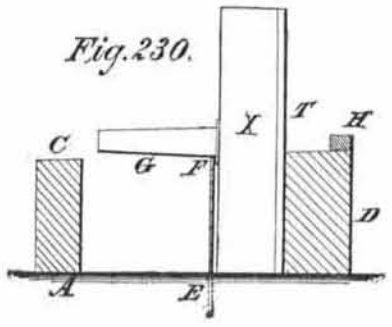
Fig. 229.



trace a line upon the shoulder of each cog by allowing one prong to travel along the turned face of the wheel while the other is pressed against the wood. The shanks of the cogs must also be marked with a common scriber where they project through on the under side of the rim.

Number all the cogs with a pencil, and number two of the mortises with a center punch or stamp, to show the direction of the numbering. Now drive out all the cogs and "shoulder" them, that is, dress the shoulders to the fork scribe line, so that, when driven in, the shoulders will fit the face of the wheel. This being done, mark a mark on the shank; into this mark on both edges of the cog insert the fork scriber and scribe a line parallel to the first but nearer up to the shoulder. This line shows where the under side of the rim will come when the cog is next driven in, for of course it will be driven just as much further as the distance between the two points of the fork scriber. In Fig. 223, observe the pin, P, the top of which lies against the rim, so in finding the center of the hole for the pin we must place it nearly one half the diameter of the wire below the fork scribe line. Make this nearly so as to have a little draw on the cog, and insure that the wire pin shall touch the rim. Then when the cogs shrink and become loose in their mortises, as they often will, the pins will at least keep

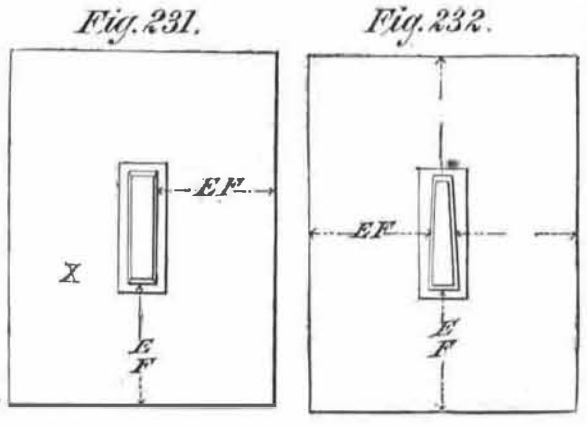
Fig. 230.



the shoulders in contact with the rim. Cogs in blind mortises are made to fit at the first drive and not removed, unless from some oversight it is inevitable. Carefully examine the hole and remove lumps or cut away the wood to escape them, and gauge the size and depth of the hole. Do this to avoid the unpleasantness of having to draw the cog when once driven in.

The cogs may now be bored for the pin. This is most rapidly performed by running a boring bit in the lathe. The ordinary pin bit will do, but let it be so pointed as not to run away from the center mark made with a center punch. It should be lubricated with tallow or beeswax very frequently, or the temper will be drawn, because the material is so hard, and the speed so high. It takes too much time to run the lathe mandrel back and forth by means of its screw, therefore, to remove the cap and wheel, fit a wooden knob or handle on the end of the screw and work the mandrel by hand. This will be clearly understood by turning the

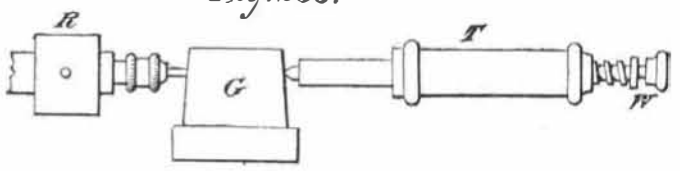
Fig. 231. Fig. 232.



attention to Fig. 233. R is the running head with bit held by a chuck, G, the cog, T, tailstock, W, the knob of wood. This method bores the cogs rapidly and straight. The cog when bored half way may be reversed and the rest of the boring completed from the other side.

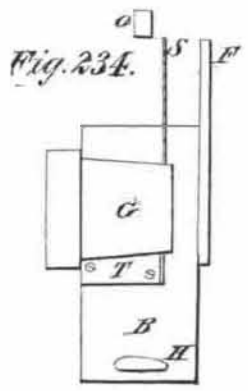
The next process is to saw the shanks off to an equal length measured from the shoulders, which have been dressed. In Fig. 234, S is the circular saw, F a guide strip, B a planed board, H a handle, T a stop. The cog, G, is shown with its shoulders resting against the edge of the board and its side against the stop. In this position it is

Fig. 233.



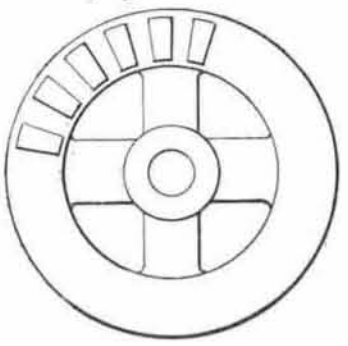
held firmly by the left hand, the right hand seizes the handle and pushes toward the saw. A second stop is show at O; it is fixed to the table to prevent the board by any inadventure from being pushed too far. The ends of the shanks may now be rounded at the corners or chamfered to give them a presentable appearance, and the cogs are ready to be again driven into the wheel. A mixture of white lead and boiled linseed oil is to be made of the consistence of thick paint. This with a piece of stick or brush is applied to that part of the shank which remains in the rim. Each cog is then driven into the mortise, to which it was fitted and which may be known by the number marked on it. Insert the pins, pieces of strong wire pointed like a center punch; these are in length somewhat less than the rim is wide but longer than the tooth. The wheel now goes to the turning shop, where the teeth are turned to the proper size and the pitch lines marked. Upon its return it is divided off, the outlines of the teeth drawn on both sides, and the excess of stuff removed with chisel and gouge. If it is possible to remove a portion with a good sharp hand saw, that may be done, as much time may be saved thereby. When the teeth are all formed, filed, and sand-papered, they may receive a few good soakings of raw linseed oil.

Fig. 234.



In bevel wheels the mortise is narrower at one end than at the other, as shown in Fig. 235. It follows that the shanks of the teeth must be made to fit, therefore an extra template must be made, so as to have one for each end of the mortise. The shape of the mortise, or in other words, the top of the shank and its size, is to be laid down as in Fig. 232,

Fig. 235.



and the distance, E F (the length of the top of the circular saw from the saw to the table), laid off on all sides, so that the box will assume a shape corresponding to that of the shank, the guides remaining the same. In this way the outer edges of the box form a gauge to saw the cogs.

Fast Flying.

A recent contest took place under the auspices of the Philadelphia Pigeon Flying Society, No. 2, the course being from Hamburg to Philadelphia, a distance of seventy-five miles. The birds participating were of last spring's brood, and, without exception, were from first class stock. The weather for the fly was favorable, and the time made the best on record in this country. The winning bird was a handsome blue specimen. The following is the result:

	H.	M.	S.
James Grist	1	13	00
John Dalton	1	41	30
Henry Heintz	1	54	56
William Knight	1	55	35
John Parker	1	57	20
Arthur Chambers	2	01	50
Arthur Chambers	2	04	35
Thomas Grist	2	08	05

AN International Exhibition of hops, and of tools and apparatus used in the cultivation, drying, packing, and preservation of hops, is to be held at Nuremberg from October 7 to 15 next. Forms of application and all necessary information can be obtained from Herr Eduard Vollrath, Nuremberg.