Friction Wheels.

So much has been published in mechanical periodicals and manuals about belts and gears that another method of transmitting power appears to be well nigh neglected. But for many purposes where absolute contact is permissible or desirable, the use of friction wheels is an excellent substitute for gears. The advantage which they formerly possessed over gears, that of noiselessness, may no longer exist, for gears are made now to run in perfect silence—that is, gears which are properly cut. But friction wheels have other merits, not the least of which is that the machine they drive can be instantly stopped and started by the slightest separation of their surfaces. These wheels can be used in any position where gears can be run, and may be of bevel or of flat faces. The faces require, however, to be held in close contact while running, as it is upon their friction that their action depends. The face of one of the wheels must be of a somewhat yielding or elastic character, as of leather or wood. Vulcanized rubber and the composition known as "vegetable fiber" are also used. The driving wheel face should always be of the softer material, or it will speedily become worn into hollows. As an instance, let the machine to be driven be suddenly stopped by the slight lifting of the face of the driving wheel. The driving wheel continues to revolve, and when the machine is started again by pressing the two wheels together, the driving wheel will rotate against a single point on the face of the driven wheel before the inertia of the machine can be overcome. In this case, if the driving wheel face is of iron and the face of the driven wheel of leather, the leather will soon be worn into corrugations across its width.

Wheels having faces of the same material also work well together, as two wooden faced wheels, or two of rubber. The wood ought to present the ends of its fibers, the blocks being set radially in a skeleton wheel of iron. Wooden wheels should be kept from moisture, which tends to soften and swell them, rapidly impairing their shape, and rubber wheels should be kept from oil of all kinds, which soon rots this material.

Tanned Fabrics.

The *Chronique Industrielle* states that Mr. H. J. Piron has recently invented a process of rendering fabrics impermeable and preveuting their rotting, without interfering with their softness or increasing their weight. This process he calls "tanning."

It is well known that the bandages that surround the heads of Egyptian mummies are always found to be remarkably well preserved. Now, this is due to the fact that they have been impregnated with some sort of resin. Mr. Piron thought, then, that in order to preserve vegetable fibers it would be necessary to have recourse to the vegetable kingdom, and he therefore turned his researches in this direction. Of all the products that he tried, the one to which he gave preference was that which is extracted from birch bark, and which serves for perfuming Russia leather. When birch bark is distilled there is obtained a light oil, one-quarter of which consists of a peculiar phenol, and this latter is what communicates that well-known agreeable odor to the above-named leather. It results from recent investigations that the green tar of birch contains neither acid nor alkaloid. This tar forms with alcohol a solution which is at first very fluid, but one which when once dried, resinified, becomes proof against the action of alcohol. This solution unites with the most brilliant colors.

As may well be imagined, these qualities permit of its entering thoroughly into every portion of a fabric. Not only does it fill the capillary vessels, but it also covers them with a varnish possessed of great elasticity, unaffected by acids and the corrosive action of sea water, and well enduring changes in temperature. Its density is slight, and it therefore but slightly increases the weight of the fabric prepared with it. This varnish is not only inexpensive, but satisfies all the conditions required of such a material; and the aromatic odor that it possesses has the merit likewise of keeping out insects. As for microscopic vegetations, such as mildews and moulds, these cannot develop in the prepared fabric, inasmuch as it is impossible for air or water to gain access to the fibers. Mr. Piron's invention is applicable to all fabrics made of vegetable fibers, as well as to rope, cordage, etc.

ACCORDING to the *Milling World*, sackcloth or canvas can be made as impervious to moisture as leather, by steeping it in a decoction of one pound of oak bark with fourteen pounds of boiling water. This quantity is sufficient for eight yards of stuff. The cloth has to soak twenty-four hours, when it is taken out, passed through running water, and hung up to dry. The flax and hemp fibers, in absorbing the tannin, are at the same time better fitted to resist wear.

THE COLUMBIA TRICYCLE.

The mechanical refinements applied in the construction of bicycles have not only created a demand for the tricycle, but have brought out the adequate means for supplying it; and it is a matter of gratification that Americans have contributed as much to the structure of the modern tricycle as they did to its precursor.

We find the latest and best development of tricycle in the Columbia of American manufacture. Two large driving and supporting wheels abreast, one smaller steadying and steering wheel in front, rotary crank action and chain transmitting devices for propelling mechanism, equal communication of power to both driving wheels, with means for differentiating it for curves, adaptation for position for driving by means of changing the weight of the rider from one point to another, in a natural and easy motion; adjustability of seat and handles; tubular metallic construction of frame, and steel suspension wheels; round rubber tires, and polygonal pedals; these are some of the necessary points in the true type of a tricycle.

The new Columbia tricycle is the product of the largest and oldest manufacturer, the Pope Manufacturing Company, of Boston. It is made on the interchangeable system. Rotary pedal action has been adopted, because it is best, mechanically and physiologically, for easy and effective propulsion.

The position of the crank shaft, with reference to the axle of the driving wheels and to the seat, and the position of the pedals on the crank shaft, are such as both to preserve the proper balance or poise of machine and rider and to secure the advantage of driving by weight of rider more than by muscular thrust. The 50-inch driving wheels roll over obstructions with ease, and also give a certain dignity of appearance to the machine and rider, while the application of the fine chain gear is such as to increase the leverage. The Columbia tricycle is a genuine "double driver," the propulsion operating evenly and directly upon both driving wheels. This result is obtained by the very ingenious compensating gear, which consists in mounting the two driving wheels independently, and connecting them on their axles by small toothed wheels (Fig. 2), so arranged and operating in connection with the chain wheel as to distribute the power to the two wheels in proportion to the resistance, evenly on a smooth, straight course, more to the outer wheel on a curve when it travels faster than the other and more distance, and more to the trigged wheel where obstruction is unequal, and the whole is completely automatic.

The frame and general construction of this tricycle is well shown in the large cut, the frame being of fine steel tubing and very rigid, the rack and pinion front steering mechanism allowing the track to be visible for all three wheels. The seat is adjustable, both fore and aft, and vertically, and the handles are inclined, so that the pull upon them is in the line of the rods, and the position of the hands is very comfortable and natural. The wheels are made with good width of hub and flange, a large number of spokes, and with deep and rigid rims. The tires are moulded in endless rings of the best rubber, and will show the earned reputation of Columbia tires for never comiug loose.

One of the most ingenious and effective parts of this new tricycle is a friction brake, applied in the form of two disks to the chain wheel, with an arrangement by which almost unlimited pressure can be brought to bear, and the machine brought to a halt on the steepest incline. The Columbia ball bearing (Figs. 3 and 4) has done as much as any other one feature of construction to give the machines of this manufacture their reputation. There are two sets on the main shaft, two sets on the crank shaft, one set in the front wheel, and two sets in each pedal, so that however the weight or the speed may be distributed, friction is reduced to a minimum. Swivel or compensating bearing box cases are provided for these bearings, so that the bearings are always true.

This tricycle is constructed for general use, under all sorts of circumstances, on all sorts of roads, by ladies and gentlemen, by the light or heavy, and for taking a reasonable amount of baggage. It is a comparatively light machine, as light as it seems practicable to make without leaving out desirable things, and saving metal where it is needed, and it is exceptionally easy running.

Fig. 2.

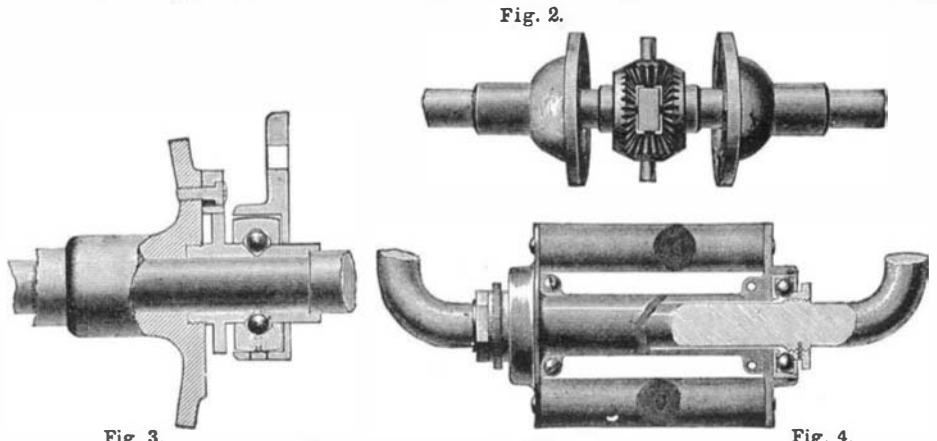

Fig. 3. Fig. 4.

THE COLUMBIA TRICYCLE.

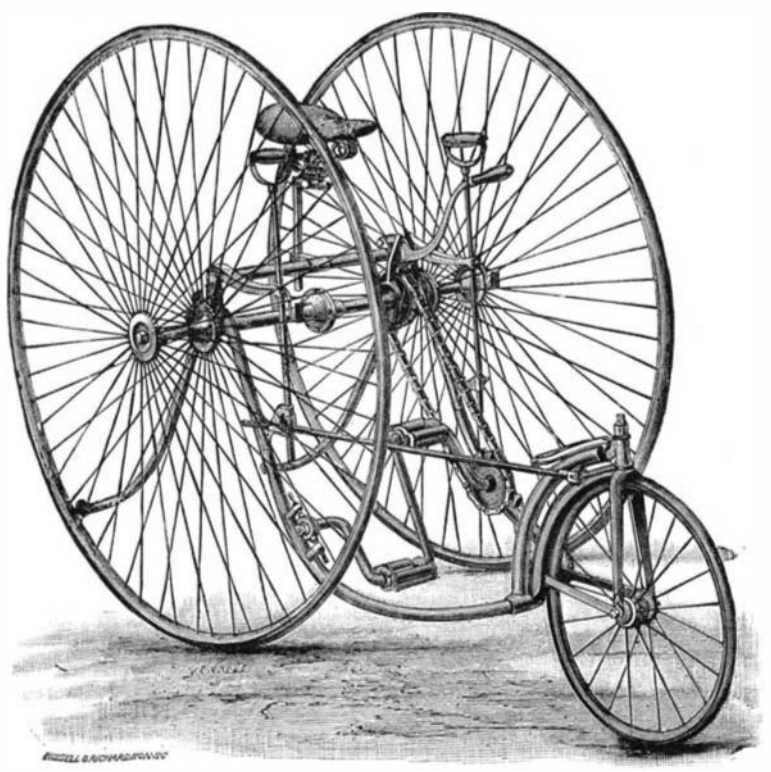

Fig. 1.—THE COLUMBIA TRICYCLE.

Roofing-linen.

According to the *Deutsche Bauzeitung*, a new covering material called "roofing-linen" has been introduced, which is about half the thickness of good *carton-pierre*, and consists of a layer of coarse linen which lies between two layers of thin roll-paper. The cohesion of the three layers is effected by an asphalt composition of special make, called "roofing-paint." It is stated that this paint should be freely applied to roofs immediately after their completion, and again about six weeks afterwards. This operation should, it would seem, be repeated every few years. The linen costs about 10*d.* to 11*d.* per square yard, and the paint 10*s.* to 11*s.* per cwt. Although this new method appears to have points which deserve commendation, a real estimate of its value cannot be formed until the material has been exposed to the test of several years' use.

Mechanics' Apprentices.

In an article—"Apprentices to Mechanical Trades"—in our issue of May 19, it was stated that the facts show the popular opinion that learning mechanical trades had fallen into disfavor with our boys to be erroneous, and the experience of a single establishment was given to substantiate that view. That establishment is the Pratt & Whitney Company, Hartford, Conn. In a subsequent conversation with Mr. F. A. Pratt, the president of the company, he stated that he employs as many apprentices as can be usefully occupied, about 70 or 80 in a total force of nearly 700 hands, and in a large proportion of cases the apprentices endeavor to be retained in employment at the end of their apprenticeship. Mr. Pratt believes it to be profitable and economical for the company to educate their own workmen, and not only are their "day hands" largely from their own apprentices, but a large proportion of the contractors also. The applicants for apprenticeships come from all parts of the country, are frequently high school graduates, or from the Sheffield Scientific School, New Haven, and the applications are so numerous that the company can take their choice of boys with good school educations and proper, manly habits.

Alluding to the article in a letter, Mr. Robert Allison, proprietor of the Franklin Iron Works, Port Carbon, Pa., gives some facts relative to his own practice in regard to apprentices, which is similar to that of the Pratt & Whitney Company. With a total force of from 75 to 100, Mr. Allison educates from nine to eleven apprentices, who are taken for three and a half years on the terms of 50 cents per day for the first year, 60 cents for the second year, 70 cents for the third, and 80 cents for the last six months. Twenty-five cents per week is retained from the wages as a bond for faithful service to the end of the term, and is returned to the apprentice in its accumulated form at that time. Lost time, except holidays, may be deducted, at the pleasure of the employer. A brief probation is a preliminary to the final contract of apprenticeship, to ascertain the fitness of the candidate. Under these conditions the applications are thirty or forty to one reception, which shows that the desire to learn trades has not died out among American youth.

FRENCH silk manufacturers are reported to be very hopeful as to the capabilities of a big spider lately discovered in Africa, which weaves a yellow web of great strength and elasticity.