SCIENTIFIC AND PRACTICAL INFORMATION.

FIREPROOF BUILDINGS.

An English architect proposes the building of floors of sheet iron and fire clay tubes, using these as a skeleton construction, and agglomerating the whole into a mass with concrete. This floor, he claims, is a non-conductor of heat and is entirely fireproof, and the hollow tubes can be employed for ventilation or for distributing the heat of a furnace, all over the floor of each room. Experiments on the strength of this flooring are said to have given satisfactory results.

DEXTRIN.

The *Polytechnisches Journal* recommends the preparation of dextrin by mixing 500 parts potato starch, 1,500 parts cold distilled water, and 8 parts pure oxalic acid in a vessel on a water bath, and heating till the mixture does not show the starch reaction when tested with iodine. When this point is reached, the vessel is removed from the water bath, and the liquid neutralized with pure carbonate of lime. Having stood for two days, the liquid should be filtered, and the filtrate evaporated on a water bath till it becomes of a pasty consistency. It can then be removed with a knife and dried into a cake in a warm place. Two hundred and twenty parts of pure dextrin are thus obtained.

STEEL HEADED RAILS.

The steel headed rails have been found, on trial by the engineer of the Reading railroad, Pa., to separate at the welds to an extent of 25 per cent of the rails laid down. It may be predicted that the use of the compound article is likely to be discontinued, especially as the price of steel has been brought so near to that of iron.

Ramie.

At the Exhibition of the Mechanics' Institute in San Francisco last year, the Pacific Ramie Company exhibited a single plant of this new textile. Like all the nettle family, to which it belongs, it makes a very vigorous growth in California soils.

From experiences with the plants now in growth, producers can count on two crops a year, making one ton of clear raw fiber to the acre, worth $350 in England. The plant is perennial and is propagated from roots, one planting lasting for years.

After the first year, the cost of cultivation is small, for the vigorous plant outgrows all weeds—from twenty-five to one hundred stalks springing up from a single root. The bark yields the fiber, which is of great strength, and from which a fine and durable quality of drsss goods, usually interwoven with wool or silk, are manufactured. It takes a permanent dye.

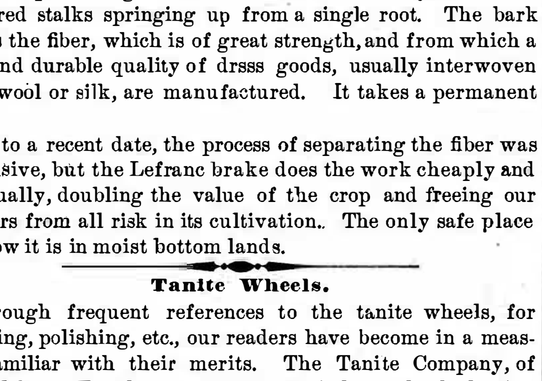
Up to a recent date, the process of separating the fiber was expensive, but the Lefranc brake does the work cheaply and effectually, doubling the value of the crop and freeing our farmers from all risk in its cultivation. The only safe place to grow it is in moist bottom lands.

Tanite Wheels.

Through frequent references to the tanite wheels, for grinding, polishing, etc., our readers have become in a measure familiar with their merits. The Tanite Company, of Stroudsburg, Pa., the manufacturers of these wheels, having ceased the contract system, now make all their own machines and are extending their works to meet the increasing demand for them. A false impression has obtained in some quarters, owing to this change in their method of doing business, that their machines are now put upon the market for the first time. This is not the case. Their merits have long been practically proved by use in many large establishments. The Company have now reduced both the manufacture of the wheels and of the machines to a system, and are employing the best mechanical skill, not only to maintain the character of their work at its present high standard, but to improve it if possible.

CLOTHES LINE REEL.

This is a new construction of the supporting frame of the reel, the frame having attached at one of its ends a dovetail tenon, A, for the purpose of connecting it to a corresponding dovetail mortise made on or attached to the post or building. The opposite end of the frame is provided with a guide, B, for the line as it passes on to or off from the reel. With the reel and frame are combined a friction plate to arrest the motion of the reel, so that, when the line is being drawn out, sufficient resistance will be offered to prevent any portion of it from dragging on the ground and thus becoming soiled. In ordinary reels, this precaution has been overlooked, and it is difficult to draw out the line without having it sag so as to touch the ground.



This invention was patented Nov. 21, 1871, by Mr. Charles H. Staffin, of Boston, Mass.

[For the Scientific American.]

FRICTIONAL GEARING.

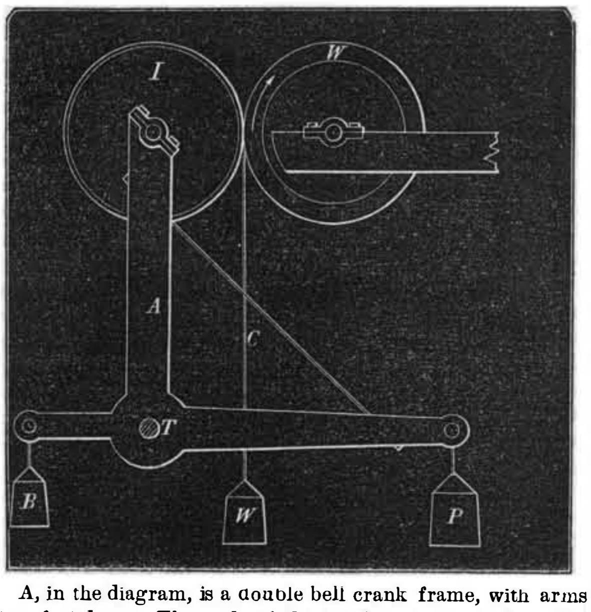
BY E. S. WICKLIN.

NUMBER III.

In the practice of mechanics, we are generally satisfied with an old and familiar principle, without giving ourselves any great trouble to inquire into the comparative degree of its efficiency. But this does not satisfy the requirements of science; nor is it sufficient for the practical mechanic when applied to principles less familiar.

When new modes are introduced as rivals of the old, the question of comparative efficiency is at once raised, and should be met by crucial experiment. But unfortunately for both science and practice, these questions are not generally so met. Too few experiments are made, and those without sufficient care and accuracy to establish principles or remove doubts. No experiment is, however, without some degree of interest, and when all the conditions of a test are known it is not difficult to estimate approximately the value of results. With this view, the conditions and results of a few experiments, made to test the tractive power of smooth-faced friction pulleys, are here given. These experiments, when made, were not meant for publication or for the benefit of science, but to establish rules for private practice. They should be repeated by others before being taken as conclusive.

For the experiments, two pulleys were made in the usual way, one being of wood—soft maple—and the other of iron. Both were accurately and smoothly finished. These pulleys were each seventeen inches in diameter and of six inches face, and were put up as shown in the annexed diagram.



A, in the diagram, is a double bell crank frame, with arms two feet long. The ends of the upright arms receive the bearings for the iron pulley, I. The journals of this pulley are one and a half inches in diameter and three inches long, and run in Babbitt boxes. The frame is hung upon journals or trunnions, t, and balanced by the weight, B. W and P are strong packing boxes, which are filled with scrap iron to the extent required. The face of the pulley, I, is extended beyond the six inches to receive the cord, C, for which purpose a shallow groove is cut in the pulley so as to bring the center of the cord just to the periphery. The driving pulley, W, is put upon a shaft where it may be made to revolve slowly in the direction of the arrow.

It will be seen that the weight in the box, P, upon the horizontal arm will bring the pulleys together with a pressure just equal to the weight. The wooden pulley being in motion, the pressure, when sufficient, will roll the other pulley and raise the weight, W.

The manner of experimenting was to put a given weight upon the cord, C, and, while the driving pulley was moving, to load the box, P, until the weight, W, was carried up. The machinery was then stopped, when the weight would slowly descend, slipping the iron pulley backwards upon the wood. The weight in the pressure box was now noted; the weight was again raised, and the pressure increased sufficiently to hold the weight from slipping down, and the pressure again noted.

In the following table, the figures on the left show the weights raised. The second column gives the pressure just sufficient to bring the weight up; and the third column shows the weight necessary to raise and hold the weight, without slip.

After these experiments were made and twice repeated with the pulleys, the frame, A, was reversed, so that the weight in the pressure box would tend to separate the pulleys. They were then connected by a six inch leather belt, and the experiments repeated with the results given in the fourth and fifth columns of figures.

FRICTION PULLEYS.			BELTED PULLEYS.	
Weight raised	Pressure required to just raise the weight.	Pressure required to raise the weight without slip.	Pressure required to raise the weight.	Pressure required to raise the weight without slip.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
10	29	33	30	34
20	58	65	60	69
30	87	96	91	120
40	115	125	121	159
50	143	154	153	199
60	171	185	183	242
70	199	214	213	247
80	225	244	239	332
90	264	289	278	375
100	295	312	310	419
120	354	387	372	487
140	416	433	442	563
160	477	499	524	652
180	538	561	592	731

It will be seen that, in this test, the traction of the friction wheels was greater than that of the belted pulleys, and considerably more than is usually supposed to be obtained from belts upon pulleys of either wood or iron; and that, while there is a marked falling off in the adhesion of the belt as the work increases, that of the friction increases as the labor becomes greater. Also, that the difference in the pressure required to just do the work, and that necessary to do it without loss or slip, advances in an increasing ratio with the work of the belt; but in the friction it is almost constant throughout the whole range of experiments. The figures applied to the friction wheels are the mean results of repeated experiments; those applied to the belted pulleys are each of a single test. It is not thought that these experiments were sufficient to fully establish all that the figures show; but they were enough to prove that smooth faced wheels possess a much higher tractive power than has been generally supposed. They are given without further deduction or comment.

And now a word as to some of the advantages of friction gearing. Being always arranged with a movable shaft, so that the wheels may be thrown together or apart with the greatest ease, the machine driven by it is started and stopped at any moment while the driving wheel remains in motion. And when stopped, the separation is complete, and may so remain for any number of minutes or months without attention, and may be again started at any moment without the least inconvenience or injury. So slight is the separation required that it is done almost without an effort. And by it, we entirely dispense with the nuisance of loose pulleys, belt shifters, and idle running belts; and with the risk of throwing off and putting on belts. It obviates the delay and labor of shipping and unshipping pinions, and the rattle and bang and frequent breaking of clutches. It is durable, and requires no repairs; it is compact, and economizes room. It does not increase the pressure on journals when the speed is quickened, as is the case with belts running with great velocity, but remains constant at all speeds. And it will transmit any amount of power, from a hundredth part of a horse power to one hundred horse power, with no greater per centage of loss, and with less pressure on journals than can be done by belts.

It is not contended that this style of gearing should supersede the belt. There are hundreds of situations in which nothing can take the place of belts. The ease with which they can be carried in almost in any direction, and to any reasonable distance, will perhaps always place them foremost as a means of transmitting power. But where several machines, that must be run independently of each other and be stopped and started without interference, are driven by the same motor, one connection, at least, should be frictional; and that, if practicable, should be the connection nearest the motor. Where the motions are slow and the occasions for stopping few, this is of less importance; but where the speed is considerable, and the stoppages are frequent, it will be found a very great convenience.

MEASURING THE CLEARNESS OF THE SKY.

John Leslie invented, in the beginning of this century, an apparatus intended to measure the amount of clearness of the sky, and he called it therefore an aethrioscope. It consisted of a differential thermometer, *d t*, which operated as usual by the difference of expansion of the air in two glass globes, thus moving the liquid column, *c*, in the tube connecting them; and this motion is observed on the scale, *s*. One of the globes, *d*, of this thermometer is placed in the focus of a parabolic reflector, *r f*; the other globe, *t*, outside the reflector, has a silvered surface and is highly polished. By those means, Leslie expected to withdraw the globe, *d*, totally from terrestrial radiation, which keeps the globe, *t*, at the constant temperature of the surrounding bodies; and, as he had found that clouds reflect heat and radiate heat, he anticipated that the descent of temperature of the globe, *d*, and the consequent rise of the liquid column on the scale, *s*, would be a direct measure of the clearness of the atmosphere. His anticipations were, however, only partially fulfilled. He found, for instance, that when the sky was cloudy, the liquid column did not move, whether the reflector, *r f*, was covered or not, proving that the radiation from the clouds counterbalanced the radiation of the mirror towards them; but he also found that the amount of cloudiness had very little influence on the instrument, and that even a total absence of clouds showed sometimes little radiation; while at other times with an equally clear sky, very powerful upward radiation manifested itself by the cooling of the bulb, *d*, and the rise of the liquid column. This utterly perplexed him, and he publicly expressed his inability to interpret the indications of his instrument, which, he said, "sometimes under a fine blue sky will indicate a cold of 50°, while, on other days when the sky is equally bright, the effect is scarcely 30°." The instrument was thus useless, for more than half a century; but recently, by investigation concern