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AMBULANCE SERVICE IN PHILADELPHIA.

Read at the Academy of Music, April 30, 1883.

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THE city of Philadelphia is urgently in need of a thorough and complete system for rendering speedy aid and comfortable transportation to those unfortunates who may be injured in her streets and busy workshops. In the accomplishment of this humanitarian purpose the rich and poor are alike interested, for there is not an individual within the city limits who may not to-morrow require such assistance. Any of us may fall in the street, suddenly stricken by an overpowering disease; we may be thrown from a wagon, or be struck by a running horse, or receive a blow from a chance brick or timber, or may trip over some slight obstruction, or may become the victims of a railway accident, or be crushed by falling walls. Maimed, perhaps insensible, and our identity temporarily destroyed, we are all proper subjects for the kindly care of our mother city. Further, every mechanic is exposed each day to the danger of mutilation of body from the surroundings which are incidental to his occupation. Machinery and railway cars produce especially a form of injury known as crush, which is often of exceeding gravity, and requires the most skillful attention.

In the past, each sufferer has been dependent upon the hospitality of a neighboring store or office, or must lie, as has not unfrequently happened, exposed to cold and wet, adding the risks of pneumonia or other

inflammatory disease, to the already existing injury, while some means of transportation was being secured. The cab, even if at hand and if the expense can be afforded, offers but sorry comfort to the seriously injured unfortunate, while the more commonly employed express wagon, with its hard floor and stiff springs, will produce untold agony as it jolts the sufferer over the rough pavements of our city. Imagine a bone crushed into a number of pieces, each sharp, angular, and capable of tearing its track into the quivering muscles at each motion of the carrying wagon, perhaps cutting its way through the skin, and converting a simple break into a grave compound fracture, or piercing a large artery, and adding profuse hemorrhage, which may endanger or destroy life. Every atom of strength wasted by torturing pain during the transit must have its effect upon recovery, and in many instances has turned the scale in the result, either landing the patient at the destination cold in death, or rendering futile the subsequent efforts of the surgeon. In a city like ours, where the firemen during the war never allowed a wounded soldier to traverse our streets except in a comfortable ambulance, every appliance for providing quick and easy transport should be within immediate reach.

These appliances should consist of 1st, Stretchers; 2d, Hand Litters on wheels, to be propelled by men; 3d, Ambulances, drawn by horses.

1. *Stretchers* may be made of various forms, but are one in principle, the suspension of a patient upon some slightly elastic substance which shall be stretched between two poles. Impromptu stretchers can be made in a variety of ways, from two poles, rods, muskets, or oars, with coats, blankets, hammocks, ropes, straps, hides, or twigs fastened between them. Doors, gates, shutters, ladders, settees, or boards, covered with clothing, blankets, leaves or boughs will answer in an emergency, but in a city such devices should not be necessary.

It is very important in fractures that every possible movement should be avoided in order to escape the dangers above alluded to, hence in cases of broken bones a moderately hard litter is preferable to a soft one like a blanket. Serious fractures should always be bound up with some form of splint to prevent this motion, and for this purpose no one need ever be at a loss for material, as shingles, laths, cigar boxes, paper boxes, book covers, twigs, or barks of trees are always accessible, and sections can be bound in position by strips torn from the clothing, or by cords, or by flexible twigs, or by twisted grass ropes.

2. *Hand-litters on wheels, to be propelled by men.* These are prac-

tically stretchers, placed upon a wheeled platform, after the model of Furley, of the St. John's Ambulance Association,* or like the one seen

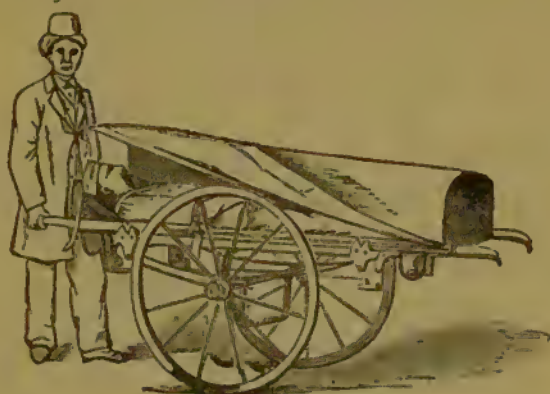


Fig. 1. Wheeled Litter.



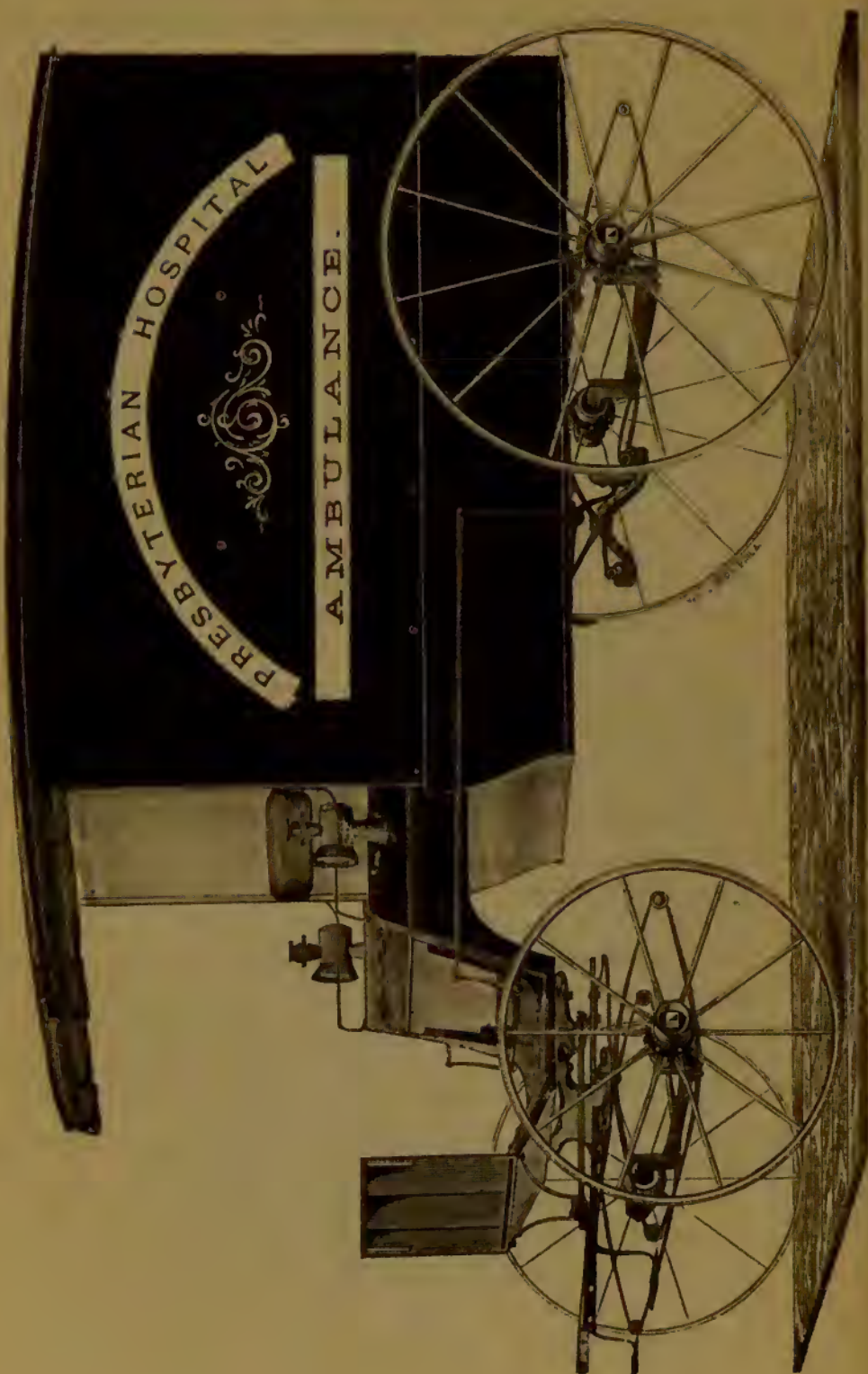
Fig. 2. Stretcher in process of removal from wheeled litter.

upon the platform to-night (the Rice Pattern), which will be fully explained to you, as it is soon to be placed in all of our station houses.†

3. *Ambulance wagons drawn by horses.* What is an ambulance? The term has two significations, one foreign, the other, American. Abroad the term ambulance is applied, as its derivation, *hospital ambulant*, would imply, to movable or temporary hospitals, transient refuges for the wounded near the field of battle, when they can be cared for immediately, and then sent back to more permanent resting places in the rear. As the term is used in America it has come to be applied almost universally to the ambulance wagons carrying the wounded, and it is

* Esmarch—Early Aid in Injuries and Accidents. Translat'n, Lea, Phila., 1892, p. 102.

† Mr. George K. Childs, No. 308 Spruce Street, has the contract for making the wheeled-litters for the city.



in this sense that the term is used in speaking of an ambulance service, although Longmore calls it an abuse of the term. As Americans, we constantly speak of "sending for an ambulance," "riding in an ambulance," etc., and those of us who served as surgeons in the late war will recall the cry of the soldiers, "here come the 'avalanches.'"

The ordinary form of wagon in this country has four wheels, is drawn by one horse, and has accommodation for two recumbent men, (rarely four,) or for eight or ten men in sitting posture. The variety in form and detail will vary according to the ideas of the constructor and the purposes for which it is to be used. For civil use, that is, for use in our cities, the weight can be diminished, and more comfort secured for the patient than will be possible in a wagon intended for army service. In the first place it traverses a distance of only a few miles, and no necessity exists for food or drink, as is so often required in long transportation in military service. A flask of water and a bottle of whiskey will give all the nourishment required while *en route* to a hospital. Without entering into special detail too minutely, let me describe an ambulance wagon lately constructed for the Presbyterian Hospital by Mr. John Server, of this city. Its weight is 1,000 lbs. The Wheeling weighs 800, the Rucker 1,100, and the Howard 1,230. Its length is sufficient to admit of the patient lying at full length upon its floor, the front wheels and the circle or fifth wheel being built in front of the body so that the ambulance can turn "in its own length;" the springs are four, exceedingly easy and well-tempered; the sides and ends are lined and padded to prevent injury even to a helpless, an insane, or a drunken patient; the width is sufficient to permit of two patients lying side by side, or one can lie while four or five are seated upon a drop seat. The stretcher is really a hair mattress with a pillow, in a frame placed upon small mortised wheels. Not being required for long carries, it has no projecting handles, as length is thereby saved, although handles could easily be made to telescope or fold. An arched, brass hand-piece at each corner answers every purpose. The mattress is covered with gum cloth, and it, as well as the whole interior of the wagon, can be easily washed when necessary. Even if the patient be already upon a canvas stretcher, it can be placed directly upon this bed, and then, being lifted to the level of the floor, is easily rolled into place without the great jarring occasioned by a bearer climbing into the wagon. When the head reaches the driver's seat it is gently raised by a handle provided for the purpose, and beneath the stretcher is slipped a long section of

hair mattress, ten inches square, four feet long; a similar pad is then placed under the foot of the litter, and thus a soft yielding cushion is speedily obtained. A second light stretcher, made of canvas, slipped over two poles, is also provided, rolled up, and can be used for carrying the patient, or for the occupancy of a second, who can also be placed upon the same cushions. Light and ventilation are secured by curtains and windows, while the whole can be tightly enclosed or thrown wide open at will.

The surgeon can sit beside the patient and apply such restoratives and palliatives as are needed to make the person more comfortable, and can watch the crushed limb for evidences of bleeding, which may require the speedy application of a tourniquet to arrest the flow of life blood which might, without such vigilant attention, result in death long before the hospital could be reached. Beneath the seat are found all appliances necessary for the relief of every emergency, and it is remarkable to see the amount that can with skill be packed in so small a space. Here are found two fracture boxes, specially constructed, and splints of all kinds, long and short, to the extent of twelve in number. In a separate tray, so as to be easily lifted from the box and carried to the side of a patient, are bandages, lint, cotton, tourniquets, rubber bandages and tubing. In still another movable tray or box are stored in separate compartments the necessary drugs for use in producing emesis in case of poisoning, for applying restoratives, etc., or stimulatives, and for lulling pain. Whisky, chloroform, a pocket case, and a hypodermic syringe are carried with cups, spoons, etc., in a locked compartment. To make this wagon complete it only needs the addition of rubber tires.

Evans* gives elasticity to the mattress by inserting springs beneath it, while the two upper men are suspended by rubber rings or straps. Since the war the subject has received great attention, and much time and ingenuity has been expended in producing a perfect vehicle which will fulfil all the varying conditions.† The "Wheeling," or "Rosecrans," and the "Rucker"‡ patterns were the principal ambulances used during

*Evans' Ambulance Wagon, History and Description of, Paris, E. Briere, 1866, also Appendix to "Les Instit. Sanitaires Pendant le Conflit Austro-Prussien-Italien."

†See Report Board of Officers to decide Pattern for Ambulance Wagon for Army Use, Washington Printing Office, 1878. Special Orders, No. 44, War Dept., A. G. O.

‡Figures 4 to 15 are taken from the Medical and Surgical History of the War of the Rebellion, Third Surgical Volume, and from Circular No. 9, S. G. O., by permission from the Surgeon General's Office.

the War of the Rebellion. Dr. Benjamin Howard,* formerly an

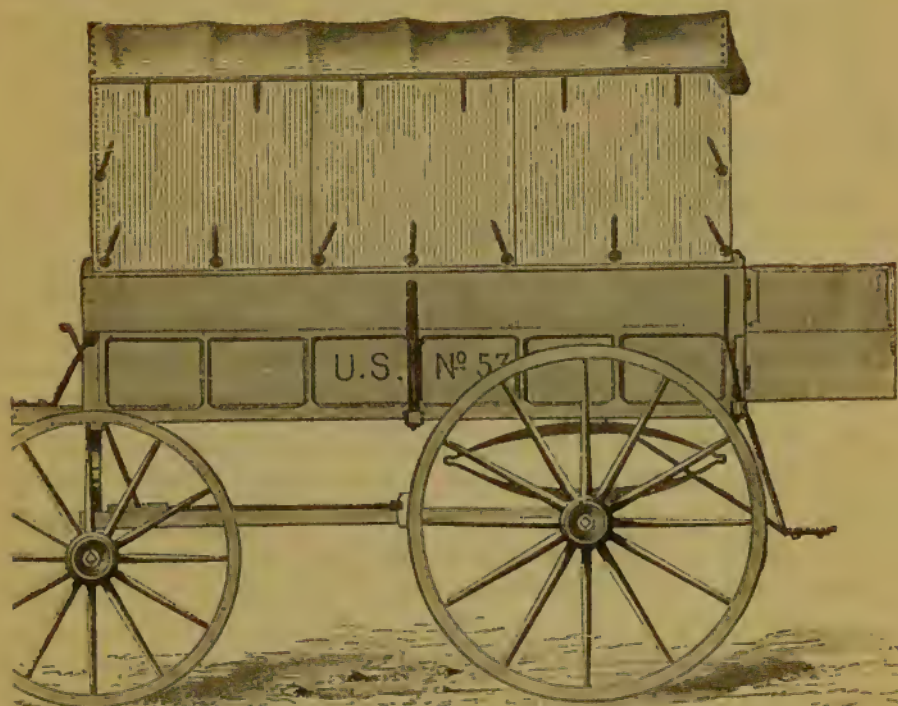


Fig. 4. The Wheeling U.S. Army Ambulance.

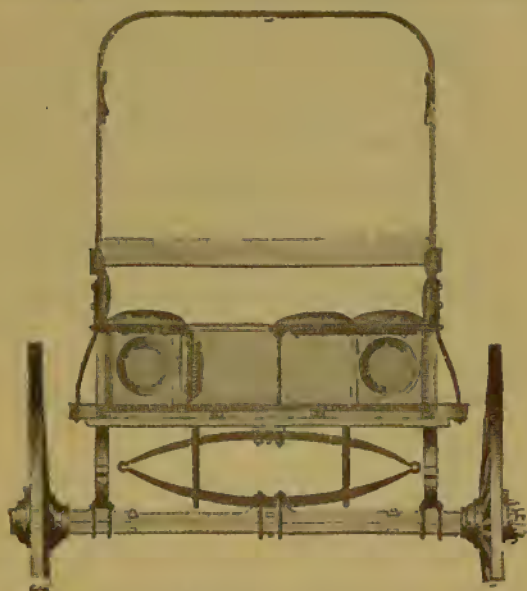


Fig. 5. The Wheeling Ambulance—Rear View.

*U.S. San. Com. Bulletin, Feb. 1, 1885, p. 980; Feb. 15, 1885, p. 994; British Medical Journal, Feb. 4, 1882, p. 152, also Mar. 4, 1882, p. 324, also Lancet, 1882, p. 172, also Medical Times and Gazette, 1882, p. 111, also British Medical Journal, 1881, p. 72.

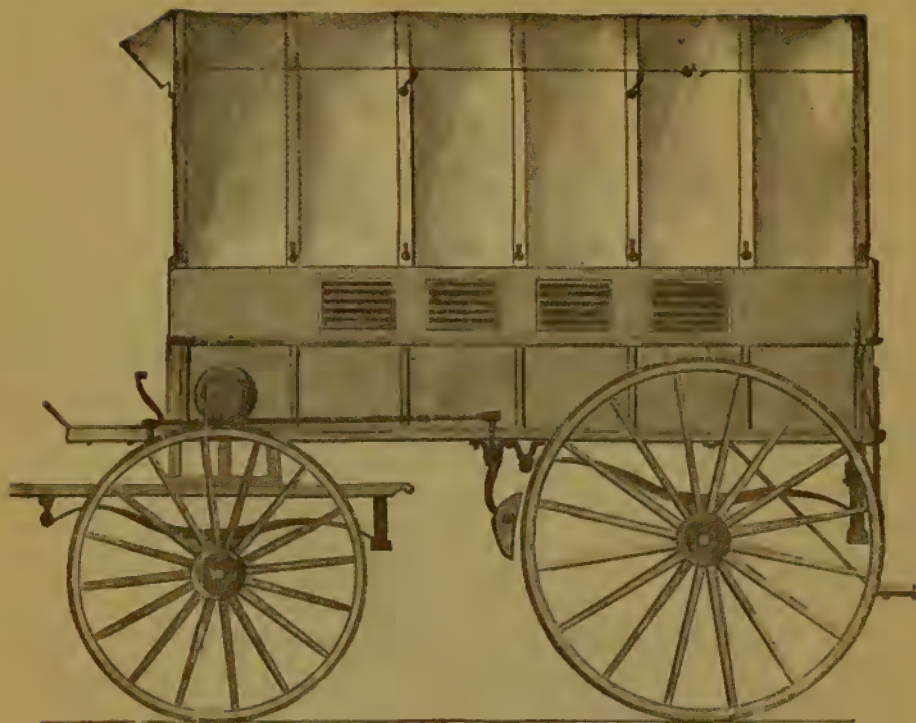


Fig. 6. The "Rucker" Ambulance Wagon.

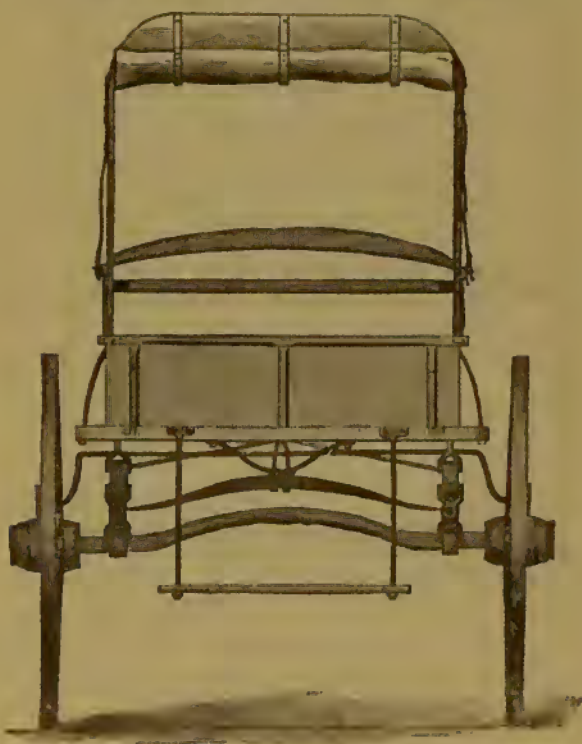


Fig. 7. The "Rucker" Ambulance Wagon—Rear View.

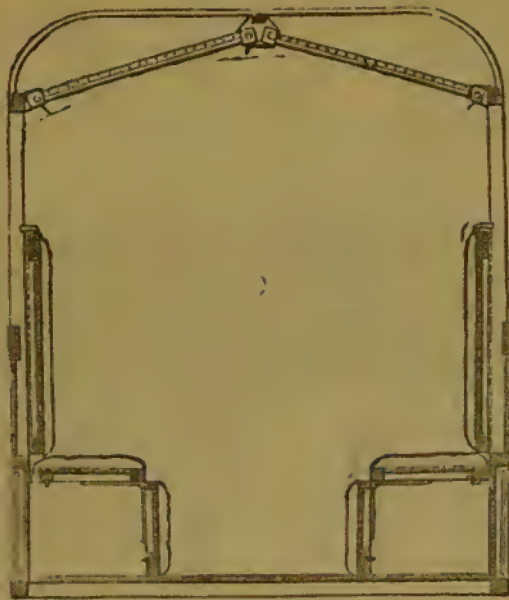


Fig. 8. The Body of the "Rucker" Ambulance—Arranged for Sitting Patients



Fig. 9. The Body of the "Rucker" Ambulance—Arranged for four recumbent patients.

Assistant-Surgeon U. S. A., has given much study to the subject, and has recently succeeded in introducing not only his ambulance into London, but has also laid the foundations for an ambulance service in that city, where so many thousands are annually injured. His wagon

is placed low down, like the Hansoms, has semi-elliptic springs and special counterpoise mattress springs. Davy's* vehicle has also large hind wheels placed far beneath the body so as to carry the major portion of the weight.

Turning to the use of these ambulance wagons, let us examine the plans of service as they exist in other cities.

The New York system may perhaps be taken as the most complete model in the world. It has been in use since 1868, so that it is no longer an experiment, and the results, while not perfect, are most satisfactory. Bellevue Hospital has now eight ambulance wagons; the New York Hospital two at each of its buildings; the Roosevelt two; Presbyterian, St. Vincent's, and others one each. The wagons are kept ready for instant service, and the attendants are as thoroughly drilled as are our paid firemen. As soon as a man is injured in any portion of the city, word is at once conveyed to the nearest station-house, and in a moment the central office is informed of the necessity for the ambulance of that particular district. The summons speeds over the wire, and as it reaches the hospital the alarm is at the same instant given at the stable, at the gate, and in the apartment of the ambulance surgeon. The trained horse at once seeks his place, a suspended harness drops into position, the animal is secured between the shafts by a few snap-hooks, and within two minutes from the time that the signal is given, the ambulance, fully equipped with every means for speedy relief, is galloping toward the street indicated by the despatch. A chart, hanging by every instrument in hospital and station-house, affords a key for correctly guiding the ambulance to any region desired. Right of way is accorded, after the U. S. mails and fire-engines, and a few moments finds the surgeon caring skillfully for the injured one. The early arrival of professionally trained aid offers infinite advantages to the plan of depending upon the well-meant, but injudicious efforts of superficially, and consequently dangerously educated helpers. In case of fire, or when there is any probability of a large number of wounded, a general call signal is given, which immediately brings all the ambulances to the spot, to be ready for any emergency. At a recent visit to Roosevelt Hospital, while in the second story of the stable building, the alarm sounded. The clatter of hoofs was at once heard, and before I had reached the stable door the horse was already half secured to the

*British Med. Jour., Dec. 9, 1882, p. 1,142.

wagon. In another moment they were off, and as they reached the gate the ambulance surgeon appeared with satchel in hand, and in the time which I have occupied in its recital the vehicle was speeding on its errand of mercy.

The city is so divided into districts that any policeman can at a glance ascertain the hospital to which word should be sent, and thus conflict is avoided. As to the work done, let us look at the results. Last year the Bellevue Hospital ambulances answered over two hundred calls per month, 2,608 in all; the New York Hospital, at its main building and House of Relief, between nine and ten each day of the year, or more than 3,300 altogether, while the other hospitals assisted large numbers. Who can estimate the saving of life and of strength to these thousands during their ride to homes or hospitals?

The Department of Public Charities and Correction, under whose control the service has been developed and perfected by Thomas S. Brennan, is now about to extend its usefulness to Harlem, with its 150,000 population, as an "efficient ambulance corps and reception hospital at frequent and convenient localities, is believed to be the wisest plan to help best the sick and injured."* The department meets with special manifestations of popular recognition and favor.

"Bellevue requires the constant service of two ambulance surgeons; they are compelled to be very prompt in their attendance, and to see that everything is kept in readiness for instant action. When patients desire to be taken home, if within the city limits, or to any hospital they may elect, such request must be complied with, if they are physically able to judge of their condition. Ambulance surgeons will call upon the aid of the police to enforce their right of way, and also claim their assistance in caring for the sick and wounded. When the necessity for attention is urgent, the word 'hurry' is added to the message. Each ambulance keeps to its own district except when a general fire call is sounded, in which case all the vehicles respond, and are sometimes started in fifty seconds after the first stroke of the gong. An alarm may be sent over either police or fire department wires. The surgeons render thorough accounts of the accident to the house surgeons.†"

Through the courtesy of the mayors and superintendents of police I

*Extracts from private letter, received through kindness of Mayor Edson, from Board of Public Charities.

†Extract from recent letter from Dr. Stephen Smith.

am able to give a resumé of the service in other cities, as reported in recent letters to me.

Washington has not so complete a system, but has two ambulances at police headquarters, supported by the authorities, ready to answer any calls for relief, either sick or wounded.

Cleveland, Ohio, has a private system, if such it may be called, the ambulances being owned by individuals, though working under the direction of the Board of Health, and permitted to carry sick and wounded for hire, the same as cabs, the city paying for the service. They have right of way, the same as fire engines, and the drivers must be licensed and give bonds of \$1,000. The plan has only been in effect about a month and has not been tested.

In Brooklyn the service is under the control of the Department of Health. The vehicles are kept in stables in immediate proximity to three of the largest hospitals, at which hospitals the surgeons reside. The alarm is by telegraph and telephone, and is supported by the city.

In Boston there are three ambulances, one under the direction of the City Hospital, two controlled by the Board of Police Commissioners. The hospital ambulance is stationed at the City Hospital, the others, one at the north end, the other at the south end of the city. These are used only to convey the injured to the hospital, and are accompanied by a surgeon. They carry from five to six hundred per year to the institutions, and monthly reports are rendered to the superintendent. At the Mass. General Hospital, an ambulance, with surgeon, will be despatched upon notice from physician, police, or other responsible source. Dr. Beach reports that the plan has worked admirably.

In Chicago, a key can be inserted into an alarm box, without going to the station house, and to prevent false alarms, this key cannot be removed except by the ambulance driver, who upon arrival releases it and returns it to the proper number. The police patrol wagons are largely used for conveyance.

Cincinnati has one ambulance at the hospital.

Baltimore is recognizing the necessity for such a service, and is taking steps looking to its inauguration.

In London, Dr. Howard* has succeeded in establishing the service in connection with a number of the hospitals; and in Paris, with the assistance of Dr. Nachtel,† a district municipal organization has been effected

* Brit. Med. Jour., Feb. 4, 1882, p. 152; also March 4, 1882, p. 324.

† New York Medical Record, Feb. 18, 1883, p. 104.

with horse ambulances corresponding in their stations to the former "Secours des Blessés."

WHAT HAS BEEN DONE IN PHILADELPHIA.

At the present time stretchers are to be found in most (if not all) of our station-houses, and wheeled hand-litters are soon to be placed at each station, in accordance with an appropriation of City Councils made at the beginning of the year, as already mentioned in the committee's report. An appropriation was also made to connect by telephone the Central Police Station with such hospitals as would volunteer to furnish horse ambulances. Although pressed for funds and realizing the additional expenses that would be incurred, several institutions nobly responded to this call in the interest of humanity, and I have the satisfaction of stating that direct telephone wires are now being placed in position, and within a few days will, I trust, be in working order, so that calls can at once be sent to the Episcopal, the Presbyterian, the German, the University, the Pennsylvania and the Philadelphia Hospitals, these being the institutions which have so kindly offered to assist the city in starting this most important project. As soon as the appropriation was assured, representatives from each of the hospitals met, and arranged upon a plan for districting the city in such a manner that each injured patient should receive the benefit of being conveyed the shortest possible distance, and at the same time distribute the cases as equally among the institutions as was practicable. Thus you will perceive that the initiatory steps have been already taken, and that we are now upon the eve of at least the beginning of what we must make in time a perfect system of relief. Chief Given reports that during each of the past five years over six hundred men have been conveyed to the hospitals, but, of course, this represents but a very small proportion of the wounded.

Let us glance a moment at our city and the position of its hospitals. The Municipal, and the Philadelphia or City Hospital (Blockley) are under the city's control. They are essentially special—the one is designed only for contagious diseases, the other has already its own fixed ambulance work, and is a place to which honest respectable workmen would object to being conveyed, and even were they willing the desirability would certainly be a question of doubt. In the near future, however, when the Almshouse shall have been removed, it is to be hoped that the hospital will be placed in such an honorable position that no one will object to being conveyed to its wards. In West Philadelphia are

two other hospitals—the University, at 34th and Spruce, and Presbyterian, at 39th and Filbert—both of which are provided with horse ambulances, and are first-class hospitals, suitable for the reception of any case, rich or poor. Crossing the river, at 10th and Sansom we find the Jefferson, and close by, at 8th and Spruce, the Pennsylvania. In the Girard College region are the German and the St. Joseph's, also near each other; while in the Richmond section there is the Episcopal, and in Kensington the St. Mary's. The Germantown is restricted to its own locality and the Jewish is too far away to be available. These are all of our general hospitals, and upon these it is necessary to depend for help. Unfortunately, the financial condition of most of them is such that it is impossible for them to incur greater expenses, and only the institutions mentioned have felt that they could come forward to assist the city in the work desired, as the outlay will be great, the first outfit being \$800 to \$1,000, and the yearly cost nearly the same.

Where shall the Ambulances be stationed? Shall they be kept at the station-houses, at the fire engine houses, or at the hospitals? The great value of the service lies in the prompt attendance of a skilled medical man, provided with appliances for the comfortable and speedy removal of the patient. That better men will be secured for this service by the hospitals rather than by the city I think no one will deny. In the one case it will be a choice man, selected with care from a number of applicants, all of whom as a rule are the better members of the recently graduated medical classes. His associations and other duties will tend to make him a far preferable attendant upon the injured than would be the medical man, who for a small salary would spend his day at the station-house waiting for an ambulance call. It is a well-known fact that the man who has much to occupy his mind will be far more efficient than the one who has little to do and therefore no time for anything. Again, a patient arriving at a hospital, in charge of one of its own surgeons is at once admitted, and no delay experienced, while in the other case a very possible rejection might subject the patient to another two miles or more of jolting before admission was secured. Especially if the hospitals receive these cases, as is now the practice, without any compensation from the city, refusal would be perfectly justifiable when the wards were already crowded and great risks might be run by the introduction of an unfit person.

If kept at the fire engine stations, the same disadvantages would arise as named in regard to police stations; and moreover, the sum-

mons would not be received as soon. True the fire stations have horses, but these horses could not be made available for this service, since the average time consumed at each ambulance call will not be less than thirty minutes, and a fire would gain great headway during such a prolonged absence of the animals. It is a service to which the general public naturally look to medical men for relief, and not to police assistance except when unavoidable. Hence our hospitals are the natural and most reasonable stations at which to place these vehicles, and under their care the system will be safe. The cordial assistance of the police department is absolutely necessary in rendering temporary aid, and in quickly notifying the Central Station of accident. It would be better in most instances that the patient be taken to the hospital in whose district the accident occurred, thus saving long transportation; but in certain cases it would be but right that the wishes of the patient be respected if he decidedly preferred a special institution.

The hospitals have responded most generously. But is it fair that this tax should be thrown upon these already overburdened institutions. Emphatically No! Our city has duties to perform toward her citizens though they be not paupers. The honest, hard working men and women, struggling for existence and determined to maintain their respectability, are actuated by motives of ambition that are both just and commendable. Even in an economic point of view it is far preferable that this feeling of pride should be fostered, and not crushed, lest the easy downward course should be commenced. They have had no opportunity for laying by a store for the day of disaster; they deserve the assistance of a wealthy city, and that this assistance should be rendered outside of the Almshouse. Our hospitals give every advantage to the charity as well as to the pay patients, and many a person in comfortable circumstances has found great help and comfort within their kindly sheltering walls.

It is plainly visible to every unprejudiced mind that the thinking men of Philadelphia demand reform, and that they will have it, but the reform which is wished is not a reduction of taxation, but such expenditure of the public moneys as would be countenanced by any prudent man in his own private business transactions. We do not wish to spend less money, we are not spending too much, but what we want is that every one hundred cents spent shall bring back one dollar's worth of improvement in health, in comfort, or in happiness. Such is proper expenditure of money. Men do not complain of one hundred dollars for

an object that is worth the money, but they do object to spending one hundred cents for that which is useless, or wasteful, or unnecessary, or improper. Just so in public life. The people of this city will gladly sanction any action of their representatives in Councils whereby this humanitarian question of the relief of suffering shall be advanced, and rendered more complete.

Let the city say to the hospitals we will equip you thoroughly with the material necessary for the transportation of these wounded ones, if you will care for them after they are received; we will connect your institutions with our police-stations, and render all police assistance necessary; we will place your Visiting Surgeons in telephonic connection with your hospitals so that speedy aid will be given the wounded when they arrive; and I venture to say that instead of causing any complaint such action will not only bring credit to the Members of Councils, but will also stimulate a wider interest in the hospitals and bring larger contributions to them. When the municipality shall thus recognize the value of the aid rendered by the hospitals, these institutions in turn will gladly give the assistance of their ambulance surgeon and wagon in escorting wounded individuals to their own homes.

To sum up, then, what is necessary to give our city a complete service for the relief of wounded persons,

1. Material for comfortable and speedy transportation, stretchers, wheeled-litters and horse-ambulances, to be provided by the city, and to be stationed, the former at the station-houses and depots, the latter at the hospitals.
2. Skilled medical care to be provided by the arrival in a few minutes of a surgeon with every means of appliance for the emergency, and a continuance of this care until the patient is safely landed in a place of rest either at his home or in a hospital.
3. A thorough co-operation between the police and the hospitals.
4. Quick means of communication by special telephones between the police-stations, hospitals, and offices of the Visiting Surgeons.
5. The strengthening of the financial condition of the hospitals by assistance from the municipal authorities and by private individuals. The former can be done by a yearly appropriation, as is the case in other cities, for the maintenance of ambulance, horse, driver and surgeon; the latter by the endowment by firms and by individuals of a hospital bed in which they can place their injured employees.

TRANSPORTATION OF WOUNDED.

To the student of the literature of this subject nothing is more enticing than an examination of the process of development of plans for the relief of suffering fellow-men. It is appropriate, therefore, that a review of army methods of transportation be alluded to, since the assisting of great masses of wounded men has necessarily stimulated the activity of thinking minds. After the battle of Gettysburg, twenty-eight thousand soldiers required immediate attendance.

During all the fifty-eight centuries previous to our own, the wounded were left to such irregular or uncertain aid as would be rendered by their comrades in bearing them to the rear, where the surgeons gave them such help as lay in their power. One can scarcely picture to himself anything more terrible than an ancient battle field, strewn with dead and dying, with rude men and furious horses trampling and crushing the already stricken soldiers.

It was not until 1796, that Larrey introduced a really systematic plan for speedy relief of the injured, the *ambulance volante* with its corps of *brancardiers*.* In our own civilized country, except in the few individual efforts of wise and kind surgeons, we find no records of ambulance relief, even in the war of 1812, in fact nothing really useful until the very beginning of our late unhappy struggle.

With that wondrous and unparalleled activity of mind and dexterity of adaptation which transformed, as in a moment, a people of quiet civilians into a nation of skilled and brave soldiers, our ambulance system soon attained a rank which in efficiency and in rapidity of relief, has not since been exceeded by any country, and many of the means of transportation devised during the War of the Rebellion have been adopted abroad as being unequalled.

The discussion of the best means for caring for the unfortunate wounded in any army, is sure to bring forth the most hearty endorsement as to the American priority and efficiency of ambulance service, even from European authorities, slow to recognize anything which originates from the young nation this side of the Atlantic.

Esmarch of Kiel says:—"The U. S. Federal Government, which, at the instigation of the world-renowned Sanitary Commission, organized the transport of wounded on railways so perfectly as to leave little to be desired, might well serve as an example to European States in future wars."

* Mem. de Chirurg. Mil., et Campag., de Larrey, 1812, T. I. p. 150.

Surgeon-General Roth, Dresden.—“For the inauguration of such an organization we are indebted to America, from whence issued a model of sanitary service formerly unknown in Europe.”

Surgeon-General Mouat, V. C. C. B., London.—“The American ambulance models fulfil the indications of simplicity, cheapness, lightness, and portability better than any others.”

Surgeon-General Longmore most unhesitatingly testifies to the superiority of American ideas and plans in caring for the wounded.

By the second year of our war each brigade was provided with an ambulance corps, properly officered and manned, about ten men and three ambulances being assigned to each regiment of five hundred or more men. These bearers were supplied with stretchers and appliances for speedy relief, and passing rapidly back and forth from the very field of battle, often under the shower of bullets and shells, quickly conveyed the men to the temporary abris, where treatment was instituted, and from whence, as speedily as possible, they were carried by ambulances and cars to places of greater safety. Before this corps was placed under the charge of the Medical Department much confusion ensued, partially owing to the inexperience of all concerned, partly to the natural instinct of each man to assist a fallen friend, and partly to the cowardice of a few who would seek this service to escape to the rear. As early as the battle of Antietam, however, its efficiency had so improved that on the very night of the engagement every wounded man had been removed from the field and placed under the direct care of the surgeons, and during the next two days had been safely transported to the railway at Frederick. The men entrusted with this work were drilled for hours each day in the proper care and gentle handling of the wounded, and the very fact that these men would boldly advance almost to the lines of the enemy to prevent a wounded man falling into hostile hands, inspired the men with fresh courage in all subsequent battles.

In 1864, Congress passed the official act placing the entire ambulance system under the authority of the Medical Department, and doubtless many men in this audience owe their lives to the timely aid rendered them in their hour of pain and peril.

The recital of the sufferings of the wounded, especially at the battle of Solferino, and the rapid progress of the American ambulance idea, led to the formation, in 1864, at Geneva, of the noble Red Cross Society, which has since performed such grand service upon nearly every battle field, and has done so much to make possible the introduction of these

necessary conveyances in our cities. Ten years since not a single horse ambulance could be found in European capitals. It would be interesting to trace the stimulation of ideas excited by our Governmental and United States Sanitary Commission work, which has resulted in the present advanced position of this Red Cross Society, of the St. John's Ambulance Association, of the Society for First Aid to Injured (New York), and of other like societies; but time forbids.

The transportation of troops by rail and water soon received great impetus, and proved of immense service, both to the field hospitals at the front and to the men removed. Even when thousands were wounded, all cases capable of being carried, were, within two or three days, safely and rapidly distributed to the various hospitals in Washington, Philadelphia, New York, and even to New England and the Western States. Passenger and freight cars were brought into service, and various modifications and devices employed to give all possible comfort. At the front and for removal to base hospitals, the floors of freight cars were usually strewn with straw, hay, leaves, or boughs, and although the trains ran slowly, yet so rough were most of the hastily constructed roads that the jolting was great, and much suffering resulted, as freight car springs are very rigid.

The United States Sanitary Commission, that noble organization at whose name many hearts here present will swell with gratitude, labored earnestly to contrive the best possible car, and their hospital train, attached to Thomas' Army of the Cumberland, carried everything that could possibly be needed, either for food, drink, or medical care. The kitchen car attached was complete, and soup, tea, bread, meat, etc., were regularly served. Running as it did hundreds of miles from the advance lines to the base of supplies, it often traversed hostile regions, but its yellow flag and bright scarlet locomotive smoke stack by day and three red lanterns at night, secured for it the respect of the enemy, and even when supply trains were wrecked and seized the hospital train was permitted to proceed unmolested. Dr. Barnum reports that of 20,000 men transported upon this train only one died. The cars were fitted up with stanchions, from which projected pegs, upon which the field stretchers were suspended in three tiers by rubber rings. This gave comfortable carriage, and permitted easy removal without disturbance when the end of the journey was reached, the patient being carried out through the wide door upon the same litter which he had occupied during the days of travel, and perhaps upon which he had been placed in the field, some

soldiers being carried from Atlanta to Louisville, four hundred and seventy miles. This arrangement which permitted from thirty to forty in the recumbent position to occupy one car also allowed the surgeon and attendants to pass among them and minister to their wants.

Thousands of sick and wounded were also conveyed by water in transports, sometimes specially fitted for the service by the United States Sanitary Commission, sometimes utilized in the unprepared state as they could be secured from the Quartermasters' Medical Department. These hospital vessels could have been made very complete and comfortable if they had been built with especial reference to the service required, but in some instances, notably upon the Cumberland and Ohio rivers, the mortality was very great, owing to the crowded condition of the boats and their dampness. Hospital gangrene was developed in a number of cases upon these boats as well as upon those conveying wounded prisoners from Richmond to Annapolis, as reported by Surgeon Brinton.

The plan of rapid removal of wounded by trains of cars has been largely adopted in Europe, and numerous devices have been suggested for lessening the jar occasioned by the heavily constructed freight car springs. At Metz in '70, Wurtemberg soldiers were back in their own town hospital in Stuttgart in thirty-six hours after the engagement.

The method of suspension by rubber rings as devised by Harris during our war, is open to criticism from the risk of breakage, yet no system contemplating placing such large numbers in one car can be free from objections. In these cars thirty or forty could be carried on the various tiers, while by the Baden plan, as exhibited at the Champ de Mars in 1867, not more than eleven could be conveyed in a single car, and by Gauvin's Spring Bed Stretchers, only eight. The Baden plan contemplates relieving the jar by suspending the litters upon swinging bars. By Grund's system the supporting cross-bars for the stretchers are not suspended, but rest upon steel semi-elliptic springs, and this is probably the easiest and most speedy plan for fitting up freight cars for hospital service. Zavodovsky's plan is to suspend poles from the roofs of the cars by ropes and to rest the stretchers upon these poles, but the oscillation is too great for comfort.*

In irregular warfare, or when removed from the base of supplies,

*For further most interesting facts in relation to army transportation, see Otis & Huntington's Medical and Surgical History of the War of the Rebellion, part III, Surgical Vol., chapter XV; also Otis' Report on Transportation of Wounded Soldiers by Railway, Washington, War Department, S. G. O., 1875; also Longmore's Transportation of Sick and Wounded Troops, London, 1868; also Loeffler, Das Preussische Militar Sanitatswesen und seine Reform nach der Kriegsfahrt von 1869, Berlin, 1868, B II, 251; also Esmarch, Verbandplatz und Feldfazerette, Berlin, 1868; also Gurit, Abbildungen zur Krankenpflege in Felde, Berlin, 1868.

peculiar methods of transportation are often extemporized. In the Zulu war, convoys were obliged to carry the wounded no less than four hundred miles, a large portion of the distance being in lumbering wagons, drawn by a long string of oxen, $2\frac{1}{2}$ miles an hour, over ant heaps and boulders, along the rutted roads where the wheels sank almost to the hub, and this, too, through a hostile country, where the sparse population of Boers would not even sell milk and other necessities to the suffering men. Here at last American skill came to the front, and light, but strongly built wagons, drawn by mules, were found to render most useful service.* For these long marches air beds would be very desirable, and while their cost would be great, yet they would be compact and light for carriage.

Stretchers made with long poles may be borne great distances by being



Fig. 10. Two-horse Litter, U. S. Army.

placed between two horses, mules, or oxen, and even camels and



Fig. 11. Two-horse Litter.

*In the Transactions of the International Medical Congress, London, 1881, Section Military Surgery and Medicine, the subject of Transportation of the Wounded is most fully discussed.

elephants have been made to do excellent service in this direction. Nor is this means of transportation to be despised, as it was formerly esteemed the most easy and genteel method of carriage. The kings of Bithynia,



Fig. 12. Two-horse Litter of the Sixteenth Century.

the ancient Romans, and many of our modern Orientals have delighted in the comfort of a palanquin, carried by trusty slaves or by animals. True, this means of progression had its disadvantages, as a stumbling mule might cause a too speedy descent to the ground, yet the same objection would hold true in regard to all horse back exercise. An unpleasant occurrence was once experienced by General Skipton, who, returning to London upon one of these two horse litters, had one of the animals attacked by a fierce mastiff, who took such hold that the horse "grew as mad as a mad dog, and the General was tossed like a dog in a blanket."* Other forms of litters or cacolets (from *cague au lait*, as casks of milk

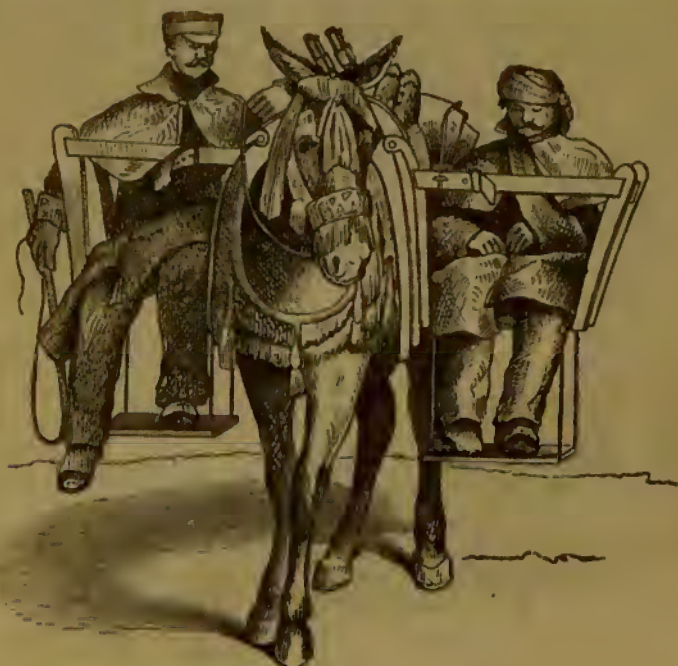


Fig. 13. British Crimean Cacolet.

*Knight's London, Vol. I., p. 24.

were carried in this fashion, or the word may be a corruption of cabriolet, a little arm chair), for use in mountainous regions are made to be attached to the backs of trusty mules, but their great weight and other inherent

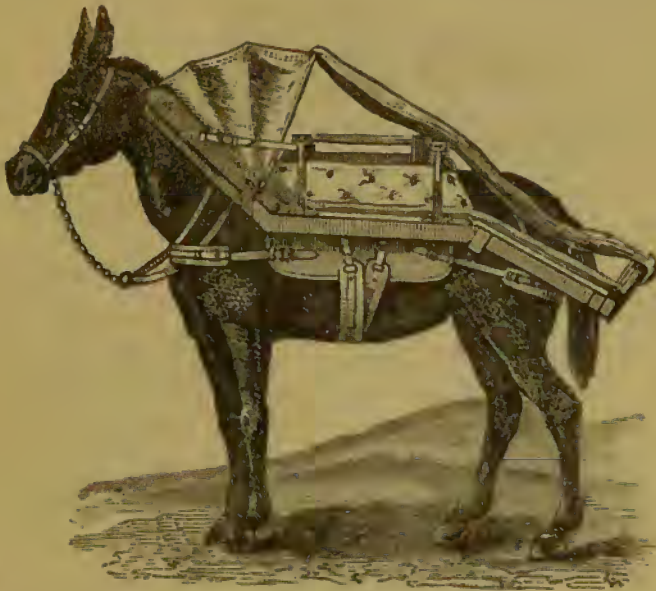


Fig. 14. British Army Mule Litter, attached to the Pack-saddle.

difficulties have prevented them from rendering much real service, and although our government spent nearly \$100,000 upon them during the late war, they can only be of real service in places inaccessible to wagons. In Indian warfare in our own country, scouting parties are often attacked when far from their base of supplies, and are obliged to bring their wounded many miles over rough roads. The unfortunates are sometimes fastened to the backs of mules, sometimes carried on the horse litters as above described, or drawn upon an Indian *travée*, made by attaching



Fig. 15. Wounded soldier on a *travée*.

the ends of two long poles cut in the woods, to the stirrups of a horse or mule, the other ends being allowed to drag upon the ground. Between these poles some material is stretched, as canvass or blankets, and the soldier being placed therein is dragged along at the risk of tumbling out, or being upset by the rough ground. It is surprising how easily, however, a moderately wounded man can be carried by this method, as has been done even one hundred miles.*

The use of plaster of paris, and other unmovable dressings, has added greatly to the comfort of the injured, and there are few places where some starchy or clayey substitute for this cannot be found, which with the bark of trees will suffice for securely preventing a fractured limb from receiving further and serious injury, when splints like Fagan's cannot be obtained.

Such expedients as have been mentioned are frequently necessary in emergencies, but the far-famed humanity of the city of Philadelphia cannot afford to see her suffering citizens borne through the streets, except in the most comfortable manner that modern ingenuity can devise.

A few moments consideration will convince the thoughtful of the practicability and advisability of the plan of action proposed in our city, and we will hope to see it soon in successful operation.

* Circular No 9. Transportation of soldiers on pack animals, Otis, S. G. Office. War Department, U. S. A.