FOUR POINTS

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#### Power==and All About It

First of a Series of Articles to Make Clear to the Lay Reader a Very Technical Subject.

extraordinary advance of the present

away from a magnet

Work is the product of force, and ne distance thru which it acts. A force cannot produce power unles t moves something. A clock weight does no work when the clock is not

done by the weight in falling is times 4 equals 20 foot pounds. A force may act forever without costing anything, but as soon as it begins to produce work then some-

Force is that which tends to produce motion. When a gun is fired certain forces are developed which tend to produce motion in the bullet. The force of gravity tends to draw all things to the earth. When we are lifted to the certain forces are developed which tend to produce motion in the bullet. The force of gravity tends to draw all its store of energy has gone. It all its store of energy has gone. It all its store of energy has gone. It all its store of energy has gone in the cook is started and would do in were 100 per astonishing. One horse pump 10,000 feet high. It lifted to the top of a building in an gravity is not a source of energy, but feet high. It would raise a ton weight elevator, the force of gravity tending only a storage battery, which returns elevator, the force of gravity tending to draw us down is overcome by the force transmitted thru the ropes of construct perpetual-motion machines the elevator tending to draw us up.

If the rope breaks, the force of gravity being then unopposed quickly. If the rope breaks, the force of gravity being then unopposed, quickly generates rapid motion earthwards.

Pressure, weight, magnetic attraction and repulsion are all manifestations by which we recognize force, and the unit by which we measure the extent of a few weight of a few would require 5 multiplied by the transport of a few would require 5 multiplied by the force of gravity must, therefore of gravity must, therefore of gravity must, therefore, and y the lorce of gravity must, therefore, and y t

twice the amount of the lift.

expressed in foot pounds, the amount of the force may be as large, or as small as is convenient, provided that

that the product of the two factors re-mains constant and equal to the amount of work to be done. ower of a machine is the meas-

ure of the work which it is able to do in a given time. It is expressed as foot pounds per minute, or foot pounds per second.

If one motor could do 1000 foot pounds of work is a county of the count

pounds of work in one second and another motor required two seconds o do the same amount of to do the same amount of work it is quite evident that the first-mentioned has twice the power of the second.

It requires a certain amount It requires a certain amount of work to raise one million gallons of water from the lake to the reservoir. A very small engine could pump this amount if it were given time enough, but if a million gallons must be raised every half-hour then engines of great power must be used.

great power must be used.

There is no time factor in work or There is no time factor in work or energy, but in power time is considered, as well as force and distance. Power is expressed as force multiplied by distance, divided by time, thus:

Force multiplied by distance, divided by time equals power.

Horse Power.

When the steam engine first came into use it was applied to doing work that had been previously done by horses. It had been found that a good horse could do work at the rate of 22,000 foot pounds per minute. Watt, to make sure of good measure, designed his engines so that they would do 50 per cent. more, or 33,000 foot pounds per minute for each rated horse-pow-This has been the standard horse

power ever since.

A weight of 33,000 pounds raised one foot high or 330 pounds 100 ft. high, or 3300 lbs 10 ft. high in one minute re-

quires one horse-power.

If we have an elevator and load weighing 6600 pounds raised 60 feet in 2 minutes we know that the number of foot pounds of work done per minute is 6600 multiplied by 60 and divided by 2 equals 198,000 foot pounds per min. And we find the horse-power by dividing the total number of foot pounds per minute by the number of foot pounds per minute in the horsepower, 33,000, i. e. 198,000 by 33,000, which gives 6 h. p.

lization lies in the application of natural forces in the place of human or animal labor in the manufacture and transportation of commercial products.

All processes of manufacture, the production of light and heat, the driving of machinery and the running of means for transportation require power.

Costing anything, but as soon as it begins to produce work then something begins to be used up. When the clock was wound up the muscle of the man who wound it put into the weight 20-foot pounds of work or enconditions. The friction of ropes, pulleys and gearing would probably amount to two or three horse power at the top, its energy remained latent at full value. While six horse power The amount of work a horse power would do in ten hours if our machines were 100 per cent. efficient, is something

> One horse power in ten hours would pump 10,000 gallons of water nearly 200 feet high, or pump 100,000 gallons 20 While the minute is generally the unit

the unit by which we measure the extent of a force is the pound. A 10pound weight requires a force of 10
pounds to lift it, or a bar of iron may require a pull of 50 pounds to pull it travel of the force equal to the require a pull of 50 pounds to pull it travel of the force equal to the travel of the force equal to the travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated that the watt in electric travel of the force equal to the it may be stated to the travel of the force equal to the it may be well to touch on the comment. travel of the force equal to the lift. But if we were to use a two to one reduction block the force need be only one-half as much, or 1000 pounds, but the distance traveled would be twice the amount of the lift. To do any given amount of work.

To do any given amount of work, small quantity, for commercial surposes small quantity, for commercial surposes of the force may be as large or as for the unit. The prefix "kilo" is used on the chain. If the clock weight weighs 5 pounds, and it has a range of the force may be as large or as by the French to denote 1000 throut their whole system of measurement, kilo-gram, meaning 1000 grams; kilo-meter, 1000 meters, etc.

The equivalent of a horse power in their whole system of a horse power in the control of the force may be as large or as for the unit. The prefix the force may be as large or as for the unit. The prefix the first should be as large or as for the un

electricity is 746 watts, hence a kilowatt is equivalent to one and one-third horse The Insurance Law power. This does not mean that when you pay for a kilowatt of current you have received one and ore-third horse power from your motor. It means that the motor has used up one and one-third horse power of current; but

H. Addison Johnston.

The next article of the series will be

NATURAL HISTORY FOR

The horse usually has four legs and a tall. Naturalists have not yet discovered

ment of Carada or any other country to correcus in this regard, but the investigations made by our late lamened ing new members into our Society.

If the proposed law should become leader, Dr. Oronbyatekha, the greatest correction of the cause of Fraternity has cover developed, satisfied him in 1993 that the perpetuity of our Society demanded the currection of our Society demanded in that currection of our Society demanded in the perpetuity of our Society demanded in the proposed law would cut them off the currection of the law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our Society demanded in the proposed law would cut them off the perpetuity of our society demanded in the proposed law would not if the proposed law strength, is sometimes called the arm of the law. It is to be found at most street the law. It is to be found at most street the law. It is to be found at most street the law. It is to be found at most street the law. It is to be found at most street the law. It is to be found at most street the law. It is to be found at most street the law. It is to be found at m

(Monday), after having an extra week of Christmas holidays.

Presbyterian—
Rev. W. G. Back of the Eglinton
Presbyterian Church will preach anniversary services at Maple to-day, to which church he has been appointed

Sunday school at 3 p.m.

At the Davisville Methodist Church
the supply minister, Rev. J. W. Wilkinthe Baptist Church, Annette-street, the son, is still taking charge of the pas- Alabama The Cat.

This four-footed quadruped is found in pastor, Rev. Thomas Cowan, will to that congregation, owing to the long and severe illness of the preach at both services to-morrow, a free state in pack-gardens and else-preach at both services to-morrow, pastor, Rev. Newton Hill, who, how-pastor, Rev. Newton Hill Rev. New

> At the Zion Baptist Church, the pas-

DEER PARK. -Christ Church-

The curate of Christ Church, Rev. E. R. Ladbrook, will preach at 11 a.m., and Texas ....

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Thatt brown man propose & siss sed serch Mee thenn muther sed u no This is leep yeer thare is yure q whatt? is A q unkel jack

deer unkel jack u shood Hav heerd siss, Kidding mister brown shee sed wry? doo u think I swoar of kandy mister brown charley I Meen mister brown Hee sed I dunno maybe Beaws itt hurts yure teeth

Word has been received in the city by relatives of Mrs. Polson, widow of the late Frank B. Polson, of the death of her little son, Hugh Gordon, which of her little son, Hugh Gordon, which evening, for which program Herb Wadwere to have commenced on Monday, when Cham.

# The Greatest Sale

## Toronto's History

### Thousands take advantage of the enormous price reductions

HAT a genuine sale is appreciated by the buying public was emphasized at the opening of our doors at 8 Saturday morning. We can truthfully say it is the hit of our career, PLEASED CUSTOMERS ... Pleased, because they weren't "fooled" -- P. T. Barnum said the people liked to be humbugged --- we don't believe it. The Great Sale will continue all this week. Come Monday if possible, Tuesday, Wednesday, Thursday, or any day you can get here. Something doing every day. If we used every page in this paper it would not tell of all the wonderful bargains. Get price lists at store for further particulars.

DOORS OPEN 8 A.M.

CLOSE 6 P.M.

Square

Rounded Corner

At

York County and Suburbs

World subscribers in Toronto Juncion are requested to register com- Bethesda to-day. plaints of carelessness or late delivery the probabilities are that it has not delivered to your factory more than one horse power, owing to losses within the motor itself.

Toronto. Intending advertisers may also transact business at the losses within the motor itself. at The World Branch Office, 22 Duntion Office.

TORONTO JUNCTION.

TORONTO JUNCTION, Jan. 11.-In Since I have had an opportunity to ciety by their own personal efforts at examine and consider the portion of the they have by their money contributions, and consider the portion of the Mortuary Fund.

Insurance Bill recently introduced into Insurance Bill recently introduced into to the Mortuary Fund.

In justice, our old members are entired to all benefits that may accrue that our Society must, and that all Fraternal Society must, and that all Fraternal Society should actively any from the lower mortality rate resulting from the introduction of new members are entired to all benefits that may accrue that our Society must, and that all from the introduction of new members are entired. There will also be a special services will also be a spec Rev. Dr. Pidgeon will preach at both

services to-morrow in Victoria Presbyterian Church. At the Annette-street Methodis Church to-morrow evening, Rev. Dr. Hazelwood will speak on the subject

Our Society has shown a deep interest to the most vindicitive representative of the most vindicitive representative of the most vindicitive representative of the so-called old-line system, it could not in my opinion, have been more effectively performed than it would be by the formance of its permanence.

We were the pioneers in this movement, and at a meeting of our Suprement have been from the cistative been been seed that its legs are chiefly used for kicking. Good horses, when they die reap-the provisions of the proposed than it would be by the provisions of the proposed than it would be by the provisions of the proposed than it would be by the provisions of the proposed than it would be by the provisions of the proposed than it would be by the provisions of the proposed than it would be by the provisions of the proposed than it would be by the provisions of the proposed than it was not need to be added to the proposed than it would be by the Royal that the proposed than it would be by the Royal that the proposed than it would be by the Royal that the proposed than it was lemonstrated the fact fact the purpose of the latter adernment, but the purpose of the purpose of the latter adernment, but the purpose of the purpose of the latter adernment, but the purpose of the latter adernment, but the purpose of the purpose of the purpose of the latter adernment, but the purpose of the latter adernment, but the purpose of the purpose of the latter adernment, but the purpose of the purpose of the latter adernment, but the purpose of the latter adernment, but the purpose of the purpose of the latter adernment, but the purpose of the purpose of the purpose of the latter adernment, but the fact fact fact fact its tall and the purpose of t

Sisters Harris and Warren; herald,

MINERAL PRODUCTION Less Gold and More Silver, Mint Di-

rector Estimates. WASHINGTON, Jan. 4.-The production moderator till a permanent pastor has of gold in the United States fell off \$4,753,-401 in 1907, as against 1906. whereas the Rev. George Little of Toronto will oc-

Rev. George Little of Toronto will occupy Mr. Back's pulpit at Eglinton and Bethesda to-day.

Sunday school, at 3 p.m.

Next Wednesday evening the annual congregational meeting will be held.

Methodist—

The pastor of the Eglinton Methodist Church, Rev. W. Wellwood, will occupy his own pulpit to-day, both at the 11 a.m. and 7 p.m. services. For the evening sermon his subject will be, "Robbing a Bird's Nest."

Sunday school at 3 p.m.

At the Davisville Methodist Church At the Davisville Methodist Church At the Davisville Methodist Church and Davisville Methodist Church At the Davisville Methodist Church and Davisville Methodist Church At the Davisville Methodist Church At Silver Methodist Church Church At the Davisville Methodist Church At the Davis At the At the At the At the

Oregon ..... Porto Rico .

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WANTED Partner, with \$5000, to take half interest in formation of a company to undertake the manufacturing of furniture plushes. Practical end of venture to be supplied by advertisef. Apply Box 94, World.

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Totals .......\$89,620,399 \$,37,571,580 The commercial value of fine silver in

1906 averaged about 68 cents an ounce, and in 1907 about 66 cents an ounce. The pro-duction of fine silver in 1906 was 56,617,900

Silver (Kennobee Journal.)

There are 15,000 cords of wood at a modest estimate going to rot in York 98,051
1,712,272 agent for The Biddeford Record, who 186 the portable mills in the shape of tops. 4,605,231 It is not cut up, because it would cost incre than it is worth to haul it to market, so it lies there rotting on lots stripped by the portable mills. Mr. Merserve 54,655,265 ages that he was offered as much as be wanted of oak, maple and beech tops for 7,013 30 cents a cord. In some cases, where 54,953 the stripped lots are near enough to make it worth while, farmers are sawing 79 3 make it worth while, farmers are saving79 their own wood and cutting up this re18 fuse for fuel, paying 25 cents a cord. In
16,633 one lot over in Lyman he estimates that
16,633 there are 500 cords of good wood going to
202,979 waste.

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vent you from having warm clothing, when you can arrange credit terms with me to supply you. It means only a small payment each week, and now that money's "The Credit Clothler" scarce and so many are out of work, my credit plan is a big help to many. Come and get what you want now-pay later.

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Suits or Overcoats made to your measure, fit guaranteed, best workman-hip and materials, \$13.50, \$18.50,

LADIES' DEPT. Coals \$7.50 to \$16.50 Suits Special line of stylish Suits, in Broadcloths, Tweeds and Cheviots, bought to sell \$16.50 at \$18 to \$2), to clear at

Skirts \$2.50 to \$10 

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NCING KAPLAN all-room, Fancy, Group ational Dances. Saturday two to five way Hall, 450 Spadina ry evening 7 to 10 o'clock ed to be extravagant agne at their entersensible man, howng himself with a sup-

iter, can give his guests

radnor water to mix h or rye whiskey.

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n Saturday Evening n Greek Theatre PPEARING A DUNCED LATER

50c and 75c. Course nd \$6.00. PLAN NOW SCRIBERS AT GER-MAN'S PIANO SAL-STREET, and at MAR-N SCHOOL. Plans 1908. Recital's begin

and anything else it can pick up, and has a weakness for pumpkin ple and burglars.

The action was taken coley for the runpose of providing for the future.

The action was taken coley for the runpose of providing for the future.

It is true that the premium rates as esters would simply have to seek a affecting the then membership were not placed and that it consciouses the form 1993 and since but this is a method of the promosel 1 we would not not threat the promose of the promosel 1 we have a led of the promosel 1 we have a led for a coherence of out of the promosel 1 we have a led for a coherence of out the promose of the promosel 1 we have a led for a coherence of out the form 1 we was a weakness for pumpkin ple and burglars.

NORTH TORONTO.

NORTH TORONTO.

NORTH TORONTO.

The following are the church services for the northern suburb for to-day and hout the pre-listence. From the standard law to the lead, it seldom, if ever, attains to the lead.

From the standard was would be not the promosel 1 we will be celebrated at the week.

From the standard was would will be celebrated at the well in the contribution of the promosel 1 we would room a was promosed to the promosel 1 we will be celebrated at the well in the contribution of the promose 1 we would room a was promosed to the well.

From the standard law would would would would would not be promosed to the promose 1 we would not be a well as a mean of the promose 1 we well as the only one that forms any content of the promose 1 we well as the only one that forms any content in the promose 1 we well as the only one that forms any content in the promose 1 we well as t

This latter problem is a most actions minion of Canada to decide mon the me, and must be solved by deing no most affective stens that may be taken needless injury to our old members— to resist the passage of this law, which many of whom have contributed quite we consider both ill-advised and deas much to the building up of our So- structive.

Elliott G. Stevenson, S.C.R.

Will Be Opposed by the I.O.F.

So Declares S. C. R. Stevenson.

The Attitude of the I.O. F. toward the pending Insurance Bill

is indicated by the following statement given out

last evening at I. O. F. headquarters by

Fraternal Societies should, actively oppose the passage of the same.

As concerns the Independent Order of tallity rate to be experienced by the Society—that is, from the mortal tallity rate to be experienced by the Society—that is supposed to have nine lives, and when it has run the gamut of these lits coat is made into seal-skin jackets. As concerns the Independent Order of Foresters, the provisions affecting it would not only seriously embarrass, but practically destroy it.

Our Society has shown a deep interest the construction of the con

was not necessary for the Parlia- at least one-quarter of a million dollars ment of Carada or any other country to of which is expended annually in bring-coerce us in this regard, but the investi- ing new members into our Society.

The Policeman.
This animal, or

the benefit of her health.

of her little son, Hugh Gordon, which occurred at Berumda, where Mrs. Polson had gone to spend the winter for the benefit of her health.

evening, for which program her wad will not open till Tuesday, when Chambar will be responsible.

The day school of St. Clement's bers and Morgan will be placed on trial the benefit of her health.