

plug, the main opening cuts off the train pipe and coupling hose, and at the same time moves the port in register with the coupling hose, the main opening then standing with one end in register with an outlet pipe in one side of the casing. This outlet pipe connects with the interior of an auxiliary valve casing in which is a valve seat adapted to be closed by a valve held to its seat by a spring. The stem of the valve slides in a screw screwing in the casing and supporting its cap, the lower end of the spring also resting on an internal flange of the screw, while the other end of the spring presses against the under side of the valve to hold it normally to its seat. In the auxiliary casing is an outlet leading to the outer air, through which air passes when the auxiliary valve is opened, by which air is released from the train pipe, so that the brakes are applied in the usual manner. When sufficient reduction of air has taken place in the train pipe to equalize the pressure of the spring in the auxiliary valve the latter again closes, retaining a certain amount of air pressure in the train pipe after the brakes have been applied, assisting in the release of the brakes when the stop cock is again opened.

THOMAS' CAR FENDER.

The recent extensive introduction of power-driven street cars in cities has made imperatively necessary some means for protecting foot passengers from danger of being run over. The car fender illustrated constitutes an appliance which provides a catch net with a frame, which bends inward as a heavy body falls into it, forming an effectual receiver. Our cut shows the fender in actual operation. The fender is preferably secured to the grip frame in the case of cable roads or to a supplemental frame carried by the axles on other cars. The striking bar at the front lower edge may be covered by padding. The net, with its flexible frame, is held in position on a diagonal plane by wire helical springs. The thrust of the padded striking bar is received by the fixed frame. Then, as a person is struck, he inevitably falls toward the car and drops upon the net. This at once yields, the side members of the frame bend, the springs stretch, and the net forms a purse or bag, securely holding the person and protecting him from further injury, such as might be incurred by rolling off were the net inflexible.

The inventor, Mr. Charles F. Thomas, Buckeystown, Md., may be addressed for further particulars.

A FUNERAL ON THE RIVER SPREE.

About fifty miles south of Berlin, in the Spreewalde, on the borders of Bohemia, funerals on the ice are of no uncommon occurrence. Here, says the *Graphic*, is one of the few districts still inhabited by the Wends, a branch of the Slavic population of Lusitania, who yet retain their distinct language, costume, and national characteristics. The numerous ramifications in which the Spree penetrates the woods and forests of this country before reaching Berlin are in the winter securely frozen over, when they take the place of roads, and are used as such even for funeral processions. Every one is, of course, perfectly at home on skates. So the young men, skating, take the ropes attached to the sleigh on which the coffin is borne, the old men, women, and children follow, skating, behind. The skates used are old-fashioned in character, tied with string. The men wear black coats and hats on such occasions, but the women vary their costume with white hoods, scarfs, and aprons.

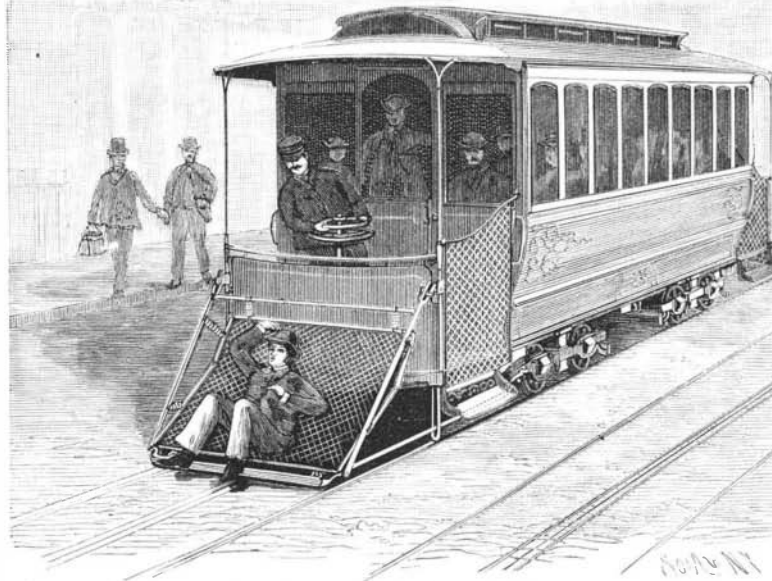
Skeleton Leaves.

E. D. Bartlett, in the *Optical Magic Lantern Journal*, reminds us of having in the long, long ago employed with much success skeleton leaves as lantern slides. The lantern is now much more than then used for educational purposes, and a set of skeleton leaves would form a valuable addition to an educational collection of slides. Mr. Bartlett recommends taking the green leaf from the tree, soaking it in rain water in a warm place till fermentation has destroyed the soft parts, and washing by a gentle stream of water till the fibrous network is clean. Heating in a suitable solution of caustic soda will very much

shorten the operation. In fact, quite a number of skeletons may in that way be made in a single evening.

The Emotions of Animals.

Dr. Gibier has reported some valuable observations upon the physiological influence of the emotions in animals. The observations go to establish, as foreseen, that these effects of the emotions are identical with those of similar emotions in man. None the less is the demonstrative proof of this forecast both valuable and important. Its special importance is that in studies upon the lower animals, prosecuted with a view to ameliorating the condition of man, allowance must



THOMAS' CAR FENDER.

henceforth be made by all observers for moral effects. It seems that Pasteur, enlightened by the quickness of his sympathy with animals, has always made this allowance; but it is doubtful if all of his disciples have done so. Or, rather, it is not doubtful that often they have not. The evidence now adduced by Dr. Gibier being of a sort that appeals to their understanding, will avert one source of error that might vitiate their conclusions.

Darwin investigated the expression of the emotions in man and animals, demonstrating that similar impulses affected identical nerves, producing identical visible muscular phenomena. Dr. Gibier's demonstration merely extends the area of these observations, showing that those secondary effects recognized as morbid or disease effects are also identical in the different animal orders. Sir John Lubbock has added systematically to the immemorial observations that establish the reasoning faculty as existing in the lower orders. In all of these there is nothing essentially new. On the contrary, the substance of it all is old as the human record itself. Man has always, at least from his earliest records, recognized the essential kin-

of his day, he found it needful to impute to man a faculty or quality apart and additional to those shared with him by his "poor cousins" of the animal creation. Hence the words addressed by him to the Thesalonians, speaking of man as possessed of a threefold nature—spirit, soul, and body, the English words assigned as equivalents to those he used. "Spirit," here, is held to express an immortal nature capable of conceiving what is called an "abstract" right and wrong and God. "Soul" as here used means, according to the Rev. Lyman Abbott and the Rev. J. T. Conant, D.D., the lower or animal nature which man has in common with those whom he calls the brutes.

During his dark ages, European man lost sight of these earlier metaphysical distinctions, as he lost all other higher insight. In such an age, his natural vision closed to the natural facts plainly visible at one end of the human scale, to the savage in direct contact with nature, and no less plain at the other end to the enlightened mind, whether this repose on the observations of a pagan Pliny or the minuter researches of a Darwin, a Lubbock, a Pasteur, and a Gibier. Yet the attitude is that of ignorance merely, not of any dogmatic teaching, for the kinship is equally clear to a Paul, learned after the learning of the Greeks, and to an Abbott, learned after the learning of eighteen centuries later. The last, to express the facts of intelligence as common to man and animals, adheres to the English word assigned to this use by the translators of the Greek Scripture, "soul." To designate a different set of concepts, of attributes which both assign to man to the exclusion of all other animal orders, Dr. Abbott equally adheres to the translators, and uses the word "spirit."

The distinction is one essential to all intelligent expression on the subject, since its function is to discriminate the domains of verifiable and unverifiable knowledge. Unless this distinction be maintained in thought and speech, all converse on perhaps the highest and most interesting subject to which the human understanding can devote itself is reduced to vain babble of words.—*N. Y. Sun.*

The Steffens Process.

Many have inquired as to the object and operation of the Steffens process to be put in at the sugar factory here next summer. James G. Oxnard and N. R. Cottman have courteously furnished us with the following description, which will prove interesting:

Steffens' "Auscheidung" (extraction) process is a process patented by Mr. Carl Steffens for the purpose of extracting the sugar remaining in the molasses after the ordinary process now in use.

It consists in mixing fine powdered lime with the molasses in such quantities and under such conditions of temperature as will effect a chemical combination between the sugar and the lime by which a saccharate of lime is formed. This saccharate of lime precipitates from the solution in a solid form, and is recovered by passing the mixture through filter presses, the saccharate of lime remaining as a solid and the impurities of the molasses running off in a liquid form. This saccharate of lime is then dissolved in water or the beet juice and treated with carbonic acid gas, C O². The carbonic acid gas breaks up the chemical combination between the lime and the sugar, forming a carbonate of lime, which precipitates as a solid and liberates the sugar, which goes into solution. This mixture is again passed through the filter presses the carbonate of lime being caught in the presses, and the sugar, in the form of a solution, running off.

By this means we see we have first separated the sugar in the molasses from its impurities by combining it with the lime, then separated it from the lime by means of carbonic acid gas, giving us a comparatively pure sugar solution, from which we are enabled to extract the sugar by means of the vacuum pan and centrifugal machine. The molasses, while lime is being added to it in small quantities, has to be in iron vessels surrounded by cold water, as the chemical combination will only take place when it is at a very low temperature.—*Chino Champion.*



BOHEMIA—A FUNERAL PROCESSION ON THE ICE.

ship between himself and the rest of the animal kingdom. Indeed, the less sophisticated his own mind by his advance in civilization, the more distinct and frank is this recognition.

The knowledge, it appears, is lost only by a race that lapses from civilization to barbarism, carrying with it the sophistication of the higher state without recovering its clarity of vision. Thus when the Apostle Paul had to enforce spiritual truths on the acute generation,