specifications will be given to those asking for them till May 18, and will be returned to the architect with the tender.—Building permits have been issued as follows: Four houses for Vve. Drolet, St. Joseph street; P. Belanger, contractor. Five houses for J. Vaillancourt, 334 St. Joseph street; Mr. Guichereau, contractor. Seven houses for Mr. Bouchard, 241 St. Valier; N. Cauchon, contractor. Nine houses for D. Broomer, Ste. Madeline street, P. Breton, contractor. Nine houses for P. B. Dumoulin, 71 d'Auteuil street; E. Cote, contractor. Eleven houses for Mr. Robitaille, Franklin and Sauvageau streets; F. X. Blouin, contractor Eleven houses for Mr Baller, St. John street; Ch. Cote & Cie, contractors.

FIRES.

The fires of the past week are as follows: Woolen factory of Mr E. Cantin, Warwick, Que.; loss $15,000. C.P.R. dining hall, Moosejaw, N.W.T., totally destroyed. —Residence and barn of Rev. P. Concoran, La Salle, Ont.; loss $5 000.—J. H. Conner's washing machine factory, Sussex street, Ottawa, Ont.; loss $8,000.—Creaser House Hotel, at Dunchurch, Ont.—James Kerr's saw mill, at Havelock, Ont.; loss $4,000.—Auxiliary building in connection with the General Hospital at St. Hyacinthe, Que., destroyed. loss $30,000.

CONTRACTS AWARDED.

BROCKVILLE, ONT.—Sewer pipe: E. D. Stacey, contractor.

CORINTH, ONT. — Methodist parsonage: William Andrews, Bayham, contractor.

BATHURST, ONT.—New school building: James Powell, contractor.

WINDSOR MILLS, N.S.—New Bridge: Dominion Bridge Co., contractors.

BARRIE, ONT.—Roofing town hall: Douglas Bros., Toronto, contractors.

TRAFALGAR, ONT. — Methodist church: John Somerville, Milton, contractor.

GALT, ONT.—Mill building for C. Turnbull Co.: Kribs & Co., Hespeler, contractors.

NIAGARA FALLS, ONT.—Heating Y.M.C.A. building: James Smart Mfg. Co., contractors.

HARRISTON, ONT.—Mr. George W. Gray has prepared and awarded contracts as follows. Township hall and court house to be built at Lion's Head—stone basement, frame superstructure; residence for Mr. John Noble, township of Maryborough—brick, hot air and plumbing; residence for Mr. F. B. Dale, Harriston—to be two storey brick, with latest improvements.

TORONTO, ONT.—Tuck pointing, Municipal Buildings: William Adams, price $3,400.—Pavement contracts: Asphalt, Wilcox street, St. George to Robert, Constructing & Paving Co., $8,494; asphalt, Howard street, Parliament to Sherbourne, Constructing & Paving Co., $9,727; brick, Elm avenue and Glen road, Sherbourne to Hill, Dominion Paving & Constructing Co., $1,737; brick, Winchester street, Parliament to Ontario, Dominion Paving & Constructing Co., $3,117.—J. Francis Brown, architect, has let the masonry contract of the Firstbrook building to Richard Chalkley, and the carpenter work to Young & Co. Other trades will be let this week.—Heating apparatus, Christian Science church: James Smart Mfg. Co., contractors.

BIDS.

STRATFORD, ONT.—Bids were received by the city council for the construction of sewers on Cambria and Well streets as follows: For Cambria street system—Clark & Connelly, Toronto, $5,968.30; Kennedy & Wade, Owen Sound, $7,958.29; W. F. Grant & Co., Toronto, $6,029.52; E. A. Cawsey, $5,772.79; Wm. Garson, St. Catharines, $5,688.29; Pigeon & Crowley, Sebringville, $6,608.21; Wm. Stevenson, Port Huron, $5,425.85; J. H. McKnight, Toronto, $5,930.69. For Well street—Clark & Connelly, Toronto, $681.88; Kennedy & Wade, Owen Sound, $899.26; W. F. Grant & Co., Toronto, $1,223.53; E. A. Cawsey, $678.78; Wm. Garson, St. Catharines, $749.92; Pigeon & Crowley, Sebringville, $775.24; J. H. McKnight, Toronto, $756.64.

MUNICIPAL DEPARTMENT

THE SAVING EFFECTED BY GOOD ROADS.*

I said in the commencement of this address that many millions sterling—I might say between one and two hundred millions—might be expended with great profit on the construction of new roads, and the improvement and proper maintenance of our high roads. It is necessary to substantiate this by reference to fundamental facts. It is an indisputable fact that the number of horses required, or the distance which horses can haul a load is inversely proportional to the road resistance, and it is equally well known that speed and load taken together decrease more rapidly than the increase of tractive resistance when that is excessive. On the best surfaces the draught will vary from 25lb. to 30lb. per ton on the level. On good well-made macadam roads it may be from 38lb. to 60lb. per ton on the level. On broken stone road it rises to 90lb. to 100lb.; and on gravel road to 140lb. per ton on the level. On tramrails it varies from 15lb. to 40lb. per ton of load; and on railways from 6lb. to 12lb. per ton. Thus the resistance on good ordinary roads, which might be in use everywhere, is less than one-third that which is met with on common roads everywhere; or, again, it is from three to six times that it need be for the heavier vehicles, if wheelways were laid and properly maintained. Hence horses can haul on an asphalt road double the load they can on macadam, or they can continue at work much longer, or 10 horses will do instead of from 15 to 20. Even on a grooved tramway, with its high resistance compared with a flat rail, two horses will haul from 60 to 100 per cent. more load than the same horses can with equal fatigue haul an omnibus on an average macadam road. This sort of difference obtains with reference to every kind of haulage done on common roads, and I want to point out that it is not the omnibus or other ordinary vehicle owners who suffer this loss it is the public; and the removal of all this would be to the public advantage in lesser fares, lower freights, greater distance carried for same fares, and great saving of time.

An equally or more important question is that of traction resistance on gradients. The increase in the power required to haul a load up a hill is directly proportional to the angle of inclination from the horizontal, and hence on a hill of 1 in 20, a very common gradient, the hauling power jumps from the average, on a good macadam road, of, say, 45lb. per ton to 45lb. + 125lb., or a total of 157lb. instead of 45lb. Bad as this is, it is insignificant as compared with the pull required on a gradient of 1 in 10 to 1 in 8, not at all infrequently met with. On 1 in 10 the hauling power required becomes 269lb. instead of 45lb., or no less than six times the power employed on the average nearly level road. It is to meet this heavy demand for power that two or three horses have often to be sent with a load which, but for the two or three short lengths of steep hill, could be taken by one horse, and it makes it necessary to put on a motor vehicle, boiler and engine power of from 12 h.p. to 16 h.p., where from 3 h.p. to 4 h.p. ought to be sufficient.

There are, it is estimated, in this country over a million horses. I will assume that 500,000 draught horses are at work. Each of these horses will cost for food alone and stabling about £30 per year, and I think I am entitled to assume, from what I have already pointed out, that at least one-third this number of horses could be dispensed with, or that the existing number of horses might be enabled to effect at least 33 per cent. more transport than they do at the present time. Ignoring for the minute the future increase in road traffic which must be provided for, this proves that about 170,000 horses less than the number now employed would need to be kept and fed. If we take only the cost of keep of these horses, and for the present say nothing of the reduced destruction of roads which would result from the removal of these horses, a saving of £30 per year per horse, or a total of £5,100,000, would be effected. Now this sum capitalized at 3 per cent. is £170,000,000 sterling, and enormous as this sum appears, there is no doubt that such a sum might profitably be invested in the roads of Great Britain if we consider the advantages to be derived from mechanical traction. It may, however, be reasonably assumed that the road traffic will grow so that even a larger sum than this may represent the possible saving. It is, in fact, the great advantages to be derived from mechanical road transport which will make road improvement desirable, and it is useless to expect either the proper development of mechanical traction, or the possible improvement in the many kinds of ordinary road vehicles, without a corresponding improvement in the roads upon which they are to run. The better the roads, the less destructive will be the vehicles and their tyres; for exactly the same reason as that which explains the wearing of thin light boots on the clean dry pavements of a well-kept city, or perhaps in a drawing room, by the man who finds it necessary to wear hob-nail boots on the rough roads of the country.

From a careful consideration of these points I am satisfied that at least one horse in every nine or ten could be saved, and that every draught horse in use could earn from £5 to £10 per year more. If, then, the saving of a horse only represents the cost of its keep, or, say, £30 per year, and if only 2s. per week, or £5 per year, be taken as the greater average earning capacity of each horse, we have a saving per year on 500,000 horses of £1,500,000 for reduced horse keep, and of £5 per year on 450,000 horses, or £2,250,000, a total saving of £3,750,000 per year. This sum, capitalized at 3 per cent., the rate at which the Government or the country authorities could borrow money, is no less than £133,000,000. Thus, after basing every gain on the lowest estimate, it is obvious that an enormous sum could be usefully employed in the improvement of our national ways of communication, and that if only the most pressing of the work were done, a hundred millions of national capital, or from £5,000 to £10,000 per mile, could be expended by engineers to very great national advantage.

* Abstract of the inaugural address of Mr. W. Worby Beaumont, M.I.C.E., etc., President Society of Engineers, London, Eng.