

is concerned. The blank of the right length for the buckle is placed in dies and bent on one end only; it is then reversed, and the end first bent is placed in the slotted end of die, while the blank is bent at the open end. This gives the buckle the proper form, and it is then placed in the finishing dies and given the correct dimensions to fit the upper frame.

The buckles for lower section of frame are made in the same dies, and examples of both are shown in the illustrations. It will be remembered that it is not common practice to put up buckles without more or less fitting after leaving the smith's shop; and the saving effected by the method shown is at once apparent, as it must have been also in the examples of work done preceding this, but which do not comprise all the possibilities in this direction by any means. Enough has been shown, however, to satisfy the most skeptical that the bulldozer can be made one of the largest factors in reducing blacksmith shop expenses.

In addition to the dies we have illustrated, there are many others in commission here that are equally as useful as those shown. On account of their general similarity in design we will only mention the work they do: Brake staff guide, brake staff carry iron, brake beam hanger, ends for dead lever rods, spring hangers, all brake rod jaws, draft timber braces, draft timber straps, draw bar carry irons, running board braces, end door slides, arch bars, body bolster plates, clips for wrecking frogs, release springs for brake beams, balance springs, axle guards, lug irons for Miller draw bars, door post plates, reverse lever sectors, crown bars, crown bar washers, chafing plates for trucks, spring pockets, tender steps.

This comprises a very complete outfit, but it is being added to whenever occasion arises, and if there are any other shops that can approach this in point of thoroughness in the way of specialties for cheapening the cost of work, we would like to know where they can be found, for it is our mission to put the best processes for doing work before our readers.



One English Engineering Opinion.

There is a journal published in London, called the "Engineer," which makes abuse of everything American its weekly theme. The crank whose daily labor is finding new excuses for slandering our people, our industrial productions and our engineering practices, has become unusually rabid over the fast run made on the Lake Shore & Michigan Southern by the Brooks ten-wheeler. He wastes an array of figures to prove that the record made was an impossibility. To aid in proving this, he makes the astounding assertion that it has been shown by experiments in the United States that not more than one-half of the power developed by a loco-

motive is available for hauling the train. Think of a paper pretending to be a guide and mentor of engineering thought permitting a statement of this kind to be made seriously in its columns. It is well known that the internal resistance or friction of our locomotives is less than those used in England, and the resistance of their engines is seldom more than six per cent. The "Engineer" was unusually polite in its assertion that the fast run referred to was an impossibility; its usual mode of expression is "Some more Yankee lies."



A Continuous Feed Track Drill.

Our illustration represents a new track drill recently put on the market by the Bignall & Keeler Mfg. Co., St. Louis, Mo.

By means of the double bevel gears and ratchet the feed is made continuous—the drill advancing with every movement of the lever, be it in either direction.

A detailed description of the tool is not necessary, the cut tells the



story. The frame or "old man" is of steel, and, therefore, light to carry around, and one of the greatest advantages is that the whole thing is entirely out of the way of passing trains.



The New York Central people are determined to keep up the reputation they have secured by running the fastest regular train in the world. At the beginning of last month they shortened the time of the Empire State Express 25 minutes in the run from New York to Buffalo. The time consumed in the run of 440 miles is now $8\frac{1}{4}$ hours, which makes an average speed of 53.33 miles per hour. This is a very high average speed, but there is no fear but it will be made regularly. A curious thing about the Empire State Express is that it gets to the journey's end on time more regularly than any train we know of. It is said that the shortening of the time was done to surpass the speed of a train on the East Coast route of Great Britain, which has lately been accelerated to make an average speed of 52.46 miles an hour between London and Edinburgh.

"Discipline Without Suspension."*

BY GEO. R. BROWN,

General Superintendent, Fall Brook Railway.

The usual penalty for a serious violation of rules on American railroads is dismissal from the service. Minor infractions are usually punished by depriving the offender of employment for a fixed time—ten, thirty or sixty days; a few roads have adopted the European practice of direct fines. In my estimation, as a rule, these forms of punishment are as unjust and inhuman as they are unnecessary.

It is a well understood principle in jurisprudence that a law without a penalty for its violation partakes more of the nature of advice than of law.

The rules and regulations governing the running of trains on a railroad are laws, and should be so considered, and penalties for their violation are not wanting.

The responsible officer or officers of a railroad must act as judges, try every case, make every decision and punish every violator. It is not only their right, but their duty, to be strict in maintaining discipline. They have no right to excuse one offender and punish another, but must try every case on the calendar.

Penalties are imposed for two purposes: First, to uphold the law and prevent its further violation; and, second, to reform the violator.

Punishment inflicted indirectly benefits thousands who do not violate the law as well as the one who does.

It often occurs that the disgrace and injury occasioned by a strict enforcement of a sentence does more to ruin the guilty than anything else, and a wise provision has been made allowing courts to use their judgment as to carrying out punishments; this is known as "suspending sentence." If the some-time offender does better, and is not guilty of the same or other offences, the judge conveniently forgets the indictment hanging over him, but should he go on committing one misdemeanor after another, his "record" rises up to condemn him.

I believe in the practice "suspending sentence" with railroad employes.

Officers of railroads differ from Judges of the law, in that they make the law and enforce it, while the Judge administers the law as he finds it. If the people are dissatisfied with the laws they change them, but there is no appeal from the decision of the railway official who performs the functions of Judge, jury and executioner.

Railroad officials who hire, discipline

* Under the caption "Discipline Without Punishment," Mr. Brown contributed an article similar to this to the February, 1894, edition of LOCOMOTIVE ENGINEERING. Several roads have adopted this plan, now known as the Brown System, and the operative officials of America have been deeply interested in the subject, discussing it at their meetings, etc. The demand for the paper setting forth the plan long ago exhausted the edition, and Mr. Brown has consented to revise his article and again explain his plan in this paper, as much to avoid writing long letters on the subject as anything else.—EDITORS.

and discharge employes cannot be too careful in exercising their authority, and no honest one can afford to decide on a single case without first "putting himself in the other man's place." In other words, treat him as he himself would consider just and honorable if the sentence was to be pronounced on him, and the decision should be made impassionately, impartially, and giving him the benefit of all doubts.

Accidents have happened on railroads since the starting of the "Puffing Billy" until to-day, and are likely to happen as long as railroads are operated.

Every wreck, every accident, every mistake, every loss has taught its lesson, and these are of no less value to the railroads and to railroad men than the successes. I practice making every mishap a lesson to every man on the road.

It often happens that an accident, or a "close shave" for one, is the best kind of a lesson to the man who could be blamed; and if he is retained in the service, he is a more valuable man than he would otherwise be or who could be hired to take his place.

I am afraid that it would do me no good, and would do me harm, to lay me off for thirty days for any offense; and I am sure I would do no better, when reinstated, than if I had been allowed to continue in the service. I should feel as if I had been ill-treated, as if my family had been deprived of the necessaries and comforts that my earnings afford them, and that they were the innocent victims of an injustice.

In order to make every accident and incident happening on the road a lesson to all the trainmen, I established twelve years ago a Miscellaneous Bulletin Board.

On this we post up brief accounts of mishaps and other occurrences on the line, pointing out how such trouble could be avoided, etc. This board is closely scrutinized. We do not mention names, but, of course, the men know "who's who" in most cases. This board has done much to keep the men on their guard, prevented many accidents, and shows them how headquarters look at every case, instead of letting them discuss every accident around the roundhouse and caboose stoves and form their own conclusions—no two of which will be alike.

To show the class of notices posted, I inclose a few that have appeared. We usually leave a notice up for ten days.

A train was derailed at Hammond. They had five cars of through freight, which they failed to give to train 84, which passed them at that station, making various excuses for not doing so, none of which are valid. These cars were all delayed at Corning, and two of them were twenty-four hours late arriving at Chicago on this account.

Please remember there are no exceptions to the rule, unless you have a written order to that effect, which will not be granted under ordinary circumstances.

This is a matter of record.

Trainmen will please discontinue throwing water at each other on the road. The party receiving the water is liable to slip or fall and injure themselves, perhaps very seriously. The stormy weather will afford the brakemen all the outside application of water that is necessary.

Please report any violation of this order to me.

I regret to announce that 13 out of 46 freight and coal train conductors who have worked the full year ending with May 31, 1895, have lost their \$60 premium. Last year there were but three out of 47 who lost it.

We believe it is possible, and we hope that the coming year every conductor in the employ of the Company will be entitled to this premium, ending with May 31, 1896.

Please remember that it remains entirely with yourselves whether you get it or not. The original notice stated that your services must be entirely satisfactory for the full year in order to insure it. Please make diligent effort, each and every one of you, to procure this \$60 with your May pay for 1896.

Caboose No. 27 had to have a new set of springs put under it on account of being loaded too heavy with links, pins, etc. There was taken out of this caboose 2,020 pounds of unnecessary material.

Conductors will only allow such material in their cabooses as may be actually necessary, and not load the boxes down for the purpose of making the springs ride easier; and it is unnecessary to haul a ton of this material around month after month.

I understand that recently, at a night telegraph office, the semaphore light had gone out and the blade was wrong when a train arrived at the station. This was not reported to Corning office by the train so finding it, and should have been done from the next telegraph station. All conductors and engineers will please report any violations of this kind at once.

Please remember that employes' lives are jeopardized when operators do not strictly comply with rules and regulations, and parties who know and do not report these things will be considered as guilty of negligence as the operators themselves.

Train 86 met train 69 at Cooks. The side track did not hold 69. The man on the rear gave signal to go ahead. This was construed by the man on the head end as a signal to stop. They took it that the train was in the side track and covered up their headlight. A brakeman in the center of the train comprehended the situation and flagged 86.

Investigating, we find that men are very careless about giving signals. When a go-ahead signal is given at arm's length by their side, instead of being raised and lowered vertically, it makes a part of a circle, which might be construed for a signal to stop.

In future, in giving a go-ahead signal please hold the lantern directly in front of you and raise and lower it vertically, and under no circumstances attempt to give a go-ahead signal at arm's length by your side. Conductors and engineers will please watch this very carefully. As an extra precaution, the brakeman on the head end should have gone out on the main track or bank, until he could have seen down the main track and have known personally whether the caboose was in or out of the side track. This should have been done in addition to all signals, as the engine was around the curve where the caboose could not be seen plainly.

A car billed from Port Allegany to Ulysses, via Ansonia, was taken by a south-bound train to Newberry Junction. This is a matter of record.

A south-bound coal train overtook the way freight at Reading Center, and was nearly stopped when the way freight started. After the way freight passed the station the semaphore was raised, and the engineer of the coal train pulled slowly by the depot the engine and several car lengths, and within six or eight rods on the caboose of the freight.

Two ladies attempted to cross the track after the freight passed, and their horse was scared, and were unable to do so. They were turned around in the street, and a man caught the horse before any damage was done. The engine of the coal train was behind the depot, where the ladies could not see it, and they claim they understood that trains were to run five minutes apart. This is correct, and should have been done. We learn from this:

1st. That the way freight is holding coal trains; which is prohibited.

2d. That trains are following each other too closely; which is prohibited.

3d. That this train passed the semaphore when it was up; which is prohibited.

Under no circumstances must the pilot of a locomotive pass the semaphore pole until the blade is dropped.

A north-bound train had some cars derailed at the south end of Level Corners' siding about 5:17 A. M. The cars ran up the main track far enough so that trains could have passed through the side track had not the frog been injured. The trainmen reported that it was necessary for a wrecking crew, which we ordered of the Beech Creek Co. Instead of taking their engine and going to the section house near Larry's Creek, getting the sectionmen out and telling them what was required to make the side track ready for passing trains, they remained at the wreck, and the wrecking train had orders to stop and get the sectionmen, where they found them surfacing the track, at nearly 8 o'clock in the morning. When they arrived at the wreck they had to go back to the toolhouse for the necessary material and tools to take out the frog and put in a piece of rail—and it was about five hours after the derailment before trains could pass. Had they taken their engine and went immediately for the sectionmen the track could have been made ready in not to exceed one and a half hours, thereby saving delay to all other trains of at least three and a half hours.

Conductors and engineers should always look the situation over carefully and work with a view of getting trains around the wreck at the earliest possible moment, leaving the wreck to be cleaned up later on.

Flags used on locomotives and cabooses in many cases are badly faded. In some cases the faded green flags look very much like dirty white ones. When flags are dirty or faded, new flags must be procured in their places.

Conductors and engineers, please give this your careful attention, remembering that the safety of employes and trains largely depends upon it.

I am credibly informed that engineers, more particularly passenger, find fault with flagmen on account of being flagged, even when it is absolutely necessary that the train should be stopped.

If engineers have any criticisms to make about when they should or should not be flagged, they will please make them at the

office, and not take the matter up with the flagmen personally.

Engines Nos. 6 and 21 collided near the water-tank in shop yard; damage, about \$80. No. 21 was going to the shops after coming in on passenger train. When the yard engine first saw No. 21 they were in one of the shop tracks, and should have remained there until No. 21 passed. Instead of doing this, they backed out on the main track, and continued to back until they saw that No. 21 was not liable to stop.

Yard engines must under no circumstances detain road engines going to or from the shops or their trains.

There is little doubt but what engine No. 21 was making too high speed around the curve, and both engineers are more or less to blame, but particularly the engineer on engine No. 6.

A coal train arrived at the "Y" without any man on the rear end. Investigating, we find that the conductor went over to the engine at Angus; a brakeman got off at Angus to close the switch, and he claims the train ran so fast he could not overhaul it; the flagman got off at Earles to close the switch, and he also claims the train was moving so fast he could not overtake it. There was, therefore, no man on the rear end of the train from Earles to the "Y." Had the train been obliged to stop, no flag would have been sent out, and had it broken in two there would have been no one to control it or prevent a wreck.

1st. The conductor had no business that required him to be on the locomotive.

2d. The engineer should not have left Angus for Earles until he got a signal from a man standing on the rear cars and not on the ground. The flagman should have given a signal to stop the train until the brakeman overhauled it at Angus.

Notwithstanding there is a telegraph office at Earles, not one of these men reported this occurrence to Corning office or to the following train, which shows lack of judgment on their part. Fortunately nothing unusual occurred to cause a wreck.

A brakeman was posted to go on train No. 85. Instead of going, he arranged with another who was not an employé of the company to go in his place, without permission from the office. When called in the office to explain, he said he had been here about two years and did not know that he had to get permission under these circumstances.

For the information of all other brakemen, will say, that the man who went in his place will not receive any pay for the trip, as he was not employed by the company to perform such service, and the brakeman who was posted has been discharged for this and other offences.

The conductor is not responsible, for he supposed this man was an extra man until going down Pine Creek, he asked him his name, at which time he asked the conductor to put the other man's name on the time-slip and he would get his pay from him, as the other man had been here about two years and was entitled to \$1.75, where he was a new man and only entitled to \$1.62½ per day.

If we have any more brakemen who are so ignorant of the rules, and do not know they must receive permission from the office when they desire to lay off or procure a man in their place, it is high time that they do know it, and this notice is posted for their information.

We don't always give the boys left-handed compliments. Here is a right-handed one from a farmer.

Wedgewood, N. Y., July 31, 1893.

Mr. G. R. Brown, Gen'l. Supt., Corning, N. Y.:

Dear Sir—Yesterday morning, as train No. 85, drawn by engine 56, was approaching this station, your employés on same discovered a portion of a flock of sheep on the track, and instead of dashing into and over them, by which a number of them must have been killed, they slowed down and used all their efforts, and so managed that not a sheep was injured. I mention this, deeming it worthy of your notice, that the men on train 85 should receive your commendation as making the extra effort in the interest of your company, even if in the line of duty.

We put up a notice that at the end of the year we will pay a cash premium of \$60 to every freight conductor whose services have been entirely satisfactory. It speaks well for the men, when our report shows that forty-five out of fifty-six conductors were awarded premiums for the year ending May 31st, 1892. The reasons the other eleven failed are given below, which shows that some of them lost it through no fault of their service.

1. Brought car of freight for Newberry Junction to Corning as an empty car.

2. Absent on vacation about a half year.

3. Stood in Billsboro side track to switch car in spur; set one brake back of car to be switched. Rear end ran down and collided with car going in spur.

4. Only worked part of year; resigned.

5. High speed, Beaver Dams to Watkins, and from Log City to Long Point.

6. Violation of rules. He supposed engineer had sent flagman.

7. Put two cars off end of side track at Dresden by giving back-up signal without receiving same from man on rear end of the train. Broke telegraph wires. Did not report it until next day.

8. Ran double-header to Beaver Dams, and only took cars that one engine should haul. (Since discharged for drinking. Now proprietor of saloon in Corning.)

9. Allowed 3d 70 to pass Cooks less than ten minutes behind; the second section overtook them south of Presho and collided.

10. Left car of horses at Himrod's Junction that were shipped for Watkins. Man in charge told him it was an error on bill. Left car without asking for instructions.

11. Engine "John" (pony engine used by officers of company) found train south of Earles; his flagman not out proper distance; conductor in caboose, and could see flagman plainly.

For the year ending May 31st, 1893, but three conductors lost the premium, for the following reasons, viz.:

1. Ran into truck loaded with steel rails. Section flag out 20 telegraph poles. Had 62 cars, running too fast; no brakeman in center of train.

2. Backed train out of south end of Four Mile Run side track without sending flagman to protect his train.

3. Left cars on farm crossing in Hil-

born storage track; also left tin box at Lyons containing way-bills.

We also pay premiums to section foremen for the best kept track. Three premiums on each Division, \$40, \$20 and \$10 respectively. The benefits derived are even more than expected. The condition of the track is at least 25 per cent. better, and the track pay-rolls for the year ending October 31st, 1893, was \$37,199.66, and for the year of 1894 \$41,842.46 less than the average for the eight years before premiums were given.

For the trainmen we keep a record book. This book is never shown to any employé, except that page which is his personal record.

In it I write down a brief statement of every irregularity for which a man is responsible; this record takes the place of the "lay off," and is dreaded fully as much; the man goes to work at once, and no one but himself suffers, and he only in reputation at headquarters.

We are very careful in the selection of our men; promote all our own engineers and conductors, and in a few months or a year or two our record tells us whether they are adapted for the business or not. We have engineers who have been running here more than twenty-five years without a scratch of the pen against them; while others, who have been running as many months, have quite a page full of irregular circumstances; but down near the bottom of such a page can generally be found the words "Discharged—incompetent."

When a man commences to make a record (in the book), we call him in and talk with him. He is reminded that, if this gets too long, we shall have to consider him a failure for our service, show him his weakness, and give him another chance. But he understands that it will not be entirely for the last offense that he is dismissed—the "suspended sentence" cases are against him.

With this system the good men are retained, developed, benefited and encouraged, and the culls are got rid of to the betterment of the service all around.

It is well understood that we do not wish to retain in the service men who deliberately deceive us about mishaps on the road; we want the "straight" of every matter, and we want it at first hands. It would be a very lively detective who could get to my office sooner than some of the men who are responsible for the accidents. If it is not serious enough for dismissal, the matter is overlooked or made a matter of record, and the man goes out on his regular run. Then the "Miscellaneous Board" has another object lesson on it.

If there is anything that will stimulate a good man, who has become careless enough to make a lapse of duty that "gets him in the book," more than that simple record, I do not know what it is; but when the record is made and the victim warned to look out and attend to busi-

ness in future, and to take his run out in the morning, he goes away with a mental vow that he will try and make his services satisfactory in future. On the contrary, if he reasons that the record is an easy way out of his trouble, makes light of it, and is frequently called on to explain irregularities, it is the best of evidence that he should not be retained in the service any longer. Some of the records are years apart. In some cases a memorandum is made, and never an occasion given for a second one.

Good men who have made some little mistake, are less likely to do so again than men who have not yet tried the responsibilities of running trains and engines, or men who are not familiar with our road or work. If the responsible officer takes such an offender into his office, talks the matter over dispassionately, and tells him that he is considered too good a man to be discharged for incompetency; that the accident has cost so much, which the company will stand "this time," but perhaps not the next; tell him that this is a matter of record against him, and if he desires to remain in the service these irregularities must not occur, this has a tendency to make better and more successful railroad men of the ones that are naturally adapted to railroad work—and the "next time" comes only too soon to the man out of his sphere.

There is nothing in this to disgrace him among his fellows, nothing to make him feel revengeful or maltreated; but everything to make him feel as though he was encouraged and helped, and that his final success depended solely upon himself. Can as much be said of the plan that disgraces a man among his fellows; that takes the comforts, and, perhaps, the necessities, from his home; that makes him a loafer for thirty or sixty days, and puts him in way of temptations that he would not find at his work, and that leaves him, in many cases, in debt to the dealers who furnish his family with supplies?

On many roads there is a great want of cordiality or confidence between the men and the officials immediately over them. In too many cases a suggestion from a trainman to an officer would be resented as an unwarranted interference. It seems to me this is not in the interest of the railroad company, however much it may enhance the dignity of the official—who is himself only "one of the hired hands" with a little more responsibility.

I have found suggestions from the men of vital importance in matters of detail, and every man in the service knows that the rule and motto at headquarters is, "Suggestions are always in order."

Train and enginemen see and know things about the road that an operative officer could never find out in his office. At their suggestion, we have frequently made minor changes in time-tables, etc., and every change has been an improvement. A laborer on a section may sug-

gest something that will save the Company hundreds of dollars, and besides this, it encourages men to think and become more interested in their work, and feel at liberty to offer other suggestions.

When a suggestion is made that is considered impracticable, the reason that it is so is pointed out, and both the man and the manager have learned something. I am sure that this rule makes and keeps up a friendly feeling between the men who plan the work and those who execute it.

Roads that can afford to let one department fight another, who can afford to have hundreds of employes disinterested and dissatisfied with their work, who can afford to have the officers "out" with the men, and the men glad to see any hoped-for improvement a failure, are few and far between.

The suggestions set forth in this article may not be practicable everywhere, but on a moderate sized road (Fall Brook has 257 miles all single track, with an average

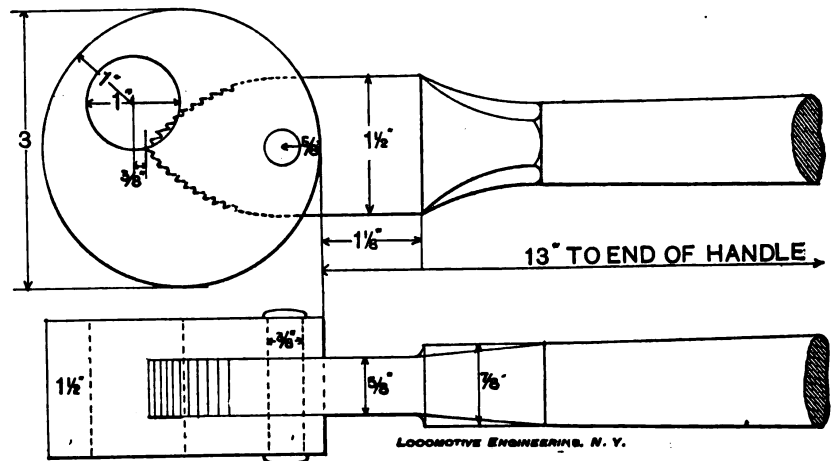
toothed gripping head forming an extension of the handle.

The disk is pivoted to the handle, so as to move freely. The serrated part of the wrench is made elliptic in form, and the two edges are toothed, so that when the sleeve is slipped over a stud the teeth in either edge may engage with the stud at will, depending only on the way it is desired to turn the stud—out or in.

Having had several falls taken out of us during our shop experience by dallying with a slippery alligator, we were ready to admire the tenacious grip of this little tool, that can give points to even the octopus in staying power, for it is absolutely impossible for this wrench to slip, its action being that of a cam.



The Moran flexible joint used on the P. R. R. big compound "1515" has been in use now for over three years, giving good service and no trouble. This joint



STUD WRENCH.

tonnage of about 6,000,000 yearly) where the superintendent knows all the men, or most of them, it has worked so well for years that I have an abiding faith that it will work anywhere and in every case in the interest of better service.



A Stud Wrench.

While on an exploring trip through the One Hundred and Forty-fifth street shops of the Manhattan Elevated Railway a few days ago, we were shown a well-ordered little tool-room that bore every evidence of being conducted on business principles by a mechanic who builded for the future as well as for to-day.

The tools arrayed in their respective racks looked much like the display of a machinery supply house—so clean and bright.

Among several creations of this place we noticed the stud wrench shown in our illustration, which looks like a combination of the sleeve and alligator features of other wrenches; but it stands alone, distinctively original, consisting of a disk-like sleeve which is slotted to receive the

does away with leaky hose, insures the full opening all the time—hose kinks up—and is not affected by the heat, by ashes or bad water. It is a question if the time has not come when a flexible metallic connection must be used between engine and tender, at least on steam heat and water supply, if not on air.



Every railroad man and every traveler will be interested in a verdict lately rendered by a court in Brooklyn, N. Y. In New York State a constitutional provision changed the iniquitous law which made \$5,000 the limit of damages for causing the death of any person. The wife of a citizen of Brooklyn was killed by a trolley car, and he sued the company for \$50,000 damages. A verdict for \$7,500 was given. The trolley company appeal to find out if the constitutional change cannot be overruled.



The Santa Fé fast train is hauled over the Southern California by oil-burning locomotives. The Southern Pacific are equipping two of their engines with Booth oil-burners, at their Los Angeles shops.