Should Investigators be Teachers?

It has frequently been observed, with more or less of regret, that some of the most capable of our scientific investigators have had to spend the larger part of their time and strength in the drudgery of teaching, apparently to the grievous hinderance of what would seem to be their true work.

In his paper on "Modern Education: its Opportunity and its Perils," read before the Social Science Association, President Porter, of Yale College, ranges himself decidedly in opposition to this view of the case, holding that science gains more in the quality of its work of research and in the value of its results by a close and active contact with living pupils than it need lose by the distraction of its attention or the lowering of its enthusiasm. He says:

"There is danger that the man of research, who is nothing else, will give himself to a single department of thought, and have neither eyes nor ears nor thought for the facts and truths which lie beyond his horizon. It is well for science itself, that when one of its devotees is inclined to shut himself up in the narrow cave of his own studies and now and then pay unlawful honors to the idols which are hidden there, he should be forced to bring his theories into the light of common day by attempting to teach them to others. Many an extravagant hypothesis might have been nipped in the bud had its romantic originator been forced to state and defend it before the scrutinizing judgment of a classroom of not over reverential youth. We do neither dishonor the eminent abilities nor the actual services of either Mr. Darwin or Mr. Herbert Spencer when we express the opinion that they would have rendered far more valuable services to science had their activities in research been arrested by constant challenging from slow-minded and critical pupils. Whatever may have been true in the past, it is certain that science must fail of a healthy life unless its duties maintain a close and constant sympathy with the intellectual life of the on-coming generation, as represented in our higher schools."

MECHANICAL INVENTIONS.

Mr. Henry A. French, of North Orange, Mass., has invented an improved wrench, in which, by pushing on a pin with the finger a lever is caused to raise a pawl, when the jaw can be moved up or down, as may be required, and when the pin is relieved from pressure the spring immediately throws the dog into engagement with the ratchet on the shaft of the wrench.

A lever power, patented by Mr. Mathew C. Franklin, of Lockhart, Texas, relates to improvements in the manner of applying the power and resistance to the lever, so that they will change positions with relation to the fulcrum as the power end of the lever descends.

Mr. Henry C. Forney, of New York city, has invented an improvement in motors for pumping water from wells, the object of which is to utilize the force produced by the gravitation of a weight down into the well or from any height to operate the pump lever.

An improved pawl and ratchet mechanism for mowing machines has been patented by Mr. Hamilton A. Dean, of New Lebanon Center, N. Y. The object of this invention is to furnish a ratchet for mowing machines that shall operate without springs, and with so small a dead point as to obviate the necessity of jerking the machine forward or backward at any time to get it into gear.

Mr. Jacob Inglehart, of East Saginaw, Mich., has patented an improvement in the class of sawmill dogs composed of a series of pivoted hooks which act downward, and an opposing hook which acts upward, so that the log is grasped between them, the two sets of hooks being connected by links and operated by a lever.

Mr. Louis D. Le Nord, of Locksburg, Ark., has patented an improved horse power to be used in giving motion to cotton gins, thrashing machines, and for other similar purposes. It consists of an arrangement of bars and sweeps which cannot be readily described without an engraving.

Mr. John H. Ahrens, of Oswego, N. Y., has patented an improved device for setting circular and other saws, which is so constructed that all the teeth will be set exactly alike, and will retain the set so that less filing and less setting will be required than when an ordinary saw set is used.

Mr. Henry W. Steinsiek, of Jamestown, Mo., has invented an improved millstone dressing machine which for accuracy and rapidity of work is intended to excel those now in use.

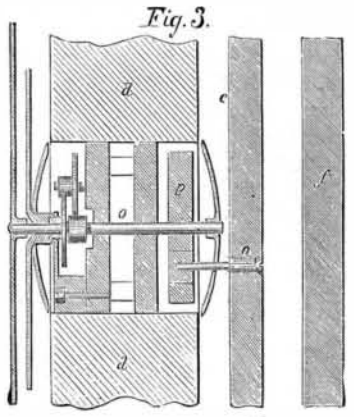
FIFTY thousand gross of watch glasses are sold annually in the United States. Such a statement seems almost incredible, but the figures are from the *Watchmaker and Metal Worker*, which ought to be authentic. One importer alone imports thirty-five thousand gross.

MYSTERIOUS CLOCK.

In M. Théodoré's clock, shown in the accompanying engraving, none of the actuating parts are visible. Apparently it has no works, but a close examination shows that the driving mechanism is concealed in the base. Fig. 1 is a front elevation; Fig. 2 is a vertical transverse section; and Fig. 3 shows the dial wheels and their connection with the movable plate that is carried by the clock mechanism in the base.

A metal frame, *a*, surrounds three rectangular plates, *f e d*, of glass. The plate, *d*, is thicker than the others, its edges are beveled, and upon it is formed the dial. The plates,

Fig. 3.



f and *d*, are fixed, but the plate, *e*, rests upon a grooved bar, *g*, and is guided at its upper edges by two springs, as seen in Fig. 2. The plate, *d*, supports the hands of the clock and the dial wheels, which are concealed by a small tube passing through it.

The grooved bar, *g*, upon which the plate, *e*, rests, is supported by two vertical rods, *i i*, the lower ends of which are carried by eccentrics, *k*, that receive their motion by a train of wheels from the wheel, *l*, on the minute hand arbor of the clock. The plate, *e*, is counterbalanced by the weights, *m m*.

The two eccentrics revolve in the same direction, and the ends of the bar, *g*, are moved in the same direction at the same time, consequently every portion of the plate describes the same circle as the eccentrics. The rods, *i*, which support the plate, *e*, are concealed by the ornaments, *c*. A small screw, *n*, passes through the plate, *e*, and enters a crank wheel, *p*, concealed in the center of the dial. As the plate, *e*, moves this screw carries the crank wheel, *p*, which, being fixed on the minute hand arbor, carries the minute hand. Motion is communicated to the hour hand by dial wheels, which are of the usual form, but very small.

As all of the glass plates are perfectly transparent, they appear as a single plate, and the motion of the plate cannot be discovered by the eye.

Fig. 1.

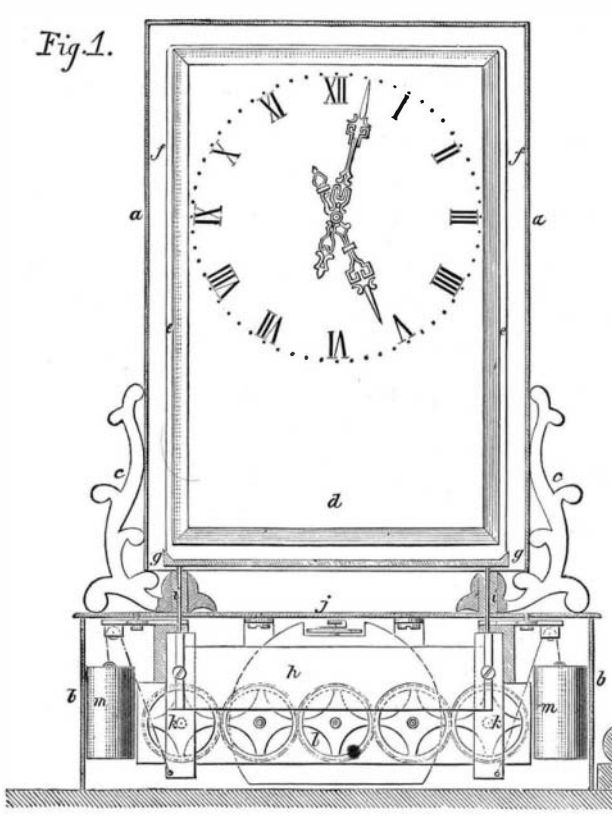
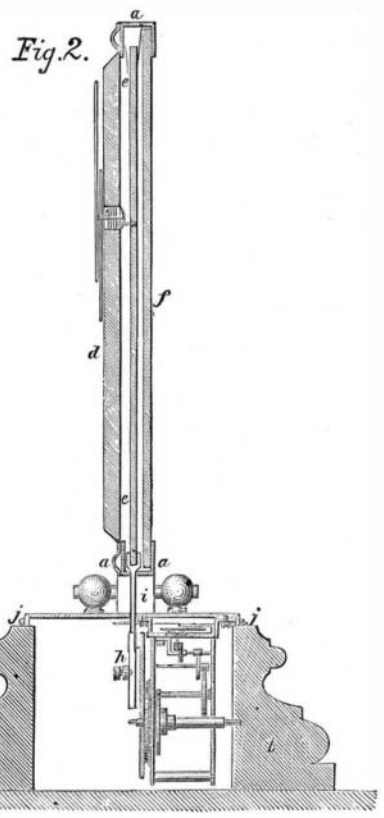


Fig. 2.



THEODORE'S MYSTERIOUS CLOCK.

Bessemer Steel.

The representatives of the Bessemer steel works of the United States held a meeting in Philadelphia, September 3, to consider measures for the regulation of trade, now more active than it has been for several years. Ten out of the eleven Bessemer steel works of the country were represented. Reports from all points showed that the trade is enjoying the highest prosperity and the brightest prospects for the future. Without exception every rail mill in the country has orders for more than it can produce up to the end of the year, and many of them have already taken orders for several months in the ensuing year.

The Metric System in Philadelphia.

After extended inquiry among the druggists in Philadelphia, the *Medical and Surgical Reporter* says: "The introduction of the metric system, so far as Philadelphia is concerned, is an absolute failure. There are many reasons for this, and good ones. When closely examined, there is by no means that simplicity about the metric system, nor is there that fixity about it, which its admirers have claimed. Its unit is notoriously based on a mathematical blunder, the meter not being the ten-millionth part of a quadrant of the meridian of Paris, as was supposed by those who first adopted it. It is wrong one meter in every five hundred and fifty-five thousand. Practically it is found very inconvenient to convert *accurately* apothecaries' into metric weights and measures."

Carriage Building in the United States.

The seventh annual convention of the Carriage Builders' National Association was held in this city, October 15. The association has a membership of nearly 300, in the most important cities of twenty States, and represents a capital of $100,000,000. The importance of the carriage trade and the rapidity of its development are shown by the following statistics compiled by the *Graphic:*

Sixty years ago there were only ninety-two carriage establishments in the United States. They gave employment to 2,574 persons, producing 13,331 carriages of various kinds, amounting in value to $1,708,741. In 1850 it had increased to 1,822 establishments, employing 14,000 persons, and producing carriages to the amount of about $12,000,000. From that year to 1860 the increase was extraordinarily rapid, showing that the number of carriage manufacturers had increased from less than 1,900 to 7,234, employing over 37,000 workmen of various grades, and turning out carriages to the value of $36,000,000. From 1860 to 1870, despite the fact of the loss of our export trade caused by the war, the increase continued at the same ratio, the total number of carriage establishments throughout the Union then numbering 11,944, employing 65,294 persons, paying out $21,834,355 for labor, and producing about 800,000 carriages, amounting to $67,406,548. It is now estimated that there are 15,000 carriage manufacturers in the United States, who employ upward of 100,000 hands, pay out from $25,000,000 to $31,000,000 for labor annually, and produced during the past twelve months upward of 1,200,000 carriages, amounting in value to fully $125,000,000. This makes one carriage to about every thirty-eight persons in the United States, to say nothing of sleighs of various kinds. This does not include the extensive manufacture of axles, springs, wheels, bows, joints, bolts, clips, leather, cloth, and the thousands of articles made in part that are now purchased in a partly finished state by the trade, in which many thousands of men find steady and remunerative employment. These statistics prove without a doubt the claim already put forth that carriage building is entitled to be rated as one of the leading manufacturing industries of the country.

The great manufacturing centers in the carriage line in the East are Amesbury, Mass.; Merrimack and New Haven. The rivalry between Amesbury and New Haven has been spirited during the past three years, but thus far the Yankee town maintains the lead, sending to the market last year 16,000 carriages of different models and of superior workmanship, against 13,000 turned out by the Elm City factories.

New York is the leading center of the Union for the sale of fine carriages, and is rapidly increasing its list of manufactures. Newark and Rahway, N. J., which prior to the war had almost a monopoly of the Southern trade, have failed to recover from the great losses entailed by the struggle, and are no longer great carriage manufacturing cities. Notwithstanding, however, the changed aspect, some of the finest models of carriage architecture are yet sent to the market by their old and experienced builders, and hopes are entertained by them, owing to the extraordinarily large demands made upon them this year, that they will eventually regain much of their lost trade. Reports from Philadelphia and Wilmington, Del., where carriage building has, within the last ten years, assumed large dimensions, show that the past year has been one of the most prosperous that the trade has experienced. In both cities the manufacturers speak encouragingly of the outlook.

Of the Western cities, Cincinnati, South Bend, Ind., and Columbus, O., take the lead in the carriage industry, eight firms in the first named city having manufactured 63,000 carriages and buggies last year. The product of South Bend, where the largest carriage manufactory in the United States is located, was less by a few thousand. There are but few great carriage manufactories in Chicago, but it is the chief center of sale of Eastern and Western varieties of carriages and buggies.

Wages and Prices in Great Britain.

Reviewing the information furnished by consular agents in England, with special regard to the influence of trades unions, Secretary Evarts says:

"A few years more of strikes and disorganization in England, and it may be doubted whether any compromise between the employers and the employes will restore to that country her manufacturing supremacy. As capital will not remain idle, nor permanently in unprofitable investments, it may be expected that English capitalists will seek new fields for investment, such as the transfer of the cotton manufacture to India, which may be said to have already begun. Under such circumstances nothing will remain for the British workingmen but emigration. Thus, if they drive capitalists and manufacturers away, they must also go. Already the British workingmen see the necessity of getting rid of their surplus labor, so as to reduce it within the actual demand therefor, the greater portion of them being working at present, where they are working on short time, to enable all to eke out an existence. Premiums are being now offered to those workingmen who are willing to emigrate to Australia or to the United States by those very trades unions which have divided capital and labor into hostile camps, brought ruin on the manufacturer, and poverty to the workingman's home, filled the land with strikes and resistance for years, made of the manly English workingman an organizer of reckless leagues, and which now offer the English people forced emigration. There can scarcely be a doubt that within the next five years 500,000 English workingmen will emigrate; indeed, should the spirit of emigration once seize the English mind, there can be no reasonable limit set to the hegira. That the greater number of these emigrants will seek 'work and bread' in the United States may be fairly assumed. We have, therefore, more interest in those people than even their own government; they are Englishmen to-day; in ten years they will be American citizens." The average rates of wages paid in England are given in the following statement, which is compiled from the various consular reports and contrasted with rates paid in New York:

	England.	*New York.*
Bricklayers	$8.12	$12 to $15
Masons	8.16	12 to 18
Carpenters and joiners	8.25	9 to 12
Gas fitters	7.25	10 to 14
Painters	7.25	10 to 16
Plasterers	8.10	10 to 15
Plumbers	7.75	12 to 18
Slaters	7.90	10 to 15
Blacksmiths	8.12	10 to 14
Bakers	6.50	5 to 8
Bookbinders	7.83	12 to 18
Shoemakers	7.35	12 to 18
Butchers	7.23	8 to 12
Cabinet makers	7.70	9 to 13
Coopers	7.30	12 to 16
Coppersmiths	7.40	12 to 15
Cutlers	8.00	10 to 13
Engravers	9.72	15 to 25
Horseshoers	7.20	12 to 18
Millwrights	7.50	10 to 15
Printers	7.75	8 to 18
Saddlers	6.80	12 to 15
Sailmakers	7.30	12 to 18
Tinsmiths	7.30	10 to 14
Tailors	$5 to 7.30	10 to 18
Brass finishers	7.40	10 to 14
Laborers, porters, etc	5.00	6 to 9

The prices for food in Great Britain, according to the figures furnished by the consuls, are fully 25 per cent higher than at New York, and 50 per cent higher than at Chicago. For instance, fresh meat in England is put down at 15 to 26 cents per pound, against 12 to 16 cents at New York, and 8 to 13 at Chicago. The same disparity in prices of food runs through the schedule. The average weekly wages of agricultural laborers are given as follows: Men, without board or lodging, $4.25; with board and lodging, $1.50 to $2.40; women, without board or lodging, $1.80 to $3.25; with board and lodging, 60 cents to $1; female house servants, per annum, $34 to $49. As evidence that good wages and good farming go hand in hand with intelligence, the Consul at Newcastle notes the fact that in the north of England and southeast of Scotland, where public schools have existed for some years, farm laborers are paid $4.10 per week, while in the southern counties of Egland, where primitive ignorance and poor farming prevail, farm laborers are paid only $2.75 per week.

The Consul at Sheffield describes the habits of the workingmen of his district, and it is feared that his description is applicable to those of most English cities. The Consul says: "A bold recklessness as to earning and spending prevails among the Sheffield workingmen. Many a man who can easily earn his $14 to $19 a week will be satisfied with earning half that sum, or just enough to provide him with his food, beer, and sporting, allowing his wife but a mere pittance of his wages for herself and children. Large numbers, who might make themselves independent, make no provision for the future, except to pay into their club a shilling or two a week, which assures them, if not in arrears, some aid in case of sickness. This method of insurance, good in itself, seems to operate here to paralyze the desire to save. One thing, however, seems evident, that, notwithstanding the great depression in the manufacturing interests of Sheffield, there would be but little destitution among the working people but for their drinking habits. Any one walking these streets will see at once where the earnings of the workingmen go, and in many cases the earnings of the working women also, for there is in this town a far greater population of women employed in the heavier kinds of labor than will be found in the cities of the United States, excepting it may be the great cotton manufacturing centers. This fact is to be considered in estimating the amount of earnings that go to the support of families, such earnings being larger than might at first appear. Were the same properly used, there would be comparatively little suffering or poverty."

The reports from England show that most of the evils with which the laboring classes of that country are afflicted can be traced to intoxicating drink. In the Sheffield district it is estimated that each workingman loses one day of each week through drink. This loss of time is equal to a loss of one-sixth of the productive power of the district, and it is pertinently observed that a nation with a labor population given to drink and strikes, no matter how favorable other auspices may be, cannot continue to compete successfully in the markets of the world with those countries whose working classes are temperate, industrious, and thrifty.

Rock Crystal Lapidary in Japan.

As in all Japanese houses, the floor is raised from the ground a foot or more. The universal manner of sitting, even when at work, on the hams, is shown with variety in disposing of the feet. Sometimes a man will take a seat on his knees and heels. Another will prefer the cross-legged style. The appliances of work are extremely simple, and skill, patience, and hereditary pride make up for any seeming lack of labor-saving tools. Heredity is an important factor in Japanese labor. In many of the villages the crack workmen trace back their pedigree, both of skill and blood, from 3 to 20 generations. I once employed a carpenter whose forefathers—as the records of the village temple of his sect in which he and they had worshiped showed—had followed the same trade for 26 generations. On the floor we see a man standing who has been out on the hills digging out the crude quartz. His hammers and picks, with which he breaks off, pries out, or digs up the rock, lie on the coarse rice-straw mat on the earthen floor. Having secured a basketful and borne the pieces to the lapidary on his shoulder, he cleanses them of adhering gravel or bits of rock. He then passes them over to the "splitter"—an old fellow too old to go bare-headed in the shop any longer like the younger men, who may be his sons. The old man's part of the work is to break off the long bars of rock into bits the gross size of the ball or bead to be made therefrom. Laying the piece on a large stone covered with a piece of matting, with the end of calculated length to be broken off protruding over the edge of the stone, a sharp quick blow with the steel edged hammer usually severs it. On larger and thicker pieces a gutter is first nicked out around the surface sufficiently deep before the final blow is struck. Skill and a "knack" are of great account in this process. On one side of the old man lies a basket of these truncated prisms, which he hands over to the man who rounds them off into rough globes. This is done by careful chipping with a tiny steel edged hammer. It is astonishing how, with simple skill, the man will make an almost perfect sphere with one very ordinary tool. He soon learns the mysteries of the planes of cleavage, where to tap lightly, where heavily, when to chip, and when to pound. The rough coated balls are now passed to the grinder, who has ready a tub of water and four or five partly cylindrical pieces of cast iron, a little over a foot long, and looking like reversed graters. These are of different sizes and curves, according to the size of the ball to be ground. His grinding material consists of powdered garnet of various degrees of coarseness. He uses water plentifully, and dexterously keeps the balls turning so as to make the surface spherically equal. In some cases the ball is fixed in the end of a bamboo tube, and the grinding finished by whirling it between the palms in a half spherical iron or stone socket. The globe is now smooth, but the perfect polish has yet to be done by patient rubbing with the tip of a bamboo cane, and then in the hands with cloths dipped in crocus, or rouge, a native oxide of iron. This produces a splendid lustrous surface, and the gem is water clear, and as refractive to the morning light as a drop of dew that nestles in the heart of the lotus.—*Harper's Magazine.*

Brain Growth.

Dr. Crichton Browne's paper, "The Influence of Domestication on Brain Growth," read in the Anatomy and Physiology Section of the British Association, is an important contribution to the science and literature of development. By a series of observations made with extreme care, the author shows that the duck has suffered in brain development by being domesticated. While other animals have been domesticated for special qualities inherent in their nature as animals, the duck represents a class of creatures in which the instincts and uses of the organism have been suspended by the change in condition. The duck has been, so to say, taken wholly out of its place in nature, and reduced to the level of food by a process and under circumstances which supersede all its natural propensities. "Food has been copiously supplied, and of a kind richer and more nutritious than could have been accessible in a feral state. Shelter has been provided, and the bird has been compelled to live in a temperature higher than that to which it was accustomed in a state of nature. Competition has been made unnecessary, and protection has been afforded against a host of enemies. Flight has been prevented, and locomotion circumscribed as much as possible. In short, the life of the duck has been rendered tranquil, luxurious, and indolent. Its whole duty has been to live and grow fat, and to multiply and replenish the pond. Few calls have been made on its intelligence. It has not had its senses and instincts whetted by the necessity to range afar in quest of food, to eschew ever recurring dangers. It has not had its energies evoked by a free existence. It has been dragged down by domestication to a lower physical level." The author might have added that it has been wholly demoralized and debased to the lowest depths of filth as a feeder The brain has lapsed in process of time as a result of the absence of stimuli. Dr. Crichton Browne, starting from this striking illustration of the effects of the "surroundings" on development, and noting the cumulative force of heredity, applies some of the obvious inferences from the facts he has detailed to the development or retrogression of the brain in different races or groups and families of men. "To fare sumptuously every day, to bask in luxury and idleness, is to court decay of the noblest of the tissues, for moth and rust doth corrupt even the greatest of man's treasures—his intellect—when it is laid by in uselessness and lavender, and thieves will surely break through and steal away his brains unless they are zealously guarded and diligently exercised." This is a practical point of the highest value and moment, and one that cannot be too strongly or constantly expounded. The brain grows by use individually and racially If it is not habitually employed, in a class or family, it will sink into subordinate importance. The moral of the consideration expressed is self-evident.—*London Lancet.*

Salicylic Acid.--Its Uses and Remarkable Cures.

The beneficial effects of salicylic acid as a medicine have been much discussed in the medical journals since 1875, when the acid was first administered as a remedy for rheumatism. Its antiseptic properties render it useful in eruptive diseases, in diphtheria; and it has the further advantage, when properly made, of being colorless and tasteless. It kills bacteria and other animalcules, and destroys the unpleasant odor of the wounds. Professor Kolbe, of Leipsic, in his many experiments with the acid, found that rain or river water containing one-twenty-thousandth of a grain thereof would keep sweet in a warm room four weeks or more, while similar water not so treated soon became unpleasant to the taste. This was confirmed by an experiment on a large scale; water charged with one gramme of salicylic acid to twenty liters was placed on board ship for a year's voyage; and was found sweet and free from organic matter when at the end the casks were opened. Milk treated with the acid remains sweet more than a day longer than without it. Eggs after a bath of the acidified water keep sweet for months in a dry place; and meat sprinkled with the powdered acid and packed in a jar acquires no unpleasant odor. Wine may be kept from turning sour by the use of the acid; brewers find it useful in some of their processes, and its property of preventing putrefaction is turned to account in the making of glue and other manufactures.—*Chambers' Journal.*

[There is no doubt but what salicylic acid is a useful remedy for rheumatism and some other complaints, but when we read of its use being so widely recommended, we are led to inquire if its advocates are not claiming for it too much. Two winters ago we met in the south of France a good neighbor clergyman who had left home a couple of months before, afflicted with rheumatism in a mild form, but which on the voyage had become so severe as to render him almost helpless. Our surprise at meeting our friend down on the shores of the Mediterranean was scarcely greater than our astonishment at his account of his cure, which had been effected by the use of salicylic acid.

It was a new remedy to us then, but we have since seen in our medical journals cases reported of its use and cures, which confirms beyond a doubt that in some form of rheumatic affections salicylic acid affords great relief to the sufferer, and often produces remarkable cures.—EDS.]

Pencils to Write on Glass, Porcelain, Metal, etc.

Such pencils are produced by Faber's factory in the following manner.

(1.) *Black* pencils: 10 parts of the finest lamp black, 40 parts of white wax, and 10 parts of tallow.

(2.) *White* pencils. 40 parts of Kremser-white, 20 parts of white wax, and 10 parts of tallow.

(3.) *Light blue* pencils: 10 parts of Prussian blue, 20 parts of white wax, and 10 parts of tallow.

(4.) *Dark blue* pencils: 15 parts of Prussian blue, 5 parts of white wax, and 10 parts of tallow.

(5.) *Yellow* pencils: 10 parts of chrome yellow, 20 parts of white wax, and 10 parts of tallow. The color is mixed with the body of wax and tallow warm, triturated, exposed to air for drying, so that the mass can be pressed by means of a hydraulic press into round pencils in the same way as lead pencils are formed. The pencils are dried after pressing by exposing them to the air until they have the proper consistence, and are then glued into wood.—*Pharm. Zeitschr. für Russland.*

A Powerful Stamp Mill.

What is described as the largest stamp mill in the West has been put in operation at the Homestake Company's mines at Deadwood, D. T. The machinery consists of a three hundred horse power Corliss engine with two pairs of boilers, four Blake rock breakers, 120 stamps, twenty-four Hendy's self-feeders and twenty-four Hendy concentrators. The engine cylinder is 26x48. The weight 90,000 lb. There are two fly wheels each eighteen feet in diameter, which are the driving pulleys of the two line shafts. Only one pair of boilers are required, and sixty pounds of steam, cutting off at one fifth, runs the entire machinery.