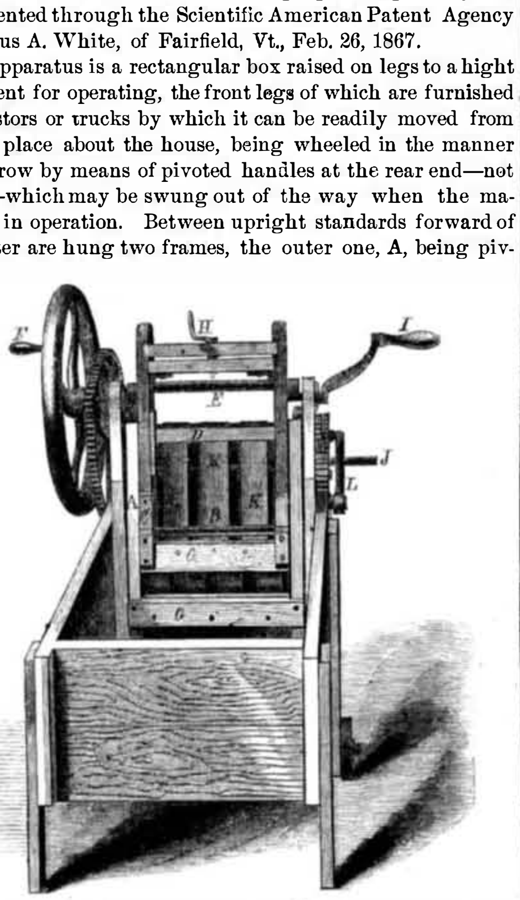
## WHITE'S WASHING MACHINE.

The engraving is a perspective view of a machine which combines the operations of washing and wringing clothes, or which can be used for either of these purposes separately. It was patented through the Scientific American Patent Agency by Cassius A. White, of Fairfield, Vt., Feb. 26, 1867.

The apparatus is a rectangular box raised on legs to a hight convenient for operating, the front legs of which are furnished with castors or trucks by which it can be readily moved from place to place about the house, being wheeled in the manner of a barrow by means of pivoted handles at the rear end—not shown—which may be swung out of the way when the machine is in operation. Between upright standards forward of the center are hung two frames, the outer one, A, being pivoted to the uprights by a round bar, B, which serves also as a guide to the lower portion of the inner frame, C, in performing a vertical sliding motion, by means of slots in its side bars. The bar, D, is secured to the frame, C, and its projecting ends traverse in slots in the side bars of the frame, A. Two motions are given to both these frames by means of the crank shaft, E, which passes through a box in the ends of the cross bar near the top of the frame, C, and is driven by the fly wheel and crank, F; one is a reciprocating motion to the frame, C, and the other a swinging motion to both C and A. The lower cross bars, G, of the frames have faces of rubber, between which the clothes pass and by which they are cleansed from dissolved dirt. These faces of rubber are adjusted near together or apart by a screw, H, which depresses or raises the frame, C, on the shaft, E. These constitute the washing arrangements; but the washing frames may be driven by the crank, I, while the wheel, F, may be placed upon the driving shaft, J, of the wringing rollers, as desired.



These wringing rollers are of the ordinary construction, geared in the usual manner, and driven by the pinion attached to the fly wheel, F, through the medium of the large gear, which is attached to the upper roller. There is a device for passing the clothes as they are washed to the wringer by means of belts, K, which traverse through suitable guides over a series of upper and lower rollers, so arranged that the reciprocating motion of the washing frames delivers the clothes to the belts, by which they are passed between the wringing rollers. The motion of the rollers carrying the conveyor belts is assured by gears connected with the prime mover, F.

Although, from the description, the machine may appear complicated, it is in reality very simple, and there can be no straining or pulling of the clothes. When one portion of a piece needs more rubbing than another it can be done by adjusting the pressure on the rubbers or turning the crank, F, back and forth. The compression of the wringing rollers is regulated by the lever, L, which turns a shaft having a cam on each end to raise the boxes of the lower roller.

### New Species of Swindling.

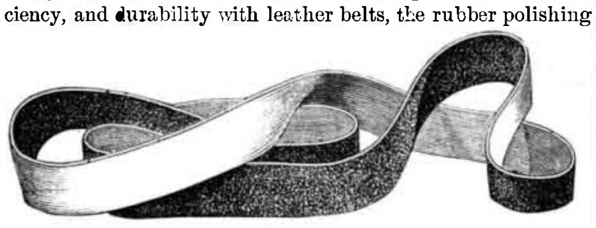
A new and successful kind of swindling has lately commenced, and been carried to such a profitable extent that a party of swindlers who have been brought to trial at Middletown, and Minisink, N. Y., had, as it is supposed, realized $150-000, twenty-five to thirty wagons, and from sixteen to twenty horses, before their arrest.

Proceeding to the country, the swindlers take different towns, and circulate among the farmers, to whom they offer patent rights of articles of ready sale. They represent the retail prices of such articles to be double or treble their cost to manufacture, and to show their confidence in the large profits that the farmers can make, they agree to sell the patent right for the note of the farmer, payable in one year, and that if he, the farmer, does not make profits, they will take back the right free of charge. If the farmer consents the swindler draws up the note, which the farmer signs, and in some cases, the swindler endorses the condition of payment upon its back.

When the parties separate, the swindler trims off the edges of the note with scissors, when the back separates from the front, the back having been neatly fastened to the front paper by mucilage upon the edges. Having thus rendered the note plainly negotiable, the swindler proceeds to the next farmer or merchant and gets it cashed, or gives it in payment for horses, carriages, wagons or other property, and then passes along to victimize another party. We hope the vagabonds will get their deserts.

## ENDLESS RUBBER POLISHING BELT.

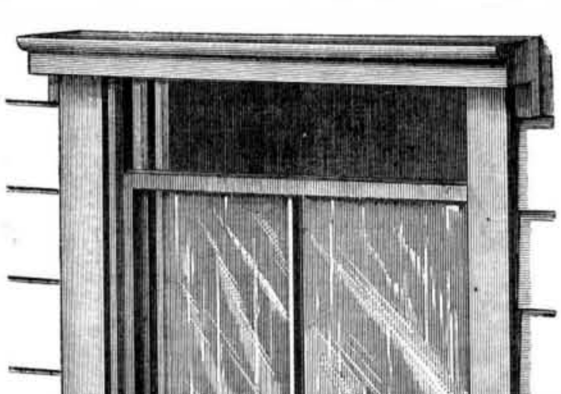
The emery or other polishing material is applied to this belt in the usual way. By the use of this belt a perfectly pliant and true surface is presented to act upon the work, which is so desirable and hard to secure in the use of leather belts. When much worn, it can be placed in water to soak off the old coating without injury, and by simply wiping the belt dry it will be ready to receive a new coating without the liability of the joints coming apart and without waiting for it to dry, as with leather belts. When compared in cost, efficiency, and durability with leather belts, the rubber polishing



belt is found to be far superior. These polishing belts are always perfectly flexible, pliant, and free from unevenness of surface. After repeated coatings of polishing material have been worn down and removed their unyielding property remains perfect, without perceptible change. By their use the work is better performed than by the use of the leather belts. Patented March 26, 1867. All communications should be addressed to Jeremy W. Bliss, No. 240 Main street, Hartford, Conn.

## GRISWOLD'S SUPPORT FOR WINDOW SASHES.

The engraving shows a very simple device for holding the upper sash of a window in any position desired for ventilating a room. Springs and catches are more or less liable to become deranged, and weights, without some fastening, are temptations to children. The arrangement is a series of bars of differing lengths, hinged one to the other, and the lower one hinged to the window sill. These bars are of such a length, width, and thickness that when extended they fill the space in the window frame under the sash in which the sash slides. In the engraving the support is drawn out of the recess to show it, but in use only one or more of the sections are



turned down, while the remainder are in an upright position. When fully extended and in place, these bars are supports to the sash when closed, and when shut down on the sill the sash may be entirely lowered. One of these may be applied to each side of the window, each differing from the other in the lengths of the sections, thus giving a number of grades of hight to the sash. It is so cheaply and easily made and attached that where more elaborate and costly appliances are not readily attainable it will commend itself to all.

It was patented by Mrs. Ellen M. Griswold, Hagerstown, Md., January 22, 1867, who may be addressed for further information relative thereto.

[For the Scientific American.]

## THE COST OF ELECTRIC LIGHT.

The time appears to be near at hand when the electric light will be used for a variety of purposes. It is worth our while to inquire as to its cost. The expense and inconvenience attendant upon the production of electricity upon a large scale has hitherto been an obstacle in the way of using the electric light, except for lecture rooms and a few other purposes. But the recent improvements in the construction of magneto-electric machines and thermo-electric batteries have put it in our power to command the services of this beautiful illuminating agent on any desirable scale of magnitude.

In order to examine the question of cost intelligently, let us refer both electrical and illuminating effects to the common measure of power, viz., the foot-pound per minute. The experiments of Mr. Julius Thomson, of Copenhagen, have shown that the power to maintain the light to that of a standard candle for one minute is equal to the raising of a weight not exceeding thirteen pounds, one foot high in that time. I have arrived at a similar result from a reduction of recorded experiments made by Müller, Ritchie, myself, and others. I am satisfied that, where an electric light of not less than eight hundred to one thousand candles is produced, under proper management, the power required will not greatly exceed 15 foot-pounds per minute per candle. For smaller amounts of light the power required will be greater.

Now let us inquire what amount of electricity is the equivalent of, or is represented by 15 foot-pounds per minute. If 100 feet of No. 18 pure copper wire be coiled into a helix and immersed in a pound of water, and if the ends of this wire be connected to the poles of one cell of the Grove battery (pint cup size as used in telegraphing), the temperature of the water will begin to rise at the rate of 1° F. in $9\frac{1}{2}$ minutes, or 0·105° per minute. Now if the temperature of one pound of water be raised one degree (Fah.) per minute, this effect will be the thermal equivalent of 772 pounds raised one foot high in space per minute; the heating effect then, of our Grove cell upon the water is the equivalent of $0·105\times772=81$ (call it 80) foot-pounds per minute.

It is well known that a galvanic battery will perform its maximum work when the external resistance which it encounters is equal to the internal resistance of the battery. I have found the internal resistance of the pint cup Grove cell to be equal, on the average, to that of 100 feet of pure copper wire, No. 18 size. Hence the maximum external effect of the ordinary Grove cell may be set down as the equivalent of 80 foot-pounds per minute, equal to the production of $80\div15=5\frac{1}{3}$ candle lights. I would not be understood as saying that this amount of light can be produced by a single Grove cell, but that 1,000 cells, if properly arranged, would be capable of evolving somewhat more then 5,000 candle lights from a single lamp.

With sulphuric acid costing $2\frac{1}{2}$ cents, nitric acid 10 cents, zinc 8 cents, and mercury 50 cents per pound, the cost of running 1,000 Grove cells one hour, while doing their maximum work, would be $27.65. This would give for 5,000 candles a cost of about $5\frac{1}{2}$ mills per hour per candle.

The cost of gas light per candle per hour would be about one mill, if gas costs $3.25 per thousand cubic feet, and if one cubic foot per hour gives the light of three candles.

With the Smee battery, carefully managed, the cost of 5,000 candle lights would be about the same as with gas.

Let us now look at the cost of electricity as developed by the magneto-electric machine. The power expended on the machine is consumed in friction, in heating the wires, magnets, etc. On a well built machine which I examined in 1861, 1,100 foot-pounds per minute were required to keep the machine in motion when the circuit was open, and the machine doing no work. But when the circuit was closed 3,200 foot-pounds per minute were required to maintain the same velocity of rotation; nearly all this excess of power (viz., 2,100 foot-pounds) was measured as electricity, about two thirds (say 1,300 foot-pounds) being expended internally, heating the coils and magnets, etc., and the balance, 800 foot-pounds, measured as external useful effect. Had the external resistance been larger, a greater proportion of the expended power would have appeared as useful effect. Suppose, however, that only 800 foot-pounds per minute could be utilized by this machine and used for illuminating purposes. This would be the equivalent of $800\div15=53·33$ candles, and the total power required (including friction, etc.) would be $3{,}200\div53·33=60$, about sixty foot-pounds per minute per candle.

In the vicinity of Boston, power is furnished, per horse-power, at the rate of $180 per year of 313 days of 10 hours each, or at the rate of $\frac{\$180}{313\times10}=\$0·0575$ ($5\frac{3}{4}$ cents) per hour. If only one fourth of this power could be utilized as light, $\frac{33{,}000}{4\times15}=550$ candles would be the equivalent of one horse-power, and would cost $\$0·0575\div550=\$0·0001046$, about one tenth of a mill per hour per candle, being about one tenth the cost of gas light.

Let us for a moment take another view of the matter. The average hourly consumption of coal by a good steam engine may be set down at four pounds per hour per horse-power, $=(33{,}000\times60)\div4=495{,}000$ foot-pounds from one pound of coal. Utilizing as electricity, and thence light, one fourth part of this, we get $495{,}000\div4=123{,}750$ foot-pounds, or as light, $\frac{123{,}750}{15\times60}=137·5$ hour candle lights from one pound of coal, through the agency of the steam engine and the magneto-electric machine.

With the thermo-electric battery I have been able to develop 130,000 foot-pounds of electricity from one pound of coal $=\frac{130{,}000}{15\times60}=144·4=$ to about 144 candle lights.

There is still another point of view worthy our attention. Common gas coal will yield about ten thousand cubic feet of gas per tun. This, at three hour candle lights per cubic foot, would give $(3\times10{,}000)\div2{,}000=15$ hour candle lights per pound of coal. About twenty-five cubic feet of illuminating gas weigh one pound. Hence one pound of gas, after it is made from the coal, will yield a light equal to that of a candle for seventy-five hours. One pound of pure carbon, wholly burned to carbonic acid gas, yields 14,500 units of heat, equal to $772\times14{,}500=11{,}200{,}000$, or $11\frac{1}{5}$ millions of foot-pounds of work: hence, were the total energy of one pound of pure carbon converted into light, it would be equivalent to one candle light for the time of $\frac{11{,}200{,}000}{15\times365\times24\times60}=1\frac{5}{12}$, or one year and five months.