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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

TO KEEP THE PEACE.

There is a growing sentiment throughout the world in favor of arbitration with its concomitant disarmament. The enthusiastic promoters of the peace movement call for the immediate institution of an international tribunal and the immediate reduction, if not entire abolition, of armaments and military forces. These good people, however, lose sight of the fact that an international tribunal, if its findings are to be of any value, must have behind it some strong physical force wherewith to back up its decisions; put down with a strong hand any opposition thereto, and permanently preserve the world's peace. The mere reduction of naval and military forces until each nation maintains only what is judged to be sufficient for the support of its own government in the administration of its internal affairs, would not meet the case; for the several armies would be relatively as strong as they are in their present overgrown condition. Moreover, should any nation disagree with a decision of the international tribunal, it would be in a position to repudiate the findings of the court; and it is conceivable, nay, even probable, that the parties in dispute would resort to the final arbitrament of war. The possession of their several armies, even in a depleted condition, would breed distrust, and would constitute a standing menace to the peace of the world.

The institution of an international court of arbitration carries with it, then, as an inseparable corollary, the abolition of independent national armies and navies, and the substitution therefor of an international army, subject to the international court of arbitration, and maintained solely for the purpose of enforcing its decrees. It is undeniable that in the recent discussion of disarmament and arbitration, recognition of the necessity for the maintenance of an international force of some such character as this has become increasingly evident. In a discussion of the problem by Arthur H. Dutton, late of the United States navy, in a contemporary journal, the writer outlines the character of the force which would be necessary for this purpose. He proposes that an international army be formed; a "compact, thoroughly trained, well-equipped and mobile force, to the personnel of which each civilized nation would contribute its quota in proportion to the population." It would be the international police force, and would stand in the same relation to the nations of the world that the United States army does to the States of the American Union. Among the civilized nations to-day there are taken from industrial pursuits, during peace times, no less than 4,250,000 able-bodied men, whose maintenance costs nearly \$2,000,000,000 annually. These many millions would be returned to peaceful occupations, and their place would be taken by an international army of arbitration of 500,000 men, costing annually about \$150,000,000. To co-operate with this army there would be an international navy, in which there would be no battleships, consisting only of cruisers, gunboats, and transports for the moving of the troops. The international army would be concentrated in three divisions of 100,000 each, one in Europe, one in North America, and one in the Orient, with the remaining 200,000 scattered in smaller detachments. The decree of concentration of the three great armies would be a matter for decision of the strategists. All the permanent fortifications would be abandoned, and the nations, having disbanded their

national armies, would depend upon their civil police for the execution of their own local laws. Each nation would agree to maintain no individual military force whatever; and the intelligence bureau of the international army would see that this obligation was fully lived up to. Military training would be restricted to international schools, the manufacture of arms and munitions of war to international factories.

Although the time may not be fully ripe for the sweeping change advocated by Lieut. Dutton, it cannot be denied that the alarming growth of the cost of our present methods of maintaining the world's peace, is driving the nations into an *impasse*, the readiest escape from which would seem to be by the broad and honorable road of disarmament and armed arbitration.

STATION ANNOUNCERS ON TRAINS.

One of the greatly needed improvements for rapid-transit service is some form of automatic station announcer placed in a conspicuous position on the car. The present method, under which the name of the next station is called out by the guard, is little better than a farce. On some lines, and this is particularly true of the surface trolley roads, the name is frequently never announced at all; and on other roads the din and confusion of traffic is so great, that the station name is inaudible to the greater part of the passengers on the car. Add to this the fact that many of the conductors and guards draw out the names with a pronunciation, or rather a mispronunciation, which renders them completely unintelligible, and it will be understood that, while the present system is confusing to the regular patrons of the line, it is "confusion worse confounded" to the "stranger within our gates." Since the vocal announcement of stations is a failure, the question arises whether some other more satisfactory system cannot be devised.

The simplest solution of the problem would be to place in some conspicuous position on the car a visual announcer, on which, immediately upon the car leaving a station or street crossing, the name of the next following station or crossing would appear in clear and easily readable letters or numbers, the change of sign being made by the conductor or guard, or, preferably, by means of some automatic trip or other form of contact arranged between the car and the several stations or stopping places. That the idea is mechanically practicable is proved by the many very creditable devices of this kind which have been invented, a large number of which are recorded in the files of the Patent Office. The advantages of station announcers are so many and obvious, that these devices began to make their appearance early in the development of the trolley car. At first they were operated merely by mechanical means; but later, with the advent of electrical traction, the many advantages of electricity for the purpose led to the invention of electrically-operated signs.

In view of the conspicuous usefulness of this system, it is a matter of surprise that it was not universally adopted long ago; and there is little question that its failure to come into general use has been due not a little to the reluctance of the transportation companies to go to the expense and trouble incidental to the operation and maintenance of the necessary apparatus. A notable instance of this occurred only a few years ago, at the time of the opening of one of the most important subways in this country. The management instructed its engineers to work out an automatic, electrically-controlled announcer, which was to consist of an oblong case, depending from the roof at the center of the car, which would display on each side of it the name of the next station at which the train stopped. The scheme would have been an immense convenience to the traveling public; but at the eleventh hour objections were raised on the ground that it would interfere with the advertising signs in the car, obscuring them or detracting public attention from them, and the system was never installed. That the objection was altogether absurd and puerile is shown by the fact that a device of this general character has recently been installed in a car of the Hudson and Manhattan tunnel, which, according to the latest reports, is working greatly to the satisfaction of the public. The new indicator consists of an oblong glass box, attached at the center of the car. A lettered sign bears the words "Next Station." Below this is a blank space, in which the name of the station following appears in brilliant letters. Undoubtedly the Public Service Commission will observe the operation of this device with close attention. Should it prove to be thoroughly practical, as we have no doubt it will, the Commission would add one more to its many valuable services rendered to the public, by ordering the equipment of all rapid-transit cars with devices of the same general character.

COMPARISON OF STEAM AND PRODUCER-GAS MARINE PLANTS.

One of the most instructive comparisons, showing the relative advantages for marine purposes of a steam

plant and a producer-gas plant, that has yet been made, is contained in a paper presented at the last meeting of the American Society of Mechanical Engineers by Mr. C. L. Straub. For the purpose of comparison, the writer takes a modern lake freighter, built last year, and shows what would be the weight of and how much space would be occupied by an installation of producers and gas engines capable of driving this ship at the same speed of 12 knots. The freighter is 306 feet in length, 45 feet beam, and 24 feet deep, and is driven by a single-screw, triple-expansion engine, which indicates 1,050 horse-power. Steam is supplied by two single-ended Scotch boilers of a working pressure of 180 pounds to the square inch.

In the gas-driven ship the place of the steam engine is taken by a 4-cylinder, 4-cycle, double-acting gas engine. The length, fore and aft, between bulkheads necessary to contain this engine is 19 feet 6 inches, and the engine room weights are 105,000 pounds. The length between bulkheads in the steam engine room is 22 feet, and the engine-room weights are 182,000 pounds. The boiler-room weights, with the water in boilers and no fuel, of the steam plant are 170,000 pounds. The weight of the two down-draft gas-producers with no water and no fuel is 82,000 pounds. The length of the boiler room, including bunkers, which is 30 feet in case of the steam plant, is cut down to 15 feet for the producer-gas plant. For supplying the boilers of the steam plant, bunkers of 340,000 pounds capacity are necessary; the bunker capacity for the producer-gas plant is 160,000 pounds. The total weight of machinery and fuel in the steam plant is 692,000 pounds, and the total length of the machinery space 52 feet; the total weight of machinery and fuel for the producer-gas plant is 347,000 pounds, and the total length of the machinery space 34 feet 6 inches. The value of this comparison is enhanced by the fact that it is made by Babcock & Penton, the firm which built the steam-driven ship; and as they guarantee one horse-power for one pound of good bituminous coal, the estimate of the engineers who have been working on this problem would seem to be not unreasonable, that the saving in fuel due to the fuel economy, and the increased cargo carried due to the saving in space and weight, would pay for the cost of the complete plant in two years of operation. If only a sister ship to the steam freighter could be built and operated in the same service, an ideal opportunity would be offered for obtaining valuable data as to the all-round efficiency of the present, and what we believe to be the coming, motive power of the freight steamship.

DEFENSE AGAINST DIRIGIBLES.

The Krupp guns for defense against dirigibles, a detailed description of which appears in the current SUPPLEMENT, have attracted much attention, as might have been expected, from military experts of other countries.

The Revue Militaire Suisse and other periodicals present some pertinent criticisms, coinciding with the view uniformly held by the SCIENTIFIC AMERICAN, that the only adequate means of defense against dirigibles lies in other dirigibles.

The chief value of balloon guns rests on the fact of the well-defined limitations of the field of use of the balloon, namely, for scouting purposes. Thus dirigibles will be mainly employed in determining the regions of concentration of troops and their lines of march, the position of lines of railway and of navigable rivers, the fortification of frontiers and ports, and the movements of fleets. Hence, the problem of placing ordnance for defense is greatly simplified.

As for the automobile gun, most experts agree that its only value would be for scouting and for rapid movement to any desired point of defense. Even on first-class and open roads it would have great difficulty in following the course of a dirigible; whereas rapid and unfettered movement across a country when the roads were not only indifferent, but blocked by the movements of cavalry, of infantry, of provision trains, as well as by the disordered flight of terrified inhabitants, would be unthinkable.

The only formidable foe of a dirigible, then, is a better dirigible. And in direct combat between two airships, the two factors of speed and lightness would doubtless determine the victor—speed, because it would enable its possessor to determine the moment of attack, and lightness, or "lift," because an absolute advantage must rest with the crew which can open the attack from above. Such attack would consist in the dropping of fire balls, the piercing of the lower craft by volleys of scattering shot, the lowering of scythes with toothed blades to tear the envelope of the enemy's balloon, etc.

In this connection a French critic notes the singular psychological phenomenon that troops are quickly demoralized by the sight of a novel and unexpected method of attack, or evidence of being observed by spies. Unless they feel that they can meet such attack with similar weapons, they lose confidence in their officers and become panic-stricken.