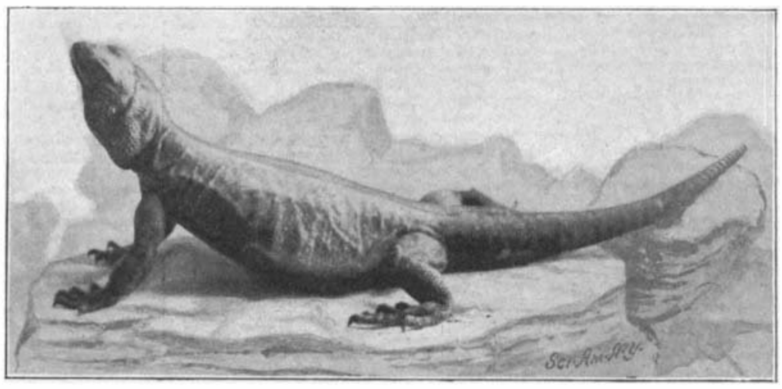
in an incredibly short time. In place of the ordinary bucket, the shovel is attached to the trolley rope, the latter traveling on overhead tracks, suspended from the roof of the storehouse or from a bridge tramway. The operator at the lever controls at all times the motion of the bucket. This method is being extensively used in the Pennsylvania anthracite regions for loading cars from storage piles, and at the breakers. It is also in vogue for handling coal under roof, the illustration showing the interior of the plant of the Philadelphia & Reading Railroad Company at Cheektowaga, N. Y., near Buffalo. This is one of the largest coal sheds in the country, being 674 feet long and 354 feet wide, while the trolleys are operated at an elevation of 80 feet above the floor, allowing the material to be piled to a height of 70 feet. The total storage capacity is 250,000 tons, and with the equipment of the shovel buckets provided, 3000 tons can be transferred in 10 hours.

Another interesting form of the Brown hoist is the type used by the Cramp Shipbuilding Company. As will be noted in the illustration, the cantilever is divided into two arms, one aiding to balance the loaded arm by means of a counterweight. It is operated by electric motors, which give it a speed of 200 feet a minute, hoisting a load of 14 tons. It can "trolley" the same weight at the rate of 500 to 800 feet a minute, and move along the tramways carrying 5 tons at the rate of 750 feet in a minute. It serves two sets of shipways at one time, and two men only are required for its operation. As a further indication of the performance of these cranes in shipbuilding, it may be stated that a cantilever at the yard of the Cramp Shipbuilding Company transferred the sternpost of the battleship "Retvizan," weighing 18 tons, from the railroad cars in the front part of the yard to its proper position in 20 minutes, including all the time required to secure it temporarily.

On the front page is shown a car-dumping machine, which is notable for its massiveness and power. Its principal features are a cradle, into which the car is clamped, which turns the car and discharges its contents into tubs or receptacles, and overhead traveling cranes, which transfer the tubs with their contents into the hold of the vessel to be loaded. When the cradle is in its lowest position, as shown in the picture, a loaded car of coal is pushed into the same by means of the car-pushing device, or "ground-hog," which is so named because it rests in a pit between the tracks, when not in use, to enable the cars to pass over it. Once in the cradle, the car is quickly clamped on the top and sides with hydraulic clamping-bars, and the engines set in motion, slowly turning the cradle over until the car is upside down. During the process of overturning the car, the coal has rolled from the car into six hopper-compartments attached to the cradle, and these six hoppers have each of them entered a transfer-tub, also shown in the picture. The hopper-compartments have doors which are automatically released on touching the bottom of the transfer-tubs. Therefore, when the cradle is returned to its original position, the car of coal is left in the transfer-tubs. It is necessary to put the coal in these oblong tubs, so that it can be lowered by cranes into the vessels. When the cradle has returned to its former position, the empty car is pushed out by the next loaded car coming in, and runs by gravity to the empty track; then the loaded car is clamped in place and the operation repeated. In the meantime, however, the tub-hauling car, containing the tubs just filled, is pulled away by the operator, and replaced by a car containing empty tubs.

Two overhead steam traveling cranes, running over the machine at a speed of 600 feet per minute, and provided with telescopic rams which work independently of the balance of the machine, take the tubs, one at a time, from the tub-handling car and lower them into the ship's hold, where, after touching the ship's bottom or the top of the coal pile, the doors are released, and the coal rolls out as the tub is returned to the car. The next tub is then dumped in the same manner. When all the tubs are emptied, the car is returned to the hoppers for another load. The crane operator can distribute the coal to all hatches. The vessel is on an even keel at all times. Two overhead cranes are ample to handle 5000 tons in 10 hours, and the tipping device is able to handle twice as much. Therefore, with the simple addition of two overhead cranes, one car dumper actually has a capacity of 10,000 tons in ten hours. The use of the bridge tramway and its modified forms is largely responsible for the rapid increase in size of the vessels on the Great Lakes. Fleets are now plying between Lake Superior ports and Cleveland, Conneaut, Buffalo and Chicago which carry from 6000 to 7500 tons of cargo each—as much as a large ocean-going tramp steamship. The largest of these vessels can be loaded or unloaded in less than 24 hours by means of the bridge tramways and fast plants, or the car dumpers, as the records show. Six thousand tons of ore have been taken from the steamship "Carnegie" at the Conneaut docks in 16 hours' working time, an average of 351 tons an hour. The steamship "Superior City," carrying 6700 tons, has been unloaded at South Chicago in 11¾ hours, an average of 569.2 tons an hour, while the "Manila," perhaps the largest cargo carrier on the Lakes, has been cleared in 12½ hours, an average of 592.4 tons an hour. The "Manila" and "Superior City" are provided with twelve and thirteen hatchways, respectively, and a bridge tramway was connected with each hatch. The cost of handling ore by this method varies from 1.32 cents per ton to 1.75 cents, depending upon the price paid for labor and fuel at various points. In tests made of coal-dumping machines at Toledo, Ohio, twenty-seven vessels were loaded with 57,100 tons of coal at a cost of 3.48 cents per ton including premium, allowance for repairs and supplies, and 114 hours' time for which the men were paid when the apparatus was not worked. Coal has been loaded by this method at a cost of 3.3 cents per ton, allowing for all expenses except interest upon the plant. The force required to handle one of the coal-dumping machines at this dock consists of four men for handling the buckets, two to operate the "ground-hog," one car puller, two signal men, and from twenty to thirty men for trimming the cargo according to the size of the boat.



CALIFORNIA BLUE-TAIL LIZARD.

SOME CALIFORNIA LIZARDS.

BY CHARLES F. HOLDER.

The stroller through Southern California cannot fail to notice the remarkable lack of noxious animals which are supposed to be a part of the equipment of tropical or semi-tropical countries. They may be summed up as rattlesnakes, tarantulas and scorpions, but are rarely seen, and as a rule have to be hunted for. Among the attractive animals are the lizards, which, owing to the peculiar changes of climate between day and night, pass through a winter sleep every twenty-four hours. Especially in the San Gabriel Valley every pile of stones or brush which affords a shelter has its lizard contingent, the one most in evidence being the brownish, bronzed alert little creature shown in the accompanying figure. It is generally found on the topmost stone, lying basking in the sun, a miniature Moloch. In color it ranges from a dark steel blue to brown, and has more or less power of assimilation. As you approach, it resembles the darkest stone, and possibly would not be noticed did it have the wit of some of its fellows; but perchance there is an element of vanity in this lizard as, at least in the experience of the writer, it apparently cannot resist the temptation of displaying its splendors and trying to dazzle the observer. This is accomplished by rapidly raising and lowering the body, which results in a blaze of bluish iridescent tints if the sun is shining, that at once attracts the attention and might disconcert a timid enemy. The lizard continues the movement, lifting itself rapidly on its fore-legs, displaying its charms, which are in the nature of a vivid iridescent patch just beneath the head and upon the breast, not visible when the animal is in its normal position, but brought sharply into view when the lizard stops, raises its head and moves rapidly up and down, as a man waves his hand to display the dazzling effulgence of a diamond or ruby What the object of this movement is, may be conjectured. It may be to arrest a pursuer or frighten it; yet the chief enemies of the lizard are the garter and other snakes and the roadrunner —foes which would not be stopped by so whimsical a display.

One of the most interesting members of this tribe is the blue-tail lizard. The body is dark brown, long and attenuated, the slender tail a vivid turquois blue. So conspicuous is the latter that at some distance off it would attract the attention of the most indifferent animal or person, and is apparently a dangerous appendage, drawing notice to the defenseless bearer. But the lizard has other qualifications which offset this brilliant lure; it is one of the most agile of all the tribe, its movements being inconceivably rapid, so much so that in many months the writer secured but one specimen, though many were seen, and then the tail would often be tossed off, remaining a wriggling lure while the animal itself escaped.

The cañons of the Sierra Madre are interesting localities in which to observe the lizards. Among the ferns and dry leaves they are constantly scampering about; now clinging to some branch or bough in pursuit of insect prey, or lying prone upon a moss-covered bowlder in the hot sun, simulating it in color and tint to so remarkable a degree that it is almost invisible until touched. Other lizards, sluggish forms, are found in damp places, also imitating the color of the leaves. All these lizards have their enemies. The garter snakes capture many of them, rattlesnakes being equally dreaded. The butcher birds are always on the lookout for them, and the dried skins and skeletons of lizards are seen hanging to limbs of trees or impaled upon the spines of orange trees.

But the most insatiate enemy of the California lizard is the bird known as the chaparral cock, or road runner. Its fierce eye never fails to penetrate the cunning disguise of the lizards, and the latter are picked up and devoured by this bird in astonishing numbers. The writer has taken ten lizards from the crop of a single bird—not so suggestive of its appetite as its discerning powers. The road runner is remarkably fleet of foot. It is difficult to run it down with a fleet horse, as curiously enough they will run a long distance when pursued before taking to the wing, doing this only as a last resource. Their agility on foot explains why they capture so many lizards.

On the edge of the great mesa that reaches down from the base of the Sierra Madres, the earth is perforated in every direction with the holes and tunnels of the lizards which undergo this strange winter sleep every twenty-four hours. At night in winter they become rigid and stiff, and enter a state of hibernation or coma. In throwing over piles of stones early in the morning many would be found in this condition, unable to move, apparently unconscious, but after a few moments' exposure to the sun they become active. In the Northern States, in the winter sleep the lizards descend into the earth and lie dormant until summer, but in California the winter sleep is undergone every winter night.

Circumference of double trunk, 8 feet 5½ inches. Area covered by vine, 115 feet square.

BIG GRAPEVINE AT SANTA BARBARA.

SANTA BARBARA'S BIG GRAPEVINE.

BY M. C. FREDERICK.

Wherever the fame of Santa Barbara has spread, that of her big grapevine has likewise expanded. The vines are of the Mission variety, brought from Spain by the Mission Fathers.

There was many a pang of regret when, in the Centennial year, it was known that the old landmark in the Montecito Valley was to be cut down and a portion of it removed to the exposition at Philadelphia; but it was whispered that relentless Age, who is no respecter of grapevines, was beginning to impair its vitaiity, and that the inevitable was only hastened a little by the intervention of man.

No record was kept of the time of planting, but from events connected with the family upon whose ground it grew, it was believed to be seventy-five or a hundred years old. The measurement of its trunk is given as three feet ten inches in circumference, and the arbor about seventy-five feet square. Its death was believed to be premature, the result of changing the course of a small stream that had flowed near its roots.

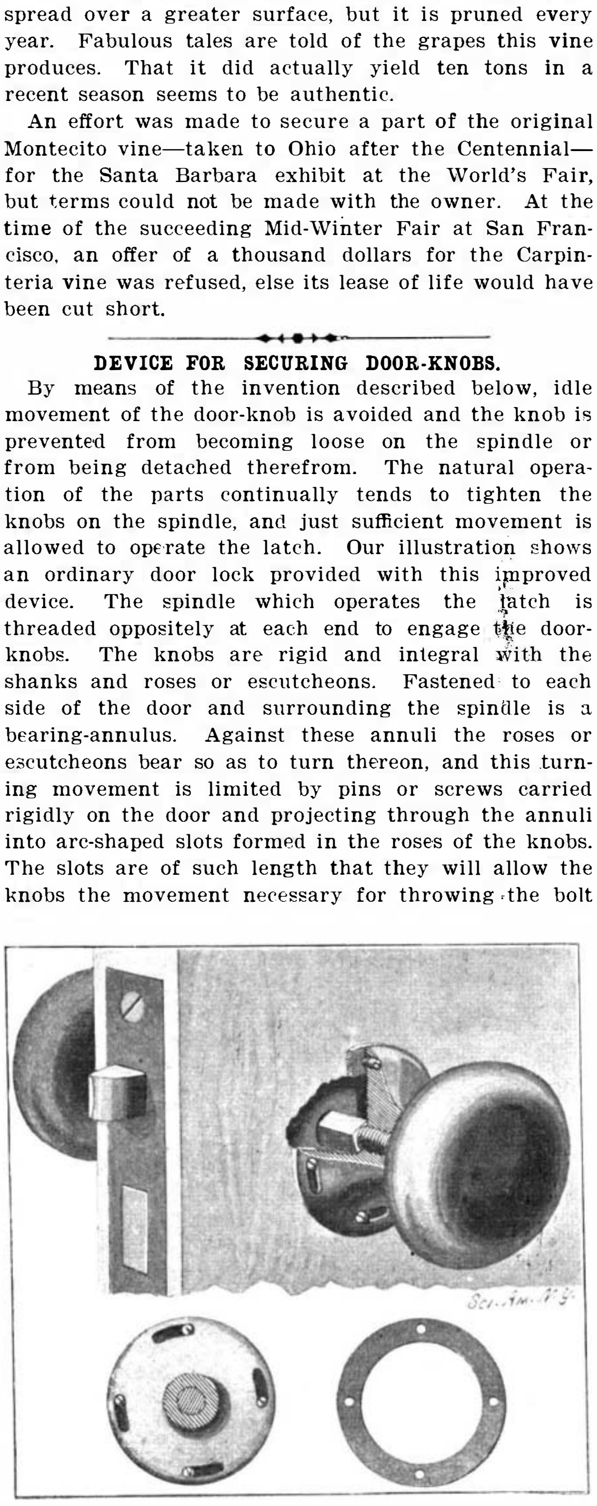
But another vine nearby, a cutting from the original, had attained to nearly this size, so Santa Barbara could still boast of having "the biggest grapevine in the world." In '99 this vine succumbed to a disease of the roots, perhaps invited by age, and its body now rests in the Santa Barbara Chamber of Commerce. Its irregular trunk attained a girth of four feet four inches at eighteen inches above ground, or five feet seven inches at forty-two inches, and its maximum yield was four tons in a season. It was believed to be seventy-five years old.

In the Carpinteria Valley, a few miles further from the city, a third vine has surpassed both of the others in size. It was planted in 1842 by Joaquina Lugo de Ayala, and has therefore just completed its three-score years. The first election in Santa Barbara County under American rule was held beneath its ample shade. This latest candidate for the world record is double from the surface of the ground up; the two parts are knit together in a David-and-Jonathan-like embrace to a height of about five feet seven inches, where they separate into huge branches, the largest having a circumference of three feet. Six inches above the ground the vine measures eight feet five and a half inches in circumference, and it covers an area one hundred and fifteen feet square (the whole back yard), sixty posts supporting the framework. The owner says that, were provision made, it would spread over a greater surface, but it is pruned every year. Fabulous tales are told of the grapes this vine produces. That it did actually yield ten tons in a recent season seems to be authentic.

An effort was made to secure a part of the original Montecito vine—taken to Ohio after the Centennial—for the Santa Barbara exhibit at the World's Fair, but terms could not be made with the owner. At the time of the succeeding Mid-Winter Fair at San Francisco, an offer of a thousand dollars for the Carpinteria vine was refused, else its lease of life would have been cut short.

DEVICE FOR SECURING DOOR-KNOBS.

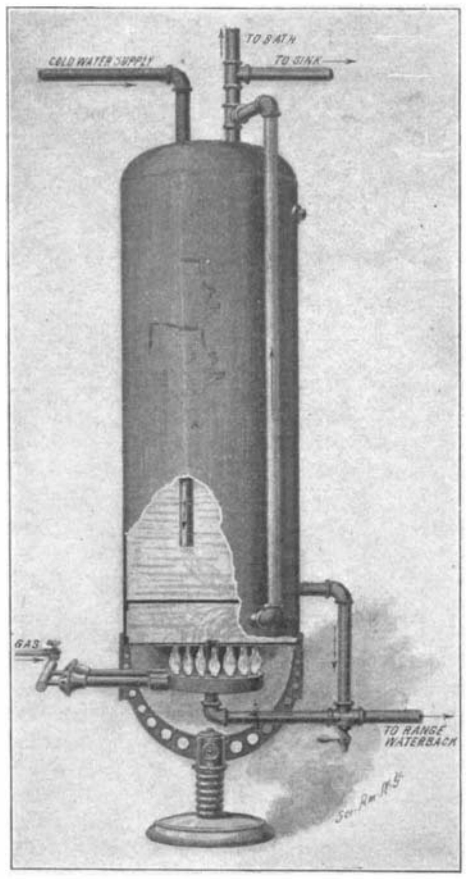
By means of the invention described below, idle movement of the door-knob is avoided and the knob is prevented from becoming loose on the spindle or from being detached therefrom. The natural operation of the parts continually tends to tighten the knobs on the spindle, and just sufficient movement is allowed to operate the latch. Our illustration shows an ordinary door lock provided with this improved device. The spindle which operates the latch is threaded oppositely at each end to engage the door-knobs. The knobs are rigid and integral with the shanks and roses or escutcheons. Fastened to each side of the door and surrounding the spindle is a bearing-annulus. Against these annuli the roses or escutcheons bear so as to turn thereon, and this turning movement is limited by pins or screws carried rigidly on the door and projecting through the annuli into arc-shaped slots formed in the roses of the knobs. The slots are of such length that they will allow the knobs the movement necessary for throwing the bolt of a lock. In assembling the parts the knobs are screwed up on the ends of the spindle until the roses or escutcheons bear snugly against the annuli, and the pins are projected respectively through the slots and through the holes in the annuli, thus holding the latter in position. It is evident that this arrangement securely holds the knobs, prevents idle movement, and permits just sufficient movement for operating the latch. Patents for this invention have recently been granted to Mr. Thomas G. Leslie, of East Melbourne, Victoria, Australia.



DEVICE FOR SECURING DOOR-KNOBS.

A SUMMER WEATHER WATER BOILER.

Probably every housewife who has perspired through a hot summer's day in the small kitchen of a small city apartment, will appreciate at its true worth the simple arrangement shown in the accompanying engraving. Rather than keep up a hot fire during the summer months, many housekeepers do their cooking on small oil stoves and gas ranges. The convenience of this arrangement is, however, offset by a serious objection, namely, the lack of a ready supply of hot water; for the water has to be heated in kettles or pails on the limited surface of the gas range. J. P. B. Sadtler & Co., of 231 Park Avenue, Baltimore, Md., are the makers of a boiler and heater particularly adapted for hot weather service.



A SUMMER WEATHER WATER BOILER.

As illustrated, the boiler is supported on a suitable standard and is heated by a small gas heater. The heater is provided with adjustable valves for the admission of air and consists of a perforated chamber through which the mixed air and gas flow so as to produce a hot blue flame. This provides a very intense heat of limited distribution, so that its energy is confined to the boiler and does not appreciably affect the general temperature of the room. The heater is absolutely odorless and, being situated under the boiler, takes up no room. There are no coils nor complicated mechanism to get out of order and its simplicity should appeal to all. But aside from this an important feature of the apparatus may be found in the construction of the boiler. It will be seen that the boiler is divided into two sections by a false bottom. The lower section being very shallow will be rapidly heated by the burner. Water from the upper section passes out through a pipe near the false bottom, and passing through the center of the burner enters the lower section from below. In this section the water is thoroughly heated and passes through a pipe into the upper section at the top, thus keeping a constant circulation. Bath room and sink connections are made directly to the latter pipe, so that a dozen gallons of hot water can be had in 15 minutes or the entire contents of the 32-gallon boiler may be heated in 45 minutes. The internal arrangement of the boiler prevents the accumulation of mud which so often causes slow heating of the water, and the heater stirs up the water to such an extent as to loosen the sediment, when it may be drawn off through a stop-cock shown at the right of the boiler. It will be seen that connection may be made to the water-back of a range whenever desired and equally as good results obtained; though it is claimed that the gas burner will do its work at a much smaller expense. Where a great quantity of hot water is wanted the water-back of the range and the gas burner can be used at the same time and a continuous flow of hot water can be had.

HARVESTER REEL.

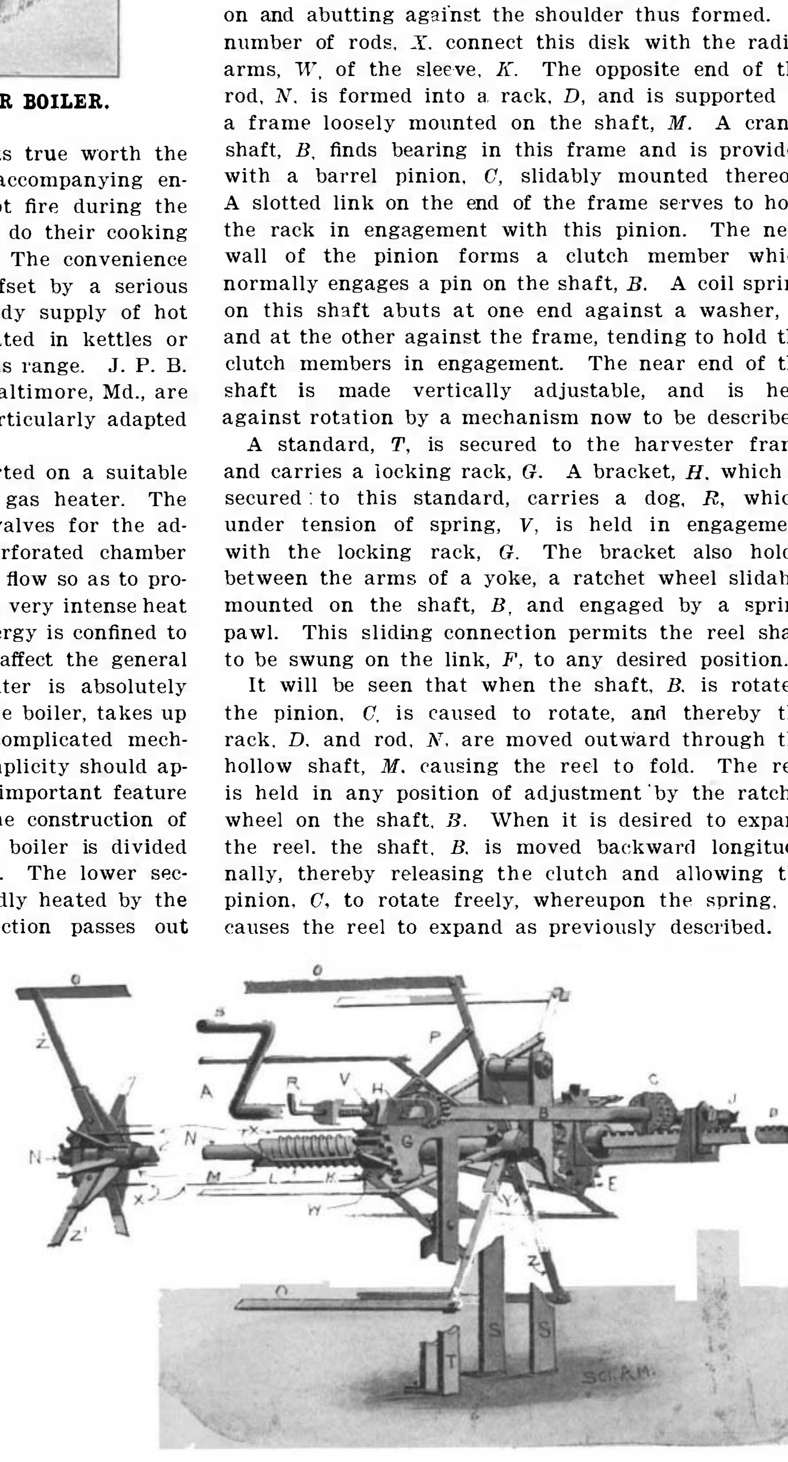
The harvester reel which is illustrated herewith possesses many advantages over those in common use. The reel is so constructed as to permit any desired variation in its diameter, the parts being held firmly in any position to which it may be adjusted. The reel may, therefore, be quickly reduced in diameter to avoid obstacles, and thus prevent breakage. It may also be quickly folded into small space for housing or to permit easy access to the sickle bar and other parts of the machine which often need attention. Being foldable, the reel may be easily moved from one field to another.

The illustration shows the mechanism partly broken away for the purpose of bringing out details. The reel-shaft, *M*, which is hollow, is provided with a driving sprocket, *E*, and is journaled in the bearing link, *F*, which swings from a rod supported by the standards, *SS*. Fixed to the hollow shaft, *M*, are the reel-hubs, having pairs of radial flanges, *Y*, in which the arms, *Z* and *Z′*, are pivoted. At their outer ends, these arms are connected by cross bars or beaters, *O*. A sleeve, *K*, is loosely mounted on the reel-shaft, and to this are pivoted the links, *P*, which connect with the arms, *Z*. By pulling the sleeve toward the outer hub, it is evident that the arms, *Z* and *Z′*, will be drawn from the vertical, thus reducing the diameter of the reel. When the sleeve is released, the spring, *L*, which is coiled between the outer hub and the sleeve, operates to return the latter to its initial position.

The mechanism for operating the sliding sleeve consists of a rod, *N*, which extends through the hollow shaft. Just beyond the outer hub this rod is reduced in diameter, and carries a disk loosely mounted thereon and abutting against the shoulder thus formed. A number of rods, *X*, connect this disk with the radial arms, *W*, of the sleeve, *K*. The opposite end of the rod, *N*, is formed into a rack, *D*, and is supported in a frame loosely mounted on the shaft, *M*. A crank-shaft, *B*, finds bearing in this frame and is provided with a barrel pinion, *C*, slidably mounted thereon. A slotted link on the end of the frame serves to hold the rack in engagement with this pinion. The near wall of the pinion forms a clutch member which normally engages a pin on the shaft, *B*. A coil spring on this shaft abuts at one end against a washer, *J*, and at the other against the frame, tending to hold the clutch members in engagement. The near end of the shaft is made vertically adjustable, and is held against rotation by a mechanism now to be described.

A standard, *T*, is secured to the harvester frame and carries a locking rack, *G*. A bracket, *H*, which is secured to this standard, carries a dog, *R*, which, under tension of spring, *V*, is held in engagement with the locking rack, *G*. The bracket also holds, between the arms of a yoke, a ratchet wheel slidably mounted on the shaft, *B*, and engaged by a spring pawl. This sliding connection permits the reel shaft to be swung on the link, *F*, to any desired position.

It will be seen that when the shaft, *B*, is rotated, the pinion, *C*, is caused to rotate, and thereby the rack, *D*, and rod, *N*, are moved outward through the hollow shaft, *M*, causing the reel to fold. The reel is held in any position of adjustment by the ratchet wheel on the shaft, *B*. When it is desired to expand the reel, the shaft, *B*, is moved backward longitudinally, thereby releasing the clutch and allowing the pinion, *C*, to rotate freely, whereupon the spring, *L*, causes the reel to expand as previously described. A



CONSTRUCTION OF THE HARVESTER REEL.