other Bcsides the advantage of having a clean bosom when one becomes soiled, the shirt having this improvement af fords protection to the chest at the most exposed part.
Mr. David H. Thomas, of New York City, has patented an improvement in Cooking Ranges, which consists in a novel arrangement of the flues and ovens; also in a sectional swinging grate and a blower or grate cover for broiling.
Mr. Henry V. Aiken, of Fishkill Landing, N. Y, has patented an improved Pneumatic Gong Pull, which is so constructed that the gong hammer may be operated by means of compressed air. It may be used upon vessels, in houses, and in other places where signals are to be given.
Mr. Jerome F. Buscy, of Peck's Mills, Pa., has devised an improved Machine for Bending Chain Links, which may be adjusted so as to produce links of different sizes and thicknesses of iron by one and the same machine, without necessitat:ag the use of several machines for each size of link.

## a Wrinkle in filing.

Those who have used slender files have met with the dif ficulty that the file bends from the pressure with which it must be forced upon the work to make it cut The result is that it files the edges of the work away, leaving the sur face rounding, as shown in
Fig. 1, in which A A repre. Fig. 1, in which A A repre.
sents the operation of filing sents the operation of filing
out a narrow keyway, the file bending from the pressure, as shown, rendering it necessary to either make a drift to finish the keyway with or to work out the roundness with the end of the file only, which the end of the file only, whi
is a long and tedious job

To remedy this defect and enable the filing to be done with full strokes and a maxi mum of pressure, the file may be grasped as shown in Fig. 2. The pressure of the forefinger and thumb, being exerted in the direction deexerted in the direction de-
noted by the respective arnoted by the respective ar-
rows, bends the file to a sweep or curve, causing it to file flat clear across the work, whilo if any particular part only requires to be filed the file may be brought to bear against it and short strokes taken. It is obvious that in this case the handle end of the file must be elevated or depressed to bring the belly of the file to bear upon the required spot.
J. R.

## Chrysoline on Cotton.

The author has been commissioned to examine the applications to cotton of a new coloring matter known as chrysoline, and which, since March, 1877, has been used in wool and silk dyeing. It is the soda salt of benzylated fluorescine, and has been discovered and manufactured by $M$. Fred Reverdin.
As the inventor has himself in several publications described the chief properties of the new product, and the method of its preparation on the large scale, it will merely be necessary to describe here its characteristic reactions.
This color is soluble in all proportions in water and alcohol. In glycerine diluted with water it is less soluble, and in concentrated glycerine it dissolves only with the aid of heat. It is insoluble in olls. Essence of turpentine precipitates it from its aqueous solutions.

Its solutions by reflected light are of a splendid green color, but by transmitted light of an orange

Alkalies promote its solution, while the acids and all the metallic salts, except the carbonates, give an orange precipitate, the shade of which varies according to the base of the salt.
Among these precipitates, the most remarkable are those given by chloride of tin and nitrate of lead. The latter is brightest if we precipitate a cold, weak solution, which has previously been rendered slightly alkaline
Chrysoline contains two distinct coloring matters-the one gives a yellow precipitate with acids and metallic salts, the other a red or rose precipitate with salts of lead.
The latter co. $\mathrm{o}^{-}$- is not fast; the former is more stable. If the precipitate produced by muriate of tin is allowed to settle, the clear liquid above is of a light orange. If this is rendered ammonacal, and mixed with a weak solution of nitrate of lead, it deposits a splendid rose-colored precinitate, apparently due to the presence of a certain quantity of eosine, which is produced in the manufacture along with the yellow color.
Cotton cannot be dyed in a direct manner with chrysoline, and receives only a slight rose coloration if previously mor. danted with salts of iron or alumina.
With a lead mordant it takes a beautiful light rose, the shade of which is scarcely proportionate to the total quan. tity of chrysoline in the dye bath. It is the red coloring matter alone above mentioned which dyes. The whites are always stained

If cotton is worked in a watery solution of chrysoline, 1 grain to the fluid ounce, and dried, it takes a very fine orange shade. This color, which is characteristic of chrysoline, is not fixed upon the cotton, and is very sensitive to
light. A few hours of exposure cause it to fade and even to disappear.
If this colored cotton is passed before drying into a bath of oil mordant, a part of the yellow color is fixed well enough to resist simple washing.
A weak solution of nitrate of lead likewise fixes the coloring matter with an orange shade, in which the influence of the red coloring matter may be traced.
Cotton previously prepared with an oil mordant exhausts the color bath and dyes up a full orange. This color resists light better, but does not wash.
Printing. - $\Lambda$ fter these preliminary trials I endeavored to apply chrysoline in printing.
A solution of 1 grain per fluid ounce of water, thickened with egg albumen, gives a fine yellow, which, after steaming, is sufficiently intense. Washing removes much of the yellow, and there remains mercly a dull faded color.
A better result is obtained by printing with precipitates containing 62 grains of chrysoline in 31 ozs. of color. I exhibit two such precipitates applied with albumen; the one obtained with nitrate of lead, and the other with muriate of $t$ in.
These precipitates were obtained as follows: $171 / 2$ fluid
ozs. of solution containing 15 grains of chrysoline.


## A WRINKLE IN FILING.

 This is slowly precipitated in the cold, with $1 / 2$ oz. of a ${ }^{\prime}$ Fine Combs, such as are made of celluloid, hard rubber, and solution of nitrate of lead, or of tin crystals, containing $31 \frac{1}{2}$ other material, the machine being adapted for cutting difozs. per $13 / 4$ pint. The precipitate is washed twice by de- ferent sizes of combs, and accomplishing its work rapidly cantation. $5 \frac{1}{2}$ fluid ozs. of this precipitate are thickened and accurately. with $21 / 2$ ozs. of egg albumen. The lead color, though the Mr. Arthur Sirois, of New York City, has devised an immore beautiful, must be given up, as it becomes discolored proved Coupling for the driving belts of heavy machinery, on steaming and exposure to the air. The tin color, on the and also for the driving cords of lighter machincry, such as other hand, is of a very fine orange, and is developed by steaming, and resists light better.The two colors are much degraded and changed in tone by a slight soaping. They present then a flesh color, which is restored to a yellow by acids.
There is still a third method of application, that with arsenite of alumina. Upon calico prepared with acetate of alumina there is printed a solution of chrysoline, 62 grains to 35 fluid ozs., containing the necessary quantity of arsenite of soda, and thickened with white starch. The results are better as regards solidity, but at the expense of beauty. The orange is less intense, more of a yellow shade, and wanting in brighiness. It resists washing and light.
Dyeing.-I submit some skeins dyed upon the same principles. The results are not much more satisfactory. The first skein was mordanted in acetate of alumina, at $5^{\circ} \mathrm{B}$., steeped in a bath of chrysoline and arsenite of soda, wrung, dricd, steamed, and washed. A tolerable orange, which resists light slightly.
The second skein, prepared in the same manner, was then dyed in a bath containing acetate of alumina and arsenious acid dissolved in glycerine. Wring, dry, steam, and wash. The tone is much more yellow.
Caution must be used in this process, as it is difficult to get the threads evenly dyed.
The third skein was saturated with a solution of chrysoline, dried, and passed into nitrate of lead. The result is a fine orange, but not solid.
The fourth skein shows the color fixed with muriate of tin, the tone being slightly less red than the foregoing. All the shades obtained with chrysoline are rendered yellow by acids, and are restored to their primitive shade by alkalies. I have still to relate a fact which has been already remarked with other artificial coloring matters. A yellow dyed with bark is considerably heightened by taking it through a weak solution of chrysoline, 1 grain to the fluid ounce.
Chrysoline, therefore, cannot be considered applicable to cotton.where nitroalizarine may be advantageously used in its stead. This lat
almost as brilliant.
Chrysoline will find its use for wool and silk, which it dyes readily without mordants, and on which it is much more solid.-Sociēté Indust. de Rouen.-Chemical hevievo.

## A Cheap Illuminated Clock,

Reiniger, ot Stuttgart, proposes an ingenious substitute for illuminated tower clocks. It is the use of a magic lantern, so frequently employed for street advertising in this
an improved Machine for
Rounding Off the Ends of
city. A small lantern could be so arranged as to throw the picture of a common watch or chronometer upon a suitable white screen in places much frequented at night. The movements of the hands would be quite as distinct as those of a real clock with a transparent face and a strong light behind it. The project recommends itself to smaller citics. unable to bear the expense of a costly tower clock with illuminated face.

## New Mechanical Inventions.

Mr. Edmund Golucke, of Crawfordville, Ga., has patented an improvement in stationary Horse Powers employed for driving cotton gin machinery; and it pertains particularly to the construction of the king post and master wheel and their appendages.
Mr. John W. Donnel, of Muscatine, Iowa, has patented an improved Millstone Driver, in which the driving points and the point of suspension are in the same plane and parallel with the face of the runner. By this construction the extra pressure on the skirt of the stone is avoided. The driving block is supported on the shoulder of the spindle a sufficient distance below the cockeye, so that it may vibrate and balance itself casily.
An improved Hoisting Jack has been patented by Mr. Richard O. Kceffe, of Omaha, Neb. The object of this invention is to furnish an improved hoisting jack for raising railroad tracks, safes, and other heavy bodies that require to be taken hold of close to the ground or floor.
Mr. Ramon Verea, of New York City, has patented an improved Calculating Machine. This ingenious machine is capable of rapidly performing addition, subtraction, multiplication, and division. The details of its construction cannot be properly described without engravings.
Mr. William Booth, of Newark, N. J., has pateuted Newark, N. J., Mas improved Machine for sewing machines, etc., the coupling admilting of the instant connecting or disconnecting of the belts or cord., while taking up a small space, so as not to interfere with the driving of the pulleys or wheels.
Mr. William H. Peterson, of Richmond, Ind., has patented an improved Double $\Lambda$ cting Force Pump, that is of simple and compact form, and adapted to be placed at any depth in the well, so as to make it non-freczing.
An improvement in Machines for Cleaning and Polishing Coffec has been patented by Mr. Henry Bamberger, of Philiadelphia, Pa . This invention has reference to an improved machine for cleaning coffee of its adhering impuritics, dry hulls, etc., and imparting to it a smooth and uniform appearance.
Mr. Willie Kniffin, of Yorktown, N. Y., has patented an improved Lifting Jack for raising the axles of wagons to allow their wheels to be removed, and to raise other heavy weights. It is so constructed as to enable a weight to be raised by a slight exertion, and will hold the weight suspended for any length of time.
Mr. William H. Walsh, of Fort Worth, Texas, has devised an improved Gin Saw Sharpencr, of simple construction, by which the teeth of the saws are cut square at the inside and pointed at the top, and by which the sharpening of all the saws of a cylinder is accomplished quickly and perfectly, avoiding the objectionable features of hand sharpening.
Sedgwick M. Wade, of Andover, Ohio, has patented a Strap Hinge, composed of two leaves, having flanges and rear tongues, the latter curved to form sockets for the pivot.

## Effect of Gas on Cotton Goods.

At the last mecting of the Chemical Section of the Philosophical Society of Glasgow, Dr. William Wallace, gas examiner and public analyst for the city of Glasgow, read a short paper on the destruction of the color of cotton goods by the sulphur in the gas burned in the London warehouses. Sulphuric acid, he said, was found in considerable quantity in the goods after being some time exposed, while the same articles in the fresh condition were quite free from that acid. In some cases the cotton fiber itself was rendered so tender as to be perfectly useless. The same thing had been observed in the warehouses in several large towns in England, such as Leeds, Manchester, etc., where common coal, containing much sulphur, was used as the source of the gas supplied to the consumers, but only to a limited extent. The remedy which was recommended by Dr. Wallace was the thorough ventilation of the warchouses, so as to insure that the sul| phurousand sulphuric acids generated by the burning of the
gas might have a sufficiently free escape into the atmosphere. $\mid$ recting the jet to control it completely without sending mes He also suggested the free use of lime for whitewashing sages to the engine driver. An engine of this kind forms ee also suggested the free use of lime for whitewashing the walls of the warehouses, so that the acid vapors floating in the more or less confined air might combine with the lime.
He exhibited a number of specimens of the goods which he had examined after they had been sent back by the London merchants, as damaged, to the manufacturers. Both in color and in strength they were seen to have suffered detriment by exposure to gaseous fumes.

## IMPROVED STEAM FIRE ENGINE

Our engraving represents one of the improved steam fire engines that have been supplied for the new chief station in the Southwark Bridge road of the Metropolitan Fire Brigade, London. The object of Captain Shaw in the construction of these machines has been to keep all the parts as light as possible, consistent with the necessary strength, so as to enable the firemen, with all their apparatus, to be conveyed quickly to a fire. To ascertain the required strength of carriage wheels, etc., Captain Shaw recently instituted a number of experiments at the vacant ground on the Thames Embankment, near Blackfriars Bridge, where the engines were tried in every possible way, and the information obtained by means of these experiments has been employed in the design of the two engines in question.

Hitherto the consumption of a considerable quantity of gas has been found necessary in order to keep up the temperature of the water in the boiler. This is now avoided by an improvement introduced by Messrs. Shand, Mason \& Co., into their inclined water tube boiler, consisting mainly of an increase of the heating surface, the quantity of the water remaining the same. By this the time required for raising steam is reduced by between two or three minutes. The engine is of the makers' well known single cylinder type with bucket afd plunger pump. The vertical and rotary parts are evenly balanced, so that the transverse oscillation previously noticeable has been entirely overcome, and the engine works at high speed with great regularity. The valve passages in the pump have also been enlarged, and the steam used more expansively, so that weight for weight the engine is rendered about one third more powerful than those previously in use. By these means, and without increasing the weight of the boiler, the area of the steam cylinder has been largely added to, so as to enable a jet of water to be thrown to the increased height required by the great extension of lofty buildings in London. A novel form of self-acting by-pass has been adopted, which can be adjusted so that the whole or any part of the water pumped is returned to the suction chamber, enabling the fireman di-
part of Messrs. Shand, Mason \& Co.'s exbibits in the Par
Exhibition. We take our illustration from the Engineer.

## Improved Hair Pin.

Mr. Edward Kelly, of Baby's Point, Ontario, Canada, has recently patented an improvement in hair pins which is clearly shown in the accompanying engraving. The improvement consists in connecting two or more ordinary hair pins by means of an elastic cord of suitable length, so that the pins may be inserted on opposite sides of hair braids with the elastic connection passing over the top. The cord contracts and securely holds the pins in place.

## Large Driving Belts.

At the Paris Exhibition, some fine main
driving belts, made after Sampson's patent, are shown by driving belts, made after Sampson's patent, are shown by
Mr. Edwards, of Manchester, Eng. There is one double belt, 207 feet long, 63 inches wide, which weighs 2,962 lbs., and is made to transmit 600 indicated horse power. Another is 184 feet long, 53 inches wide, while a third is 163 feet long and 63 inches wide. These two latter weigh together 4,378 lbs., are without cross joints from end to end, and are intended for a large cotton mill, to drive direct a flywhee 30 feet in diameter, and 10 feet 3 inches on the face. The combined horse power they are made to transmit is 1,000 .

## American Cotton at Parts

Colomel Balys, special commissioner from Tennessee to he Paris Exhibition, reports that Memphis not only won the leading prize for the exhibition of the best bale of cotton, but also received a grand testimonial, the bale which it displayed being said to be the best ever raised in the world. Its history is somewhat remarkable. At an exhibition in Memphis it received the grand prize of $\$ 1,000$, another first prize at the Centennial, a third at Liverpool, still another at a national fair on the continent of Europe, and now these awards at Paris. The value attached to it by its owner has been so great that in transportation abroad it has been in charge of a special messenger. It was finally bought by the largest spinner of lace goods in Paris to be kept as a souvenir. At the Philadelphia exhibition the Fiji Islanders carried away the prize forlong staple cotton, but at Paris this year they gracefully yielded to Memphis. That Egyptian cotton, long staple, is to a certain extent compcting with our sea island staple, is to a certain extent compcting with our sea island
cotton is attributed to the fact that while the South has been
favored with unusual crops, yet it has not been careful in their preparation, and consequently they have not yielded so high a price as they would have been otherwise entitled to.

## ASTRONOMICAL NOTES <br> by berun be wrots

Penn Yan, N. Y., Saturday, October 19, 1878. The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated. PLANETs.

|  |  |
| :---: | :---: |
| ${ }_{5}^{\text {E.M. }} 18 . \mathrm{mo}$. | Uranus rises. |
| ars rises... ............. 526 mo . | Neptune rises ............ 549 eve . |
| pitersets................ 1052 eve. turn in meridian.... . 10 01 eve. | Neptune in meridian... .. 038 mo . |
| FIRst magnitude stars, etc. |  |
|  |  |
| Apheratz in merldian. . . 10 |  |
| Mira (var.) rises.. ...... 832 eve. | Regulus rises ... ... .... 127 mo . |
| Algol (var.) rises | Spica rises... .......... 604 |
| ${ }^{\text {a }}$ |  |
| Capella in meridian...... 317 mo . | Vega sets .............. 136 |
| es.............. 944 | Altair in meridian ........ 55 |
| Betelgeuse riseд.......... ${ }^{12} 29 \mathrm{ev}$ | Deneb in meri |
| Sirius rises.............. 1145 ev | Fomalhautin meridian... 857 | REMARKS.

Venus and Mars will be uear the moon October 25, Venus being $7^{\circ}$ and Mars $6^{\circ}$ north of the moon. They are in Virgo. near the middle of the consteliation, being $5^{\circ}$ northwest of Spica. Jupiter and Saturn are the only planets visible to the naked eye, which are at present favorably situated for observation. Jupiter will be at eastern quadrature October 21, being then $90^{\circ}$ east of the sun. Uranus will be in conjunction with the moon October 21, being about $3^{\circ}$ north.

ANSWERS TO CORRESPONDENTS.
F. V. Pike.-The amplitudes of the three stars which have been added to the above list since the amplitudes were published are: Fomalbaut, $41^{\circ} 41 \mathrm{~m} .30 \mathrm{sec} .-$; Deneb, $68^{\circ}$ $30 \mathrm{~m} .20 \mathrm{sec} .+;$ Mira, $4^{\circ} 39 \mathrm{~m} .57 \mathrm{sec} .-$ Jupiter retrograded from May 25 to September 22. Inquirer.-We have never witnessed an eclipse of one of Jupiter's satellites by another, and do not think such a phenomenon has ever been recorded, though it is possible.

## Two Crops of Silk a Year.

Touching the reported improvement in the breeding of silkworms, whereby two broods a year are raised, Mr. J. J. Hessler, of Reading, Pa., informs us that it is an old practice, at least one that he has followed for many years. He has been in the business from childhood, be writes, and
has always raised two yields in a year without any trouble.


