Medals at the Inventions Exhibition, London.

The crop of medals harvested by Americans at the Inventions Exhibition in London was not a very abundant one. There was some complaint that the exhibits made by our countrymen were much smaller than had been expected, and this may account for the limited awards which they have received. In proportion, however, to the number competing, the results are not unfavorable. The four gold medals awarded to American exhibitors were as follows :

Adamson, Daniel & Co., "Wheelock" automatic cut-off engine.

Edison and Swan United Electric Light Company (Limited), Edison-Swan systems of electric lighting.

Thomson and Houston systems of electric lighting (exhibited by Laing, Wharton & Down).

Westinghouse Brake Company (Limited), automatic air brake and passenger communication for railway trains.

Two silver medals were awarded:

Delany Synchronous Multiplex Telegraph System, multiplex telegraphy.

Maxim-Weston Electric Light Co., electrical exhibit.

Bronze medals were also received by two exhibitors:

Anglo-American Brush Electric Light Corporation (Limited), electric lighting apparatus.

Van der Weyde, electrical illumination of the sitter in photographic portraiture.

It will be noticed that of the eight awards, six are for electrical apparatus, well illustrating the prominence given in America to electrical study.

Hints for the Workshop.

The following suggestions, to which hundreds of others might be added, are taken from the *Manufacturers' Gazette:*

Clean and oil leather belts without taking them off of their pulleys. If taken off, they will shrink. Then a piece must be put into them and removed again after the belt has run a few days.

The decay of stone, either in buildings or monuments, may be arrested by heating and treating with paraffine mixed with a little creosote. A common "paint burner" may be used to heat the stone.

Set an engine upon three or four movable points, as upon three cannon balls. Connect with steam, and exhaust by means of rubber hose. If the engine will run up to speed without moving itself back and forth, then that engine will run a long time with little repair. If it shakes itself around the room, then buy another engine.

Safely moving a tall mill chimney has been accomplished several times. Chimneys which have been caused to lean slightly through settling of the foundation may be straightened up again by sawing out the mortar between courses of brick at the base. A chimney 100 feet high and 12 feet square at the base will be varied over 8 inches at the top by the removal of 1 inch at the base.

When you begin to fix up the mill for cold weather, don't forget to put a steam trap in each and every steam pipe which can be opened into the atmosphere for heating purposes.

For leading steam joints, mix the red lead or litharge with common commercial glycerine instead of linseed oil.

Put a little carbolic acid in your glue or paste pot. It will keep the contents sweet for a long time.

Look well to the bearings of your shafting, engine, and machines. Sometimes twenty-five, thirty, forty, and even fifty per cent of your power is consumed through lack of good oil.

When you buy a water wheel, be sure to buy one small enough to run at full gate while the stream is low during the summer months. If you want more power than the small wheel will give, then put in two or more wheels of various sizes.

When it becomes necessary to trim a piece of rubber, it will be found that the knife will cut much more readily if dipped in water.

When forging a chisel or other cutting tool, never upset the end of the tool. If necessary cut it off, but don't try to force it back into a good cutting edge.

In tubular boilers the handholes should be often opened, and all collections removed from over the fire. When boilers are fed in front, and are blown off through the same pipe, the collection of mud or sediment in the rear end should be often removed.

Nearly all smoke may be consumed without special apparatus, by attending with a little common sense to a few simple rules. Suppose we have a battery of boilers, and "soft coal" is the fuel. Go to the first boiler, shut the damper nearly up, and fire up one-half of the furnace, close the door, open damper, and go to the next boiler and repeat the firing. By this method, nearly if not quite all the smoke will be consumed.

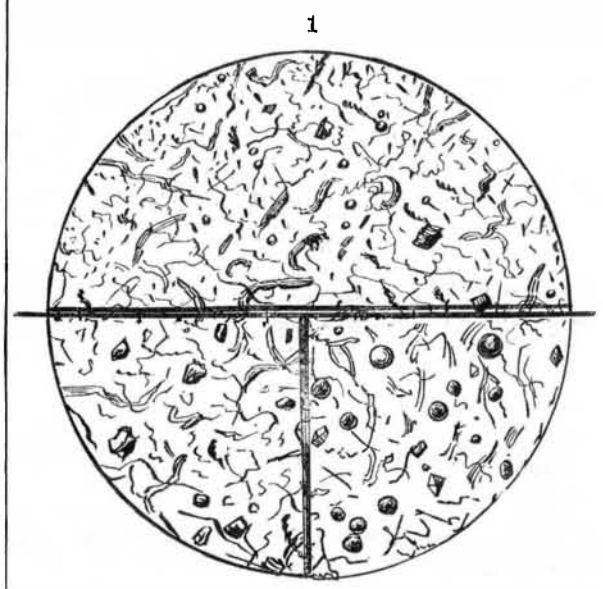
A coiled spring inserted between engine and machinery is highly beneficial where extreme regularity of power is required. It is well known that a steam engine, in order to govern itself, must run too fast and too slow in order to close or open its valves, hence an irregularity of power is unavoidable.

THE MICROSCOPE IN THE MECHANIC ARTS.

BY GEO. M. HOPKINS.

It is said that a workman may be known by his chips, and the same test of workmanship may be applied to an emery wheel; there is no truer index of the character and efficiency of an emery wheel than the microscopic dust which is projected from its periphery while it is in use.

An examination of this dust by the aid of a microscope shows whether the wheel is doing its work without undue waste of its substance; also whether the constituents of the wheel are disproportioned, to the extent of using too great a proportion of cement to bind the particles of emery together, or whether the cement employed for this purpose is weak and inefficient. An emery wheel is nothing more or less than a rotary cutter, whose cutting edges are composed of emery or corundum, and of course the efficiency and the durability of the wheel depend upon the manner in which these cutters are held. Each cutter must have a setting sufficient to hold it while it is doing its work. If this setting is too weak, or in other words, if the cement employed in making the wheel lacks strength and tenacity, the cutters will be readily loosened and lost; but while the wheel will be rapidly disintegrated, it will cut freely, and in this respect has the advantage over a wheel formed with an excess of cement, which completely envelops the cutter, or the particle or crystal of corundum or emery, and thereby



MAGNIFIED EMERY WHEEL DUST.

prevents the material being ground from being brought into contact with the cutting edges without undue pressure. The characteristics of a wheel of this kind are the rapid glazing of the surface and the slowness of its cutting.

The microscope reveals exactly what the character of the emery wheel is; whether it is composed of too great a proportion of cement, whether it is made up of materials other than emery and cement, whether it is friable and liable to rapid disintegration. An examination of the dust projected from the periphery of the emery wheel will show whether there is too great a proportion of cement employed in its manufacture; it will show whether the wheel is cutting freely; it will also indicate whether too great a pressure is required to cause the wheel to cut as rapidly as it should.

If an examination of the emery wheel dust reveals mainly fibers of iron or steel cleanly cut, with very few grains or crystals of corundum or emery, and if few fused globules of steel or iron are present, it may be concluded that the emery wheel is of a good quality, and is doing its work properly; but if such an examination shows a large proportion of the grains of emery, it indicates, of course, that the wheel is becoming rapidly disintegrated. If, on the other hand, steel and no emery is found in the wheel dust, if the iron or steel fibers are partly fused, and if the number of globules of melted steel or iron is great, we may conclude that the wheel is one that is liable to glaze, and requires too great a pressure to work upon it.

Fig. 1 shows the dust of a first-class wheel magnified about sixteen diameters. It will be noticed that there are comparatively few angular grains or particles of emery, while the iron or steel chips cut from the work by the wheel are long and clean, and carry the evidences of having been done with a good cutter.

Fig. 2 shows the dust from an emery wheel which contains a large proportion of emery, and either a small amount of cementing material, or cement of poor quality; and while the iron or steel chips appear equally as well as in the other case, the wheel in this case is being rapidly destroyed.

Fig. 3 shows the dust from a wheel having too great a proportion of cement, and exhibiting a tendency to glaze; the great pressure required to make the wheel cut also generates a heat which is sufficient to fuse the particles of iron or steel as they are separated from the main body of the object being ground.

Photo Emulsions Spoiled by Thunder.

The most noticeable effect of thunder upon gelatinous solutions or on emulsion is, says the *Photo. News*, to bring about a certain decomposition, which interferes, more or less, with the setting properties of the gelatine; and if the solution be kept, it quickly becomes putrid. In some extreme cases the emulsion refuses to set altogether; in others, where the injurious effect is less marked, it does set, but tardily, and then, although the plates may turn out otherwise good, they generally frill or blister to such an extent, during the fixing and washing, as to render them next to worthless. What is the actual effect, chemically, of thunder upon gelatinous solutions, at present is very doubtful. Whatever the effect may be, the cause by some is attributed to the presence of ozone, which usually accompanies violent electric disturbances in the atmosphere. But ozone will scarcely account for all the injurious changes wrought by thunder upon substances which are similarly affected to gelatine. For example, it is no unusual circumstance for ale which is stored in air-tight casks in underground cellars to be rendered both turbid and sour by a thunderstorm; and we have known an emulsion while in a closed vessel being spoilt from a similar cause. It is difficult to conceive, under these circumstances, how ozone can possibly be the cause.

Curiously enough antiseptics, which, under ordinary condition, prevent decomposition in gelatine, appear to have little or no influence in the case of thunder. It is worthy of note that thunder appears to exert little or no influence upon cold or jellied emulsions, neither has it upon concentrated solutions of gelatine, even when they are in a fluid condition. Therefore, as a piece of practical advice, we suggest that when electrical disturbances of the atmosphere are apprehended, precaution be taken that all emulsions be got into the jellied condition as quickly as possible. Also to bear in mind that it is during the emulsification, with the small proportion of gelatine, that the injury is most likely to arise.

It is a curious fact, but not the less true, that a severe storm may sometimes occur without causing the slightest inconvenience, while, on another occasion, the conditions being apparently identical, a very slight one, even a single clap of thunder, will cause an immense amount of trouble. In all cases it is wise, when possible, to defer preparing emulsions, particularly on a large scale, when violent electrical disturbances of the atmosphere are anticipated.

A Tornado in Ohio.

About 8 o'clock, on the evening of September 8, the town of Washington Court House, the county seat of Fayette County, Ohio, about fifty miles northwest of Cincinnati, was struck by a tornado, which destroyed a great part of the place. More than fifty of the principal stores and business buildings were ruined, besides the damage of many others, the loss upon buildings alone being computed at from half a million to a million dollars. The duration of the tornado is said to have been about two minutes, but this is probably largely conjectural, although it lasted long enough to destroy some brick and many wooden buildings, killing several and wounding a large number, and giving the place in the track of the storm the appearance of a total wreck, all in so short a time that the terrified people could hardly realize what was happening. One family of five, living six miles west of Washington, when the storm first struck took refuge in the cellar, just in time to see their house lifted above them and hurled through the air a distance of 250 feet. There were meetings being held in Music and in Odd Fellows' Hall, and they were both so ruined that it was wonderful how so many escaped. The northeastern and southwestern portions of the town were not much damaged. The tornado is described as having had the appearance of an immense rolling ball of cloud, illuminated with electricity.

Success of Aluminum Smelting by Electricity.

Among the valuable metals peculiarly adapted for use in the mechanical and fine arts may be mentioned aluminum, hitherto utilized only to a limited extent because of its refractory qualities and the expense encountered in its reduction.

For articles requiring great tensile strength and resistance, aluminum bronze may be considered the foremost, reaching 100,000 pounds per square inch; is susceptible of being tempered, and of receiving a high degree of finish.

By the process of "smelting ores by the electric current," recently patented by the Messrs. Cowles, of Cleveland, Ohio, the expense is so materially reduced that aluminum and its alloys will enter largely into the various branches of mechanical industry, to the exclusion of inferior metals; and the beautiful gold, silver, and bronze colors render it exceedingly valuable and desirable for small ornaments, statues, and all art metal work, and the remarkably low price at which this aluminum bronze is now produced insures for it a widespread employment in the arts.