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IMPROVED CRANK SHAFT LATHE.

We illustrate an exceptionally large lathe for turning crank shafts, constructed by F. Berry & Sons, of Sowerby Bridge, Eng. *Engineering* gives the following description: The lathe is quadruple geared, and is 48 inches from the center to the top of the bed. This latter is 43 feet long, 11 feet broad in its widest part, 2 feet 3 inches deep, and weighs 40 tons. Upon the bed there are fitted four sliding carriages, one furnished with a compound slide rest, and the other three with pillar rests. All the rests have a traverse of 2 feet 9 inches, and all the carriages are self-acting longitudinally, by means of screws 4½ inches in diameter. A complete set of change wheels is provided for screw cutting, and quick traverse of the carriages can be effected by means of pulleys fixed on the ends of the screws. The face plate is 8 feet 3 inches in diameter, and the spindle in the fast headstock is 16 inches in diameter by 20 inches long in the front neck, and 12 inches in diameter by 15 inches long in the back neck, and is made of steel. The massive size of this magnificent tool will be best appreciated from a consideration of the weight of the various parts. The fast headstock, including the spindle and gearing, weighs 12½ tons, the loose headstock 4½ tons, and the total weight of the lathe is about 90 tons.

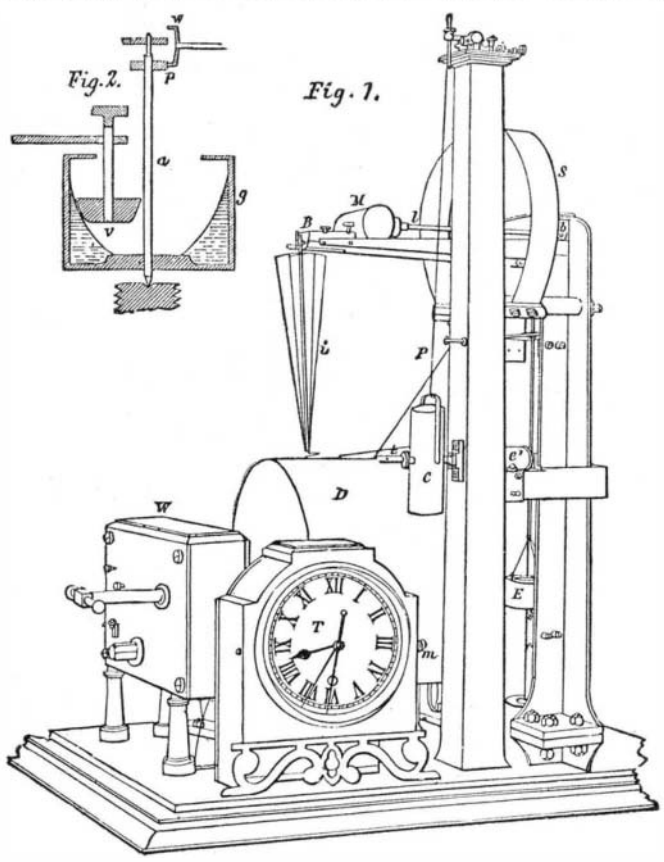
THE EARTHQUAKE RECORDER.

During the past session of the Philosophical Society of Glasgow, a paper was read giving a description of an apparatus which had been designed for the purpose of recording the time of occurrence, the duration, and the nature and magnitude of the motions in an earthquake. In the light of recent events this paper has a special interest. The author was Mr. Thomas Gray, B.Sc, F.R.S.E., recently a member of the professional staff of the University of Tokio, Japan, and now assistant to Sir William Thomson in the physical laboratory of the University of Glasgow. He stated that the apparatus had been made by Mr. James White, the well known scientific instrument maker of that city, and that it is to be used by a former colleague, Professor Milne, of Tokio, in the investigations which are being carried out by him as one of the committee appointed by the British Association for the investigation of the earthquake phenomena of Japan.

An earthquake, he remarked, generally consists of a considerable number of separate to-and-fro movements of a part of the earth's surface. These movements are irregular in period during any one earthquake, and vary very much as to period, duration, and magnitude in different earthquakes. From past experience in Japan, it is inferred that the instrument described in the paper may have to record motions varying from one-tenth of a millimeter to ten millimeters in amplitude, and from one-fifth of a second to something near one second in period; while the duration of the earthquake may vary from half a minute to about four minutes.

In order to determine the amount of movement, it is found convenient to record three rectangular compounds of it—two horizontal and one vertical. The horizontal compounds are recorded by means of the two pendulums indicated at P, Fig. 1. Each of these pendulums consists of a hollow brass cylinder, *c*, filled with lead, and suspended by a silk thread. The cylinder is held deflected from the position in which it would hang with its center of gravity vertically under the point of suspension by means of a thin tube, *t*, which terminates at one end in a sharp, vertical knife edge. One of these tubes is continued by a long and very light index of aluminum foil; while a similar index is attached to the tube on the other pendulum, close to the knife edge, and with its length at right angles to that of the tube. The knife edge rests in a flat V, cut in a hard steel plate, and the point of suspension is regulated by means of screw adjustments, capable of giving motion in three directions at right angles to each other, until it is very nearly vertically above the knife edge, and at such a height that the knife edge bears along all its length. The points of suspension are so adjusted that the planes through the axes of the tubes, *t*, and the suspending threads are at right angles to each other. In this way the indices are parallel to each other, and they are arranged to be in a horizontal plane.

The vertical component of the motion is recorded by means of the mass, M, supported on the end by the lever, *l*, by means of the spring, S, and actuating the vertical index, *i*. To the crossbar, B, which is sharpened to a knife edge on its upper side, there is firmly attached the lever, *l*. The sharpened edge of B rests in a flat V-shaped groove formed on the under side of a steel plate, while the spring is attached to the lever by links working round knife edges. The mass, M, is considerably further from the knife edge than the spring, S, the reason for which is that a moderately long period of free vibration can thus be obtained without an inconveniently long spring. By placing the point of attachment of the spring a little below the line joining the knife edge and the center of inertia of the mass, M, the period of vibration is lengthened to some extent, and it is still more increased by a box, which is mounted on a long horizontal axis and supported at one end of the lever, *l*. In order to give rigidity to the index, *i*, without making it massive, it is made of a very thin tube of aluminum, which is prevented from bending sideways by fine silk threads attached to its point, and to light crossbars of aluminum at its upper end. The threads are kept stretched by means of



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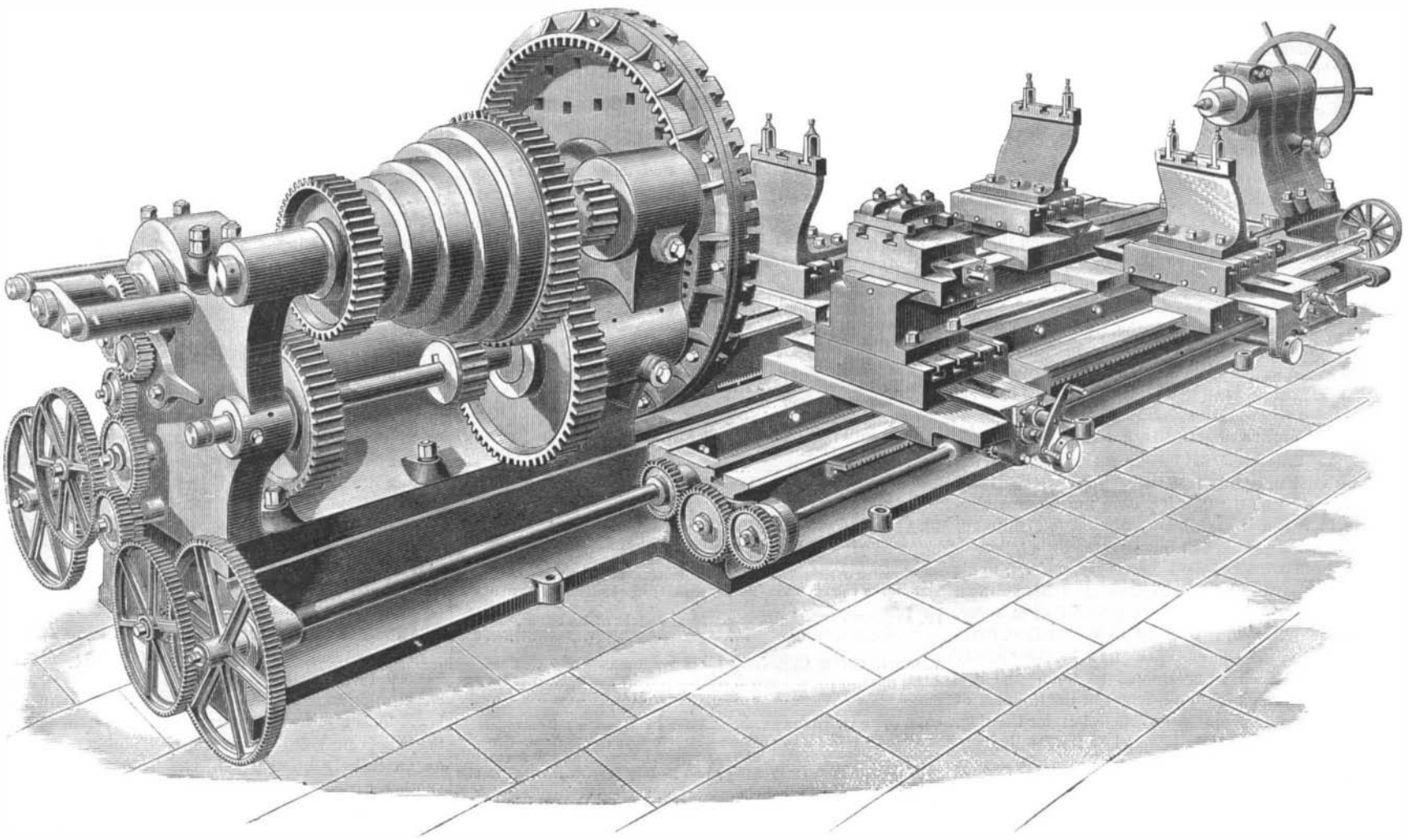

IMPROVED CRANK SHAFT LATHE.

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a light but stiff spiral spring, which presses against the top of the tube. To the point of the index a very flexible piece of aluminum foil is attached, which projects in a horizontal direction, and can be raised or lowered by a thread which passes up the center of the tube and round a pin fixed in the end of the box, B.

These three components of the motion are written on a band of smoked paper, wound around a drum, D, which is kept continuously rotating by a train of clockwork, W. The ends of the indices are arranged to lie in a line parallel to the axis of the drum, so that the corresponding vertical and horizontal components can be easily detected. The pressure of the point of the indices, which write the horizontal components on the paper, can be adjusted by means of threads attached near the ends of the indices, and passed over studs fixed in the pillar which supports the pendulums.

The clockwork, W, is driven by means of two weights acting on separate driving wheels, one on each side of the first pinion, thus, at the same time, giving a pure couple to the pinion, preventing excessive weight on the bearings of the weight barrels, and avoiding the necessity for maintaining power to keep the clockwork in motion during winding. The clockwork is governed by means of a governor in the form shown in section in Fig. 2, where *g* is a light cylindrical box, partly filled with glycerine or some such liquid, and mounted on a vertical axis, *a*, which in this instrument works in jewels at top and bottom. By means of the pinion, *p*, and the crown wheel, *w*, the box, *g*, is geared to the clockwork. The governing action is obtained by causing the liquid to come in contact with a fixed vane, *v*, which can be turned to different distances from the side of the box so as to vary the speed.

The action of the apparatus is as follows: Suppose that the earth moves in a direction at right angles to the plane of one of the deflected pendulums, then, since that pendulum is very free to move round a vertical axis, the inertia of the bob of the pendulum causes it to turn relatively to the remainder of the apparatus, and, consequently, the point of the index attached to it will move across the drum through a distance depending on the length of the pointer, and the distance of the instantaneous axis of the bob from the knife edge. There will not, however, be any motion of the other pendulum. The same is true of motions at right angles to the other pendulum, or to the lever, *l*; and hence if the motion be inclined to all of these, each one will indicate its own component, thus determining the nature, magnitude, and direction of the movement.

The duration of the earthquake is obtained from the known rate of motion of the drum, D, and the length of the record on the smoked paper.

The time of occurrence is obtained by means of the time piece, T, and a system of magnets and circuit-closing apparatus. The circuit-closer is shown at E, and consists of a small pendulum, the bob of which is made to turn a light metallic tube, *r*. This tube is carried on a point resting in a conical hole in a rod rigidly attached to the framework, and it is pivoted to the pendulum by a point resting in a conical hole pierced in a small block on the end of a fine spring, so attached to the bob of the pendulum that the conical hole is under its center of inertia. The lower end of this tube hangs in the center of a dimple formed by capillary attraction in the surface of a cup of mercury, over a thin iron pin fixed in the bottom of the cup.

When the framework of the apparatus is slightly shaken, the point of the tube cups into the mercury, and thus closes the circuit of the electro magnets, e_1 e_2. The electro-magnet, e_1, attracts an armature, to the end of which is attached an index, the point of which is in the same line with the ends of the indices for writing the motions on the drum, D, and thus makes a mark on the smoked paper, which shows at what part of the shock the circuit was closed. The magnet, e_2, at the same time relieves a catch, and allows the weight, *m*, to fall, turning a shaft which passes through behind the dial of the clock. This shaft is provided with two small projecting wheels, which push the dial suddenly forward on the hands. The hands are provided with ink pads, and thus leave a mark on the dial indicating the time at which the circuit was closed. Immediately after the circuit is closed through the mercury, it is again broken by means of a simple circuit-breaker, thus preventing useless waste in the battery.

Presence of Mind in a Dog.

The Boston *Journal* says that on Jan. 23 last, Elmer Wier, aged ten, while skating on the mill pond at Salem, Mass., ventured out too far on the thin ice, near the lower sluiceway, where there is a powerful current, and fell through. A Newfoundland dog, who had followed the little fellow to the shore, at once perceived the lad's danger, and ran to his assistance. The boy, in the mean time, had been drawn under the ice. The dog made a large space of open water, and diving quickly, brought the boy to the surface, dragging him thence to the shore. Some men in the vicinity who witnessed the accident attempted to rescue the lad, but were unable to reach him on account of the thinness of the ice, and he would have been drowned but for the dog. The animal was a waif recently adopted by the family."

Hydrophobia from Skunk's Bite.

Several New Jersey farmers have lately lost a number of cattle and hogs, hydrophobia showing itself in an unmistakable manner, and their conclusion is, that the bite of a skunk was the origin in several cases.

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THE SCIENTIFIC AMERICAN SUPPLEMENT

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NULLIFICATION OF THE PATENT LAWS.

The House of Representatives passed January 22 two bills which seriously affect the value of all patents or inventions not directly used for manufacturing purposes.

The first, No. 3925, to regulate practice in patent suits, throws the burden of costs upon the plaintiff in all suits for infringement by purchasers "in good faith," where the damages recovered are not $20 or over; and further compels the plaintiff to give bond at the beginning of the suit to pay all costs that may be adjudged against him, and also a sum not exceeding $50 for the defendant's counsel fees, in case the defendant prevails.

The second, No. 3934 (submitted by the Patent Committee as a substitute for bills numbered 311, 419, 1134, 1250, and 1956) provides that the use of a patented article, purchased in open market for personal benefit, and not for manufacturing purposes, shall not be liable for damages or profits, but in all cases the manufacturer and vender only shall be held liable. It further provides that when the infringement lies in the use of an article made by the defendant or his employe, for his own benefit and not in the manufacture of an article for sale, the measure of recovery shall be a license fee, to be fixed by a jury in case no license fee has previously been established.

The effects of a law, of the nature of the bill first mentioned, have been fully considered in recent issues of this paper. The number of valuable patents that would be practically nullified by it is very great, and would include a majority of all patents on household conveniences, stoves, lamps, and other articles of domestic utility and ornament; agricultural tools and implements; mechanics' and machinists' tools; electrical batteries and appliances; carriage trimming and saddlery hardware; "notions" of every sort, toys and so on almost endlessly.

Should the second bill pass the Senate and become a law, it would by its first section make it extremely difficult for a patentee to protect himself against infringement in connection with any article of easy manufacture and wide utility. He could not reach the market of the fraudulent manufacturer or vender, for the purchasers and users would be "innocent"; and as a rule he would find it equally hard to discover the actual trespasser, or collect from him if found.

By its second section the proposed law would take away from the patentee all real control of inventions that anybody might choose to manufacture for his own use, and express, when sued, a willingness to pay a "reasonable" license fee for the privilege; a provision that would cover all devices used not only by individuals but by all corporations, as railway companies and the like, where it would be to the user's advantage to manufacture the article for himself.

We will suppose an improvement in railway appliances. To one having the exclusive right to manufacture the device the patent might be of great value in providing an assured and stable business, even if no special charge were made for the use of the invention as such. If every railway company could manufacture the article for their own use in their own shops, the inventor's business would be ruined. If, on the other hand, the article were one on which a royalty could be charged, the forcible substitution of a license fee therefor would not recompense the inventor, for after all it would ultimately lie with the companies who might wish to manufacture the article to fix the license fee.

The Patent Committee seek to justify the bill by referring to the complaints of annoyance arising from the practice of persons owning patents or pretending to own them, in allowing the use of an article for a term of years, and then demanding damages.

That there have been annoyances of this nature is not denied; nor is it questioned that Congress could properly provide means for stopping such abuses. Inventors and owners of property under patent rights may well protest, however, that the alleged wrong should not be corrected at their cost.

The large vote in favor of these obnoxious bills (ayes 114, nays 6) would indicate a small membership in the House familiar with the condition and needs of our manufacturing industries, or favorably disposed toward inventors as a class.

Under these conditions it devolves upon owners of property under patent rights, and all those directly employed or interested in industries based on such rights, to seek the protection of their property and interest, as far as they may, by addressing remonstrances to the Senate against the concurrence of that body in legislation of this character. Action in this direction must needs be prompt, and it can scarcely be too urgent, as powerful interests are clearly at work in Washington to incite and encourage legislation which cannot be other than disastrous to all honest patentees.

We give elsewhere the text of the two bills that have been passed by the House.

ANOTHER MOVEMENT FOR A SWISS PATENT LAW.

In July, 1882, by a majority of 5,000 in a total vote of 295,000, the people of Switzerland refused to amend their constitution so as to provide for the enactment of a patent law. This result was in part attributed to the fact that on the ballots provided was a proposed highly unpopular law on an entirely different subject. There is now, however, another earnest movement on foot for again bringing the question of a patent law before the people. At the Swiss National Exhibition, held last summer at Zurich, the matter was actively canvassed, and an impromptu convention held, at which the need of furnishing protection of law to Swiss

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