

would render the river navigable as far as the town of the Dalles. This work is well under way, and will be of great importance in developing the Upper Columbia.

Surveys have been made above the Dalles with a view of conducting a similar work at this point, and thus connecting, by means of locks, the Upper and Lower Columbia.

The Upper Snake River, however, is one of the most remarkable streams with which we are familiar. It offers an absolutely impassable barrier between North-eastern Oregon and Idaho.

An Important Electric Lighting Suit.

On May 21, 22, and 23, at Pittsburg, Pa., before Justices Bradley and McKeenan, the final hearing in a suit brought to test the right to the modern incandescent lamp occurred.

Successful Trial of the Second Otis Elevator at the Eiffel Tower.

The official trial of the second Otis elevator in the south pillar of the Eiffel tower was successfully carried out on June 8, in the presence of M. Alphonse, M. Eiffel, and the Lift Committee.

The Joint Snake.

A correspondent sends us an account of a joint snake he with other school children encountered about twenty years ago, and he asks whether the existence of such a snake is denied.

The so-called joint snake, or "glass snake," is known to herpetologists as the snake-lizard (Ophisaurus ventralis). For description and figure, see SCIENTIFIC AMERICAN, Vol. 57, No. 10, page 152 (September 3, 1887).

C. FEW SEISS.

WHEN two or more colors are used, it is necessary to keep in mind the laws governing the combination of colors. All colors in combination are beautiful, provided only that the combination is artistically managed.

Scientific American.

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THE WATER SUPPLY FOR NEW YORK CITY.

In the course of municipal growth, New York should absorb her suburbs in the order of their coming. This is the ideal conception of urban expansion; but if by order we mean regularity of position, we find that New Jersey and Connecticut already possess more than half of the neighboring territory which rightly belongs to the metropolitan area, and that Brooklyn will credit to herself the townships of Long Island, from mere proximity.

In the narrow tract extending north along the Hudson, we must, therefore, find the districts to be acquired in succession, one beyond the other. There is some likelihood even of this section becoming still narrower and partially unfit for occupation, for, as is well known, the supply of water for the city has been gathered here for fifty years, and work is progressing within the same limits to double the volume gathered and delivered.

A comparison is here made between the three hundred and sixty square miles comprising the drainage area of the Croton river and forty-five hundred square miles of other suburban country in New Jersey, Connecticut, and New York.

Like all studies based upon the results of the various censuses, this one is full of surprises, and brings in strong contrast the errors of imaginative opinion and the rulings of fact. The density of population in the Croton valley is first noticed to be relatively low, then to show an actual decrease—both in spite of the fact that thirty years ago the density was normal and the growth rapid.

So marked is the retardation in the whole basin, that the period of doubling in population is one hundred years longer than that of any division under consideration. Attention is also drawn to the lack of increase in the assessed valuation of property. The proof of actual retardation unaccompanied by an increase of valuation brings forward an inquiry as to the right exercised under the acts of the legislature of taking small areas for storage purposes and at the same time injuring large tracts.

The land so far condemned is insignificant in area as compared with that injuriously affected by such appropriation. To say that the working of the law is justifiable is a misinterpretation of the principle of eminent domain, while to claim that the city should buy every acre of the watershed is preposterous, since the city will soon have to go elsewhere for an adequate supply.

The deduction to be made from the tables and statements given is that the prosecution of the work has had a perceptible and measurable effect in preventing immigration and the increase of taxable property. The importance of this result as a lesson for the future can be understood when we say that the present storage capacity must be increased threefold before the supply of water can be doubled.

After showing the obvious detriment of water storage to regions which in the natural course of events should be occupied by homes, Mr. Parrott applies the data of recent census enumerations to some of the watersheds of the Catskill mountains, and points out a decrease of inhabitants here also, but from a very different cause.

The reference to the Catskills strengthens the criticism very materially, inasmuch as it makes the present expenditure of the Croton aqueduct department inexcusable on the score of necessity.

Trade Mark—Firm Name.

The English Court of Appeal has rendered a decision of interest in a case involving the right of a man to the use of his own name in business. The case was that of Turton et al. vs. Turton et al. The principal appellant had for a considerable time carried on the business of a steel roller and steel manufacturer in Sheffield under the title of "John Turton & Co."

Worsted and Woollens.

The question is asked, what is the difference between worsted cloth and woolen cloth? The answer is: Worsteds are composed of wool that has been carded and combed, while woolen goods are made of wool that has been carded but not combed.

[SPECIAL CORRESPONDENCE OF THE SCIENTIFIC AMERICAN.]
The Paris Exhibition.

FRENCH, ENGLISH, AND AMERICAN LATHES.

PARIS, June 15, 1889.

The American lathe has, in its smaller sizes, not yet been copied in Europe, but that it will be there can be no manner of doubt when its advantages are understood here, and particularly on account of its handiness. The American lathe in the large sizes has not so much individuality about it, but it has in some of the minor details, nevertheless, as will be pointed out presently. "There is no American lathe. You are in a constant state of change, and I am informed that most of your changes are made, not to improve the lathe, but to have some particular selling point," remarked a machinist to me to-day. Now, there is just a grain of truth here, but it is a very small grain. No doubt dealers prefer to have some particular feature that they can dilate upon to make sales, but these new features are studied out by the designer, and no alteration of design is made without the conviction that it is an improvement. As to there being no American design of lathe, there are two or three distinct kinds, each of which has no counterpart in Europe, and all possessing advantages for the class of work for which they are intended. Beginning with lathes, say up to 20 inch swing, or 10 inch centers, as such a lathe would be designated in England. As a general rule, such a lathe of English design would have a hand slide rest, and not a self-acting feed. Now, be it remarked that some (only a few as far as I have yet seen) of the new designs are provided with self-acting feed motions, but most of the lathes (within 20 inch swing) you find in the workshops have, as I have said, hand slide rests and are, as a consequence, as awkward as can be for the great majority of work they are used upon. All experience shows that at least nine-tenths (and I think I would be within the mark if I said nineteen-twentieths) of the work done between the centers of such sizes of lathes is of such a short length that it can be turned from end to end without moving the slide rest from its position, while all the boring or chucked work can of course be completed without moving the slide rest; but boring and face plate work form but a small proportion of ordinary work, and it is on ordinary between-centers work that the slide rest is so awkward; first, because the slide rest handle that works the screw for the longitudinal feed will not clear the tail stock of the lathe, and you can only wind this screw half a revolution, then you must take it off, put it on again, and wind the screw another half revolution, and so on. It is positively aggravating, to one having used an American lathe, to go through this awkward and humbugging business every time a cut is set or after setting a tool. The worst thing is that on short work the slide rest smothers the work so that you can't get at it either to set the tool, see the cut, or measure the work.

With regard to the first named defect, it could be modified, to a certain extent, by putting the screw on the outside of the slide instead of in the middle of it, then throwing it further out from the line of centers of the lathe, and therefore more out of the way of the tail stock, but this is very rarely done. Now suppose that the lathe has a self-acting feed motion and a slide rest as well, as is sometimes the case in English and French practice, and you are no better off so far as the first named defect is concerned, because the hand traverse to the lathe saddle (as the lathe carriage is termed in England) consists of a long handle operating the spindle of a small pinion gearing direct into the rack of the lathe; and the consequence is that, notwithstanding the awkward length of the handle, the carriage motion is too quick (moving the handle as slowly as you can) for the purpose of feeding, and, furthermore, as the rack is cast and not cut, the hand traverse of the carriage is too spasmodic and jerky to permit of its use for feeding; but supposing the rack and pinion to be cut, which is not often the case, and the conditions are not much bettered, for the motion is still too quick and the handle is so long that the right hand has to reach out too far to admit of a close inspection of the work. Another annoying feature is the straps or clamps forming the tool-holding device, which are bulky and in the way. Again, no device for regulating the height of the tool is provided. Hence, slips of iron, pieces of tin, iron washers, and other loose and odd pieces are used for this adjustment. Whatever the length of the work may be (when a slide rest without a self-acting feed is provided), the longitudinal feed handle will come in the way of the tail block, while the length of continuous longitudinal feed is limited to the length of the upper slide of the rest. Of course the slide rest can be moved along the bed and reset, but after a little wear it will be found that each turn you move the slide rest it requires to be adjusted for parallelism again, and this involves the loss of a great deal of time. When no self-acting feed is provided, all threads must be started and cut by hand. This involves a great deal of practice in order to be able to start a true thread, and the removal of the slide rest and substitution of a hand rest when cutting the threads making the operation slow and expensive.

On the other side of the question there is the fact that with a compound rest all ordinary tapers can be turned without setting the tail stock over, that is to say, all tapers that are not longer than the longitudinal traverse of the tool slide of the rest, and tapers can be bored with every facility. But taper work forms a very small proportion of the work done in such lathes, and, furthermore, facilities for its production are provided for in all American lathes for general work. Where there are several small lathes in a shop, it is not essential nor even desirable that all of them be provided with facilities for taper boring, as it involves the use of either a compound rest or a taper-turning attachment (the latter being the most desirable of the two).

Considering now the American form of similar sized lathes, a self-acting or automatic feed is always provided, and the tail stock is made to set over for turning tapers between the centers. As a result a continuous cut either taper or parallel, can be taken on work as long as the lathe will take in. If taper boring is to be provided for, a taper-turning attachment is provided for, or in some cases a compound rest is used, but this compound rest is not open to the objections shown to exist in corresponding English lathes, as the hand traverse of the carriage is slow enough to permit of hand feeding by means of the handle that works the hand feed of the carriage. This is accomplished by means of gearing in the carriage that reduces the revolutions of the rack pinion below those of the hand feed handle. This speed reduction is sufficient that a short hand feed handle can be used; and the position of the operator's body is therefore natural and not strained when using this hand feed. Hence, he can operate the cross-feed screw and watch the cut or measure work with ease and comfort—a thing impossible in English or French lathes. By thus dispensing with the longitudinal slide of the compound rest, the work is in full view (no matter how short it is) and is accessible for tool setting or measuring. The American plan also of a tool post in a T slot leaves nothing but a simple cylindrical tool post in front of the work, and this tool post can be moved to either end of the T slot as may be most convenient for the kind of work in hand, hence the tool may be clamped as close to the work as possible and swiveled to any angle to the line of centers, which is a great convenience, not attainable where two clamps are used or a single tool post in the center of a square slide. If the lathe has a taper-turning attachment, you can change from taper to parallel work in a moment without unsettling the lathe, whereas in the case of a compound rest and no automatic feed a great loss of time occurs in making these changes, because of the difficulty of setting the top slide to cut parallel, and a great deal of skill is required. So much indeed are these two difficulties met with that, to avoid them, the workman is often induced to adopt improper methods in doing his work. Thus, to take a common example, suppose a crank pin (for an engine) with a taper on it is being turned, and the taper part will be finished complete before the parallel part is roughed out, with the result that the two parts will not be true, one with the other.

Let us now consider very short work of small diameter, and with the American form of lathe carriage and rest the tool need not stand far out from the tool post or rest, as there is nothing to interfere; whereas on the English or French lathe the top slide comes butt against the tail stock, and the tool must be pushed out far enough to meet the work. The tool posts of all American lathes of the sizes under consideration are provided with more ready means of adjusting the tool height without using the slips of iron, etc., before referred to.

Objection has been made to me concerning the desirability of constructing the tail stock to set over for taper turning, as it is said to involve some trouble and difficulty in setting it back true for parallel turning, but this is an unnecessary trouble, since it is not necessary to operate both set and tail stock screws. Indeed, only that screw should be unscrewed that will let the tail stock set over in the required direction, the other screw being allowed to remain untouched, and therefore set for parallel turning, the tail stock being pulled over by hand. All that will be necessary in that case for putting the tail stock back true for parallel turning will be to screw up again the one screw that has been turned back. Workmen often overlook this wrinkle, and give themselves a great deal of unnecessary trouble and loss of time.

We may now consider the chucks and fixtures for this class of lathe, and, beginning with the smallest sizes, there is a large sale here of both two, three, and four jawed American drill chucks, and as yet I have not seen any English or French imitations of them. In work-holding chucks, whether universal or combination chucks, the same remark applies, but, strange to say, the chucks are very little used, face plates with dogs removable from hole to hole being used, and bell chucks also. A dog chuck or a bell chuck for lathes of the sizes under consideration would be curiosities in American workshops. The movable dog chuck belongs to a primeval era that has long passed away in the

United States, nor is there any occasional use for it. The bell chuck, however, can sometimes be used to advantage even where the most improved chucks are used, because it will grip firm enough with its double set of screws to permit work to be operated on a long way out from the chuck without the use of a steady rest. The cone plate for use in place of the steady rest is also a good English form of chuck for very true work, but, like the bell chuck, it can be done without, and the occasions for its use are so rare that it is not a good investment to either make or buy one, unless for special work done in quantities. There are no elevating rest or weight lathes used in England or France. Nor have I yet seen a small lathe with raised vees, all having flat shears, with vee slides on the edges like the old style Sellers lathe or the Freeland lathe.

I am well aware that even in the United States there are some who decry the raised vee, and also at the elevating rest and at the New England lathe as a whole, but that is because they apply it out of its place. "How can you do good boring on such a lathe?" I have been asked. My answer to this is that at the Ashcroft Manufacturing Company's works, in Boston, I saw chucked work that stood 18 inches out from the face plate on a $\frac{3}{4}$ inch swing lathe faced and bored as smooth and true as could be, as pretty a piece of work as a mechanic could put his eye on, and the lathe was one of Sam Putnam's design. Now take a Pratt & Whitney elevating rest lathe, with taper-turning attachment and stop motion, and it is all that can be desired; in fact, both these lathes are simply perfection, and their peers do not exist on this side of the ocean. I could name many more American lathes that are pre-eminent in their lines; and it must always be remembered that the shop system has got to be considered when the lathe is considered. A light lathe will do when the cuts are light and the feeds fine, but if you are going to spare blacksmithing and use the lathe to cut the work out of the solid, of course the lathe must be heavy and all its parts strong.

JOSHUA ROSE.

Burning of Seattle.

About three o'clock in the afternoon of Thursday, June 6, fire broke out among some turpentine in a frame building at Front and Madison Streets, Seattle, W. T., and, fanned by a high wind, rapidly spread. The fire jumped the street, and within a half hour had consumed another block of buildings. The opera house block, a fine brick structure, was the next one to go, and then, one after another, square after square of business structures of wood and brick succumbed, and the fire became a great conflagration, spreading with almost inconceivable rapidity.

The burned district covers an area of about thirty-one blocks, its boundary being University, Front, Spring to Second, James, South, Fourth, Wall, and Water Streets, comprising the business portion of the city, the residence district escaping. Every newspaper, hotel, telegraph office, railroad depot, and wharf in the city was destroyed. The entire water front, including all wharves and docks, coal bunkers, and railway tracks, the wholesale quarter, and everything south of Union Street and west of Second Street, and reaching around to the gas works and above Fourth Street, on Jackson, was completely burned. No less than 280 firms and persons doing business have suffered loss.

The population of Seattle is estimated at 25,000, and the loss by this fire is roughly estimated at about \$7,000,000. Of this something over \$2,000,000 is covered by insurance.

Corporations Retard Inventions.

Mr. Erastus Wiman, on the subject of telegraphs and telephones, in an address before the New York Electric Club, recently said, among other things, that it was a great blessing that the telegraph and telephone were early divorced, "because I do not believe that the telephone would ever have been developed to one-quarter the extent to which it has been developed if it had been dependent on the telegraph." To which *The Electric World* adds, "and those are exactly our sentiments." Mr. Wiman goes on to show a little later how the Western Union Company discourages invention. "To-day the Lord help the man who goes to the Western Union with a new scheme," says Mr. Wiman. What electricity stands in need of to-day is not the repressive spirit that sits down at once on the man with the new idea, but the encouraging spirit that tenders a helpful hand to every inventor of genius and high aspiration. We shall never have too many inventions in electricity, the *World* adds, but under the regime of Mr. Wiman's trust there would soon be too few. Our patent record, week by week, shows how active is invention in the electrical fields. What would be the stimulus or encouragement to all these persevering inventors, producing new apparatus and appliances for the good of mankind as well as for their own benefit, if they were at the mercy of "a hard-headed set of men on new schemes" bent on "discouraging speculation or inventive enterprises" by all means in their power?