Rope and Twine Information

The Chatfield & Woods Company

Written by

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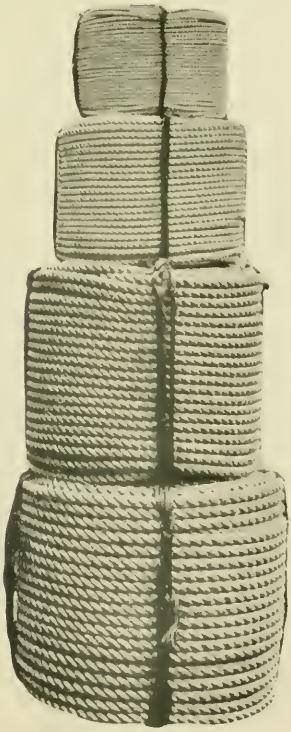
ROPE and TWINE INFORMATION



COMPILED BY

THE CHATFIELD & WOODS CO.

CINCINNATI, OHIO

BRANDS

The use of brands makes the necessity of understanding qualities a simple matter. The best quality of our rope or twine will always be "Crown." The second quality will be "Cross." The next quality will be "Scepter."

It is unnecessary for us to advise you of the importance of mentioning brands instead of grades. Any salesman can readily see the advantage of saying "This is our Scepter Brand" instead of "This is a third-grade rope." The grade of rope is the same whether it is called "Scepter" or "third-class," but the influence on the mind of the customer is not the same.

The best quality of rope or twine that we can offer will be sold under the "Crown Brand."

The "Cross Brand" represents our intermediate grade, and is to be offered when the price of "Crown Brand" is too high and there is danger of losing the order.

For those desirous of the cheapest quality we have our "Scepter Brand."

By using these Brands in an intelligent way all discussions of quality with the customer are done away. As you will find, very few people want to buy third class goods but want to imagine that they are buying first class goods at third class price—and it is not good policy to undeceive them.

TWINE AND ROPE INFORMATION

THE history of Cincinnati and its nearby cities and suburbs is most closely connected with the twine and rope industry. While Boston, New York and Philadelphia are the towns with the largest rope plants of the country, Cincinnati is the home city of the real American Twine industry, and from the foundation made in Cincinnati has sprung up the many twine factories in the United States today.

This fact was largely occasioned by Cincinnati's proximity to the Kentucky hemp fields, and for many years before the Civil War, Cincinnati and its environs was the home of hundreds of small rope manufacturers who spun the yarn at home, and with a small rope walk laid up the home-made yarn into Cordage, which Cordage was used largely in the South for baling cotton. Up to 1860 all cotton was baled and bound with hemp rope.

Many of the present prominent citizens are the descendants of rope makers, whose wives spun the yarn, and whose grandfathers took the yarn into their little rope walks and laid them up by hand. Many of the Cincinnati jobbing houses owe their origin to the fact that these journeymen rope makers wanted an outlet for their goods, and when the Cincinnati jobber went East to buy his supplies he would ship in return, as payment for the goods bought, Kentucky Hemp Rope, and Kentucky Hemp Twine, and thus founded an exchange of products which is being kept up to this day.

The records of the United States Government show that in 1865 the maximum production of Kentucky Hemp Twine and Cordage was reached and the amount was 65,000 tons. This amount is small today, as one manufacturer of Binder Twine makes more than this alone. Statistics show that in 1916 the consumption of Cordage Twine was over 432,000 tons in the United States and in all probability it will keep on increasing. Shortly after 1865 the introduction of Manila Hemp and other Hard Fibres cut down the use of hemp, but the principal decrease in the amount of hemp produced was caused by the introduction of steel bands which replaced the hemp bale rope, and the introduction of Jute as a substitute for Hemp.

The production of Kentucky Hemp was first introduced in 1779 from Virginia, and the first record that is historical of

the hemp growing in Kentucky was in 1782, when it was stated that a band of Indians in attacking the pioneer inhabitants of Bryan Station advanced through the hemp fields.

The most delightful description of Kentucky hemp is that of Mr. James Lane Allen, which is as follows:

"Some morning when the roar of March winds is no more heard in the tossing woods, but along still brown boughs a faint, veil-like greenness runs; when every spring, welling out of the soaked earth, trickles through banks of sod unbarred by ice; before a bee is abroad under the calling sky; before the red apple-buds become a sign in the low orchards, or the high song of the thrush is pouring forth far away at wet pale-green sunsets, the sower, the earliest sower of the hemp, goes forth into the fields.

"Warm they must be, soft and warm, those fields, its chosen birthplace. Upturned by the plough, crossed and recrossed by the harrow, clodless, levelled, deep, fine, fertile—some extinct river bottom, some valley threaded by streams, some table-land of mild rays, moist airs, alluvial or limestone soils—such is the favorite cradle of the hemp in nature. Back and forth with measured tread, with measured distance, broadcast the sower sows, scattering with plenteous hand those small oval-shaped fruits, grey-green, black-striped, heavily packed with living marrow.

"Lightly covered over by drag or harrow, under the rolled earth now they lie, those mighty, those inert seeds. Down into the darkness about them the sun rays penetrate day by day, stroking them with the brushes of light, prodding them with spears of flame. Drops of nightly dews, drops from the coursing clouds, trickle down to them, moistening the dryness, closing up the little hollows of the ground, drawing the particles of maternal earth more closely. Suddenly—as an insect that has been feigning death cautiously unrolls itself and starts into action—in each seed the great miracle of life begins. Each awakens as from a sleep, as from pretended death. It starts, it moves, it bursts its ashen woody-shell, it takes two opposite courses, the white fibril-tapered root hurrying away from the sun; the tiny stems, bearing its lance-like leaves, ascending graceful, brave like a palm.

"Some morning, not many days later, the farmer, walking out of his barn lot and casting a look in the direction of his field, sees—or does he not see?—the surface of it less dark. What is that uncertain flush low on the ground, that irresistible rush of multitudinous green? A fortnight, and the field is brown no longer. Overflowing it, burying it out of sight, is the shadow

tidal sea of the hemp, ever-rippling. Green are the woods now with their varied greenness. Green are the pastures. Green here and there are the fields, with the bluish green of young oats and wheat; with the grey-green of young barley and rye; with orderly dots of dull dark green in vast array—the hills of Indian maize. But as the eye sweeps the whole landscape undulating far and near, from the hues of trees, pasture and corn of every kind, it turns to the color of hemp. With that in view, all other shades in nature seem dead and count for nothing. Far reflected, conspicuous, brilliant, strange; masses of living emerald, saturated with blazing sunlight.

"Darker, always darker turns the hemp as it rushes upward; scarce darker as to the stemless stalks which are hidden now; but darker in the tops. Yet here two shades of greenness—the male plants paler, smaller, maturing earlier, dying first; the female darker, taller, living longer, more luxuriant of foliage and flowering heads.

"A hundred days from the sowing, and those flowering heads have come forth with their mass of leaves and bloom, and earliest fruit, elastic, swaying 6, 10, 12 feet from the ground, and ripe for cutting. A hundred days reckoning from the last of March or the last of April, so that it is July. It is August; and now, borne far through the steaming air floats an odor, balsamic, startling; the odor of those plumes and stalks and blossoms from which is exuding freely the narcotic resin of the great nettle. The nostril expands quickly, the lungs swell out deeply to draw it in; fragrance once known in childhood, ever in the memory afterward, and able to bring back to the wanderer homesick thoughts of midsummer days in the shadowy, many-toned woods, over into which is blown the smell of the hemp-fields.

"Who apparently could number the acres of these in days gone by? A land of hemp, ready for the cutting. The oats heavy-headed, rustling, have turned to gold and been stacked in the stubble or stored in the lofts of white, bursting barns. The heavy-headed, rustling wheat has turned to gold and been stacked in the stubble or sent through the whirling thresher. The barley and the rye are garnered and gone, the landscape has many bare and open places. But separating these everywhere rise the crops of Indian corn now in blade and tassel; and—more valuable than all these that has been sown and harvested or remains to be—everywhere the impenetrable thickets of the hemp.

"Impenetrable! For close together stand the stalks, making common cause for soil and light, each but one of many, the

fibre being better when so grown—as is also the fibre of men. Impenetrable and therefore weedless; for no plant-life can flourish there, nor animal, nor bird. Scarce a beetle runs bewilderingly through those forbidding colossal solitudes. The field-sparrow will flutter away from pollen-bearing or pollen-receiving top, trying to beguile you from its nest hidden near the edge. The crow and the blackbird will seem to love it, having a keen eye for the cutworm, its only enemy. The quail does love it, not for itself, but for its protection, leading her brood into its labyrinths out of the dusty road when danger draws near. Best of all winged creatures it is loved by the iris-eyed, burnish-breasted, murmuring doves, already beginning to gather in the deadened tree-tops with crops eager for the seed. Well remembered also by the long-flight passenger pigeon, coming into the land for the mast. Best of all wild things whose safety lies not in the wing but in the foot, it is loved by the hare for its young for refuge. Those lithe, velvety, summer-thin bodies! Observe carefully the tops of the still hemp; are they slightly shaken? Among the bases of those stalks a cotton-tail is threading its way inward beyond reach of its pursuer. Are they shaken violently, parting clean and wide to right and left? It is the path of the dog following the hot scent—ever baffled.

"A hundred days to lift out of those tiny seed these powerful stalks, hollow, hairy, covered with their tough fibre—that strength of cables when the big ships are tugged at by the joined fury of wind and ocean. And now some morning at the corner of the field stand the black men with hooks and whetstones. The hook, a keen, straight blade, bent at right angles to the handle two feet from the hand. Let these men be the strongest; no weakling can handle the hemp from seed to seed again. A heart, the doors and walls of which are in perfect order, through which flows freely the full stream of a healthy man's red blood; lungs deep, clear, easily filled, easily emptied; a body that can bend and twist and be straightened again in ceaseless rhythmical movement; limbs tireless; the very spirit of primeval man conquering primeval nature—all these go into the cutting of the hemp. The leader strides to the edge, and throwing forward his left arm, along which the muscles play, he grasps as much as it will embrace, bends the stalk over, and with his right hand draws the blade through them an inch or more from the ground. When he has gathered his armful, he turns and flings it down behind him, so that it lies spread out, covering when fallen the same space it filled while standing. And so he crosses the broad acres, and so each of the big black followers stepping one by one to a place behind him, until the

long, wavering, whitish-green swaths of the prostrate hemp lie shimmering across the fields. Strongest now is the smell of it, impregnating the clothing of the men, spreading far throughout the air.

"So it lies a week or more drying, dying, till the sap is out of the stalks, till leaves and blossoms wither and drop off, giving back to the soil the nourishment they have drawn from it; the whole top being thus otherwise wasted—that part of the hemp which every year the dreamy millions of the Orient still consume in quantities beyond human computation, and for the love of which the very history of this plant is lost in the antiquity of India and Persia, its home—land of narcotics and desires and dreams.

"Then the rakers with enormous wooden rakes; they draw the stalks into bundles, tying each with the hemp itself. Following the binders move the wagon-beds or slides, gathering the bundles and carrying them to where, huge, flat and round, the stacks begin to rise. At last these are well built; the gates of the field are closed or the bars put up; wagons and laborers are gone; the brown fields stand deserted.

"One day something is gone from earth and sky. Autumn has come, season of scales and balances, when the earth, brought to judgment for its fruits, says, "I have done what I could—now let me rest!"

"But of all that the earth has yielded, with or without the farmer's help, of all that he can call his own within the limits of his land, nothing pleases him better than those still, brown fields where the shapely stacks stand amid the deadened trees. Two months have passed, the workmen are at it again. The stacks are torn down, the bundles scattered, the hemp spread out as once before, there to lie till it shall be dewretted or rotted; there to suffer freeze and thaw, chill rains, locking frosts and loosening snows—all the action of the elements until the gums holding together the filaments of the fibre rot out and dissolve, until the bast be separated from the woody portion of the stalk, and the stalk itself be decayed and easily broken.

"Some day you walk across the spread hemp, your foot goes through at each step, you stoop and, taking several stalks, snap them readily in your fingers. The ends stock out clean apart; and lo! hanging between them, there is at last—a festoon of wet, coarse, dark-grey riband, wealth of the hemp, sail of the wild Scythian, centuries before Horace ever sang of him, sail of the Roman, dress of the Saxon and Celt, dress of the Kentucky pioneer.

"The rakers reappear at intervals of dry weather and draw the hemp into armful and set it up in shocks of convenient size, wide flared at the bottom, well pressed in and bound at the top, so that the slanting sides may catch the drying sun and the sturdy base resist the strong winds. And now the fields are as the dark brown camps of armies—each shock a soldier's tent. Yet not dark always; at times snow-covered; and then the white tents gleam for miles in the winter sunshine—the snow-white tents of the camping hemp.

"Throughout the winter and on into early spring, as days may not be warm or the hemp dry, the breaking continues. At each nightfall, cleaned and baled, it is hauled on wagon-beds or slides, to the barns or the hemp-houses, where it is weighed for the work and wages of the day.

"Last of all, the brakes having been taken from the field, some night—dear sport for the lads!—takes place the burning of the "hemphurds," thus returning their elements to the soil. To kindle a handful of tow and fling it as a firebrand into one of those masses of tinder; to see the flames spread and the sparks rush like swarms of bees skyward through the smoke into the awful abysses of the night; to run from grey heap to grey heap, igniting the long line of signal fires, until the whole earth seems a conflagration and the heavens are as rosy as at morn; to look far away and descry on the horizon an array of answering light, not in one direction only, but leagues away; to see the fainter, ever fainter glow of burning hemphurds—this, too, is one of the experiences, one of the memories.

"And now along the turnpikes the great loaded creaking wagons pass slowly to the towns, bearing the hemp to the factories, thence to be scattered over land and sea. Some day, when the winds of March are dying down, the sower enters the field and begins where he began twelve months before.

"A round year of the earth's changes enters into the creation of the hemp. The planet has described its vast orbit ere it be grown and finished. All seasons are its servitors; all contradistinctions and extremes of nature meet in its making. The vernal patience of the warming soil; the long, fierce arrows of the summer heat, the long, silvery arrows of the summer rain; autumn's dead skies and sobbing winds; winter's sternest, all-tightening frosts. Of none but strong virtues it is the son. Sickness or infirmity it knows not. It will have a mother young and vigorous or none; an old or weak or exhausted soil cannot produce it. It will endure no roof of shade, basking only in the eye of the fatherly sun, and demanding the whole sky for the walls of its nursery."

The art of Rope and Twine making is an extremely ancient one, the ancient Egyptians used Flax for small cordage, and the fibres of the date palm for Rope.

In the year 200 B. C. ships of Syracuse were rigged with rope made of Hemp grown in the valley of the Rhone, and Pliny tells us that towards the end of the first century this fibre was in common use among the Romans for Sails and Cordage.

In America the manufacture of Cordage by European methods began in 1662.

The name Rope is generally applied to Cordage exceeding one inch in circumference. Ordinary Threads, Twines, Cords and Ropes, may be composed of two or more single yarns twisted together. A single thread is termed a yarn.

Were a rope to be formed by simply twisting together in one direction the whole of the fibres of which it is composed, there would be nothing to prevent its untwisting as soon as left to itself. It is therefore necessary to twist the fibre in relatively small portions and so combine these into a rope, that the tendency to untwist in one part may counteract the like tendency in another. Thus the same force which would cause the component parts to separate and to become loose or untwisted is employed, when they are combined in a rope, to keep the whole firm and compact.

Rope loses in strength from twisting, the breaking strain of the rope being about 30% less than the sum of the breaking strains of its component parts. Soft laid ropes are stronger than hard laid ones. Hard laid ropes are, however, more durable.

The principal fibres used in the manufacture of Rope and Twine are divided into two principal classes, viz: Hard and Soft Fibre.

The following are the Hard Fibre class:

	Point of Origin
Manila	Phillipine Islands
Sisal	Mexico
	Java
	East Africa
	Hawaii
	India
	Bahama Islands
Maguey	Phillipine Islands
New Zealand	New Zealand
Mauritius	Mauritius
Istle	Mexico

Hard Fibre really means a fibre that is directly obtained by decortication without previous retting or decomposition.

MANILA HEMP

MANILA Hemp or Feather Fibre is derived from several species of Musa, chiefly from Musa Textilis in the Phillipine Islands. This fibre is called Abaca.

The cultivation of the plant is an important industry in the Phillipine Islands, especially in the provinces of Albay and Camarines, on the island of Luzon; the islands of Leyte, Marinduque, Cebu, Mindoro and Samar, also produce large crops.

The fibre is produced from the long leaves that envelope the stem, the plant grows to a height of from twelve to twenty feet, almost any land will grow Manila Hemp but it grows best in the mountainous districts and particularly in the volcanic regions on the Eastern part of the Islands. It is a perennial plant which reaches maturity in three years, the inner leaves producing the best hemp. These leaves contain over 90% of fluid, consequently the yield is comparatively small, being in fact only about 1½% of the green weight, for this reason it requires the produce of about five acres to produce one ton of fibre at each cutting.

To extract the fibre from the leaves the native first makes a slight cut just beneath the fibre at the end and giving a sharp pull brings away a strip or ribbon of the outside skin which contains the fibre. When a sufficient number of ribbons are thus obtained they are carried to the cleaning machine which is used for extracting the fibre. This machine is of the most primitive character, consisting of a rough wooden bench with a long knife blade hinged to it at one end and connected at the other to a treadle by means of which the operator can raise the knife for a moment in order to insert one end of the ribbon he had previously stripped from the leaf, this ribbon being twisted round a small piece of wood to give a good hold is dragged through between the knife blade and block and all the pulp weak fibre and pithy matter is scraped off. The ribbons must be drawn several times between the knife and the block before the fibre is sufficiently clean. The unscraped end which was held by the operator is then scraped, the fibre is washed, dried in the sun and is then ready for packing. One man can clean by real hard work fifty pounds per day. A bale of Manila Hemp weighs 270 pounds, and over 1,000,000 bales are produced annually. Not all Manila fibre is of the same quality and therefore it is graded and sold according to grade.

"A" is Superior White
"B" " Good Current
"C" " 50% over Good Current
"D" " Good Current
"E" " Midway Current
"F" " Fair Current 25% over
"G" " Soft Good Second
"H" " Soft Good Brown
"I" " Superior Second to Fair C
"J" " Superior Second
"K" " Brown

SISAL HEMP

Sisal Hemp was known as a cordage fibre at the time of the Conquest of Mexico by Spain, being then used by the natives for making ropes.

It is principally used in the manufacture of Binder Twine, which twine is used to bind the sheaves of wheat, oats, rye, barley, after being cut by the harvester. The production of this fibre is principally in the province of Yucatan, Campeche and Sinaloa, Mexico, it is also produced in Java, Hawaii, Bahama Islands and East Africa, in smaller quantities in many other places in the tropics. It is produced from a plant Agave Rigida Elongata. The plant thrives best in Yucatan on account of the coral formation underlying that country. The plant is grown from shoots which are planted in rows about four feet apart and each row is twelve feet from the next row. Land is measured in Yucatan by squares of twenty-four Spanish varas and in this square about ninety-six shoots are planted. It takes about five or six years for the plants to grow to the proper maturity to begin cutting leaves; when the plant is growing all its leaves point upwards; as the plant matures the leaves begin to open; as they open they begin to attain a horizontal position; as soon as the leaf becomes horizontal it is perfectly matured and must be cut. From five to six leaves become matured at the same time on a plant; these are then cut; in about two to four months the next row of four to six leaves drop to the point and are ready for cutting; each plant always has from 25 to 27 leaves, and when the leaves are cut new ones form from the center or cogolla. If properly cared for a plant continues to produce leaves for fourteen years, about which time it throws up a flower stalk from the center and after flowering the plant dies.

The quantity of fibre varies from 50 to 75 pounds per 1,000 leaves. The leaves are cleaned by a machine (operated by steam power), which after macerating the leaves with heavy discs the resultant fibre produced is dried in the sun and baled in bales weighing about 350 pounds each, ready for shipment to the United States, to be spun into Binder Twine or Cordage.

The production of Sisal in 1916 was 1,200,000 bales.

MAGUEY

Maguey is produced in the Philippine Islands, and is of the same family as Sisal, being produced from the "Agave Cantala" and is really of the same type as Sisal; on account of its not being as carefully cleaned or decorticated, it does not have the same value.

NEW ZEALAND

New Zealand is produced both on Auckland and Wellington, from the New Zealand hemp plant (phormium tenax). In appearance this plant resembles the ordinary flag, but varies greatly in the length of leaf and the way the leaf is split and curved.

It grows best in swampy ground and the fibre is taken from the leaves after the plant is five or six years old. The fibre resembles Manila Hemp somewhat, but is of inferior strength. The average length of the fibre is about ten feet.

When the long flat leaves have been cut they are subjected to the action of a stripper, which detaches much of the bark. The partially cleaned fibre is then put into a trough through which water circulates, is washed and scraped. The fibre is then dried and bleached in the sun, after which it is scutched, which softens, cleans and renders it ready for market.

The grades are: Superior. Good Fair. Fair.

A crop can be taken every three years from each plant and about eight tons of green leaves produce one ton of fibre. New Zealand is used in making rope and binder twine, and is valuable on account of its length and strength.

MAURITIUS

Mauritius fibre is produced from Furcroya Gigantea in the Island of Mauritius, from which island it derives its name. It is a long bright colored fibre, creamy white in color, and on this account is used largely to mix with other fibres darker in color to brighten them up. It is produced by the native striking

the leaf with a wooden mallet, this bruises the pulp, renders it less adherent to the fibre which is then scraped by hand. The production per acre ranges from one to two tons. In some of the larger plantations the leaves are cleaned by machine. The leaves are from five to eight feet in length, resemble the other agave plants weighing about five pounds. The same method of cultivation is practiced as in the case of Sisal.

ISTLE

The Istle or Ixtle of commerce is produced from three different plants, Juamave is obtained from the inner leaves or cogallos of the Lecheguilla which grows in the Juamave Valley about sixty miles west of Victoria Tamaulipas.

Palma Istle is obtained from the leaves of Palma Sam-Andoca, Samuella Camerosana a species belonging to the Yucca family; this species is native in the States of Coahuila, San Luis Potosi and Tamaulipas.

These fibres are used as an adulterant with Sisal to make the second quality or cheaper Sisal Rope. They are also used after a different system of preparation in the manufacture of the so-called Yucatan, Mexican, Ivory, Belgian Hemp Twines.

Tula Istle is obtained principally from agave lecheguilla, which grows wild on the hills of the high table-land from Western Texas to the Southern part of San Luis Potosi. This fibre is principally used in brush making.

SOFT FIBRE

The following are the principal soft fibres:

Flax	Italian
	Irish
	Belgian
	Russian
Hemp	American
	Russian
	Italian
	Turkish
	Bombay
Jute	India
Cotton	North and South America
	Egypt
	India

FLAX

Flax is obtained from the stems of a plant Linum Usitatissimum. Ireland, Belgium, Holland, Italy and Russia produce flax fibre. Much flax is grown in the United States, but for

seed only, the plant having to be pulled before the plant has quite reached maturity if fibre is wanted.

This fibre is used in the manufacture of linen and in a few of the very high grades of fishing lines, mattress, broom and sail twines. On account of the present war, this fibre is very scarce and hard to obtain. Cotton in many cases having taken its place.

HEMP

There is but one species of the true hemp plant (Cannabis Sativa); it is called in France, "Chanvre;" Germany, "Hanf;" Italy "Canappa." It is grown in Russia, China, Italy, France and the United States of America.

The best and finest hemp is grown in Italy. After careful cultivation it is sown in March and cut in August or September. The stems are then put into bundles for steeping, this is done in stone basins or tanks and occupies from four to fourteen days, depending on the temperature and quality of the hemp. It is then removed from the water, dried and scutched, is then beaten again and this renders it softer and more pliable.

In Russia the same process is used, but not so much care is taken with the result that the fibre produced is not as clean nor as good as that produced in Italy.

In America the plants are cut in October and after being spread on the ground are stacked and allowed to dewret. In February or March the hemp stalks are broken and the fibre scutched. The yield per acre is about 850 pounds.

The Indian Hemps are Bombay, Jubbulpore, and Allahabad. These are treated in practically the same manner as jute.

Under the microscope, hemp fibres resemble those of flax. Hemp is the strongest of the soft fibres.

JUTE

Jute is grown almost exclusively in the province of Bengal, British India.

The commercial fibre is chiefly derived from two species of plants, viz: Corchorus capsularis and Corchorus Clitorus.

The fibres exist in the plant as a skin under the bark of the stem. Land intended for Jute cultivation is well tilled and manured, as the ground must be in fine condition to produce a good quality of fibre. The Seed is sown in April or May, and it is ready to be cut in September. After being cut the stalks are bound in bundles and steeped in water for about ten days, the fermentation thus set up softens the tissue or gum in which the fibres are imbedded until they are easily detached from the woody portion of the stem.

The stalks are examined periodically to test the progress of the retting operation and when it is found that the fibres peel off readily, the bundles are withdrawn from the water in which they have been steeped. The natives standing waist deep in the pools strip off the bark, wash the fibres, wring it out and hang it up to dry. About 1,400 pounds of fibre are produced to an acre. The usual length of the fibre is from six to seven feet, but it occasionally runs to fourteen feet.

Jute is principally used in making Hessian Cloth or Burlap. About 1,500,000 tons are produced annually, one-half of this is used in India, the balance being exported to Europe and the United States. About 1,000,000 bales are used in the United States per annum. A bale of Jute weighs 400 pounds.

Naturally there are many qualities, the best being the Sirai Ganj, the most generally used being the Daisee. The butt end of the plant is used in the lower grades of twines and ropes, and also in the manufacture of coarse cotton bagging, used to cover the bales of cotton.

The following trades use items of twines and ropes:

AGRICULTURAL IMPLEMENT MANUFACTURERS

Buy: Manila Rope
Sisal Rope
Tarred Lath Yarn
Transmission Rope
Wrapping Twine

AUTOMOBILE MANUFACTURERS

Buy: Fine Finished Twine
India Twines
Jute Wrapping Twine
Manila Rope
Seaming Cord

AWNING AND TENT MANUFACTURERS

Buy: Cotton Rope.
Cotton Sail Twines.
Jute Rope.
Manila.
Marlines.
Sewing Twines.
Sisal Rope.
Tent Rope.

BAG MANUFACTURERS

Buy: Bag Twine.
Bale Rope.
Box Twine
Jute Rope.
Jute Wrapping.
Manila Rope.
Millers' Twine.
Sail Twines.
Sisal Rope.
Transmission Rope.

BASKET MANUFACTURERS

Buy: Coarse Twines, unfinished.
Lath Yarn.
Manila.
Sisal Hay Rope.
Sisal Rope
Sisal Spun Yarn (single or double).
Unfinished Jute.

BED MANUFACTURERS

Buy: Box Twine.
Transmission Rope.
Tube Rope.
Wrapping Twine.

BOLT AND NUT MANUFACTURERS

Buy: Fine Twines.

BOILER MANUFACTURERS

Buy: Manila Rope.

BOX MANUFACTURERS

Buy: Box Shook Twines.
Box Twine.
Hay Rope.
Hide Rope.
Lath Yarn.
Ring Yarn.
Sisal Hay Rope.
Spun Yarn.
Transmission Rope.
Tubing.

BRIDGE BUILDERS

Buy: Manila Rope.
Marline.

BROOM AND BRUSH MANUFACTURERS

Buy: Broom Twines.
B. C. Twines.
Colored Flax Twine.
Fine Twines.
Sisal Hay Rope.
Wrapping Twine.

BUTCHERS (Wholesale)

Buy: Cotton Twine.
Fine Twines.
India Twines.

CANDY MANUFACTURERS

Buy: Box Twine.
Wrapping Twine.
No. 9 Soft Seine.
Cotton Twine.

CARPET MANUFACTURERS

Buy: Coarse Twines.
India.
Sail.
Tube.
Wrapping.
Jamaica Twine.

CARRIAGE AND WAGON MANUFACTURERS

Buy: Jute Wrapping Twine.
Sisal Hay.
Tarred Lath Yarn.
Tarred Sisal Yarn.
Tube Rope.
Wrapping Twine.

CEMENT COMPANIES

Buy: Box Twine.
Drilling Cable.
Manila Rope.
Millers' Twine.
Sail Twine.
Tarred Sisal Yarns.
Transmission Rope.
Unfinished Jute Wrapping.
Wrapping Twine (single end or rope form).

CHAIR FACTORIES

Buy: Jute Wrapping.
Oiled and Unoiled Ring Yarn (untarred Lath Yarn).
Tarred Sisal Lath.
Jamaica Twine.

CHEESE MANUFACTURERS

Buy: Lath Yarn.
Papermakers.
Tube Rope.

CIGAR BOX MANUFACTURERS

Buy: Coarse India Twines.
Jute Wrapping.
Tube Rope.
Jamaica Twine.

CLOTHING MANUFACTURERS

Buy: Coarse India Twine.
Jute Wrapping Twines.
Jamaica Twine.

COAL COMPANIES AND MINES

Buy: Manila Rope.
Transmission Rope.

COMPRESS COMPANIES

Buy: Coarse India Twines.
Jamaica Twine.

CONTRACTORS
Buy: Manila Rope.

COTTON MILLS
Buy: Manila Bale Rope.
Sail Twine.
Sisal Bale Rope.
Transmission Rope.
Jute Rope.

COTTON SEED OIL MILLS
Buy: Manila Rope.
Millers' Twine.
Sail Twines.
Transmission Rope.

CRATE AND BASKET MANUFACTURERS
Buy: Hay Rope.
Manila Rope.
Papermakers' Twine.
Sisal Rope.
Tube Rope.

DEPARTMENT STORES
Buy: B. B. and B. C.
Clothes Lines.
Coarse India Twines.
Fine Twines.
Jute Wrapping.
Tube Rope.
Unfinished Twines.
Jamaica Twine.
Fancy Twines.
Ivory Twine.

DOOR MANUFACTURERS
Buy: Hay Rope.
Hide Rope.
Manila Rope.
Raft Rope.
Spun Yarn.

Tarred Lath Yarn.
Transmission Rope.
Tube.
Untarred Lath Yarn.
Wrapping Twine.

DREDGING COMPANIES
Buy: Manila Rope.
Tarred Marline.
Tarred Ratline.

DRUG COMPANIES
Buy: Fine Twines.
Jute Wrapping.
Sea Island Cable Laid.

ELECTRIC COMPANIES
Buy: Manila Rope.
Tarred Marline.

ELEVATOR MANUFACTURERS
Buy: Hawser Laid Manila Rope (Oil Well Cordage).
Manila Rope.

EXPORT HOUSES
Buy: All kinds Twine.
Binder Twine.
Manila Rope.
Sisal Rope.

EXPRESS COMPANIES
Buy: Coarse Twines.
Manila Rope.
Sisal Spun Yarn.
Sisal Twines.
Jamaica Twine.

FEED AND GRAIN DEALERS

Buy: Bag String.
Jute Wrapping.
Lath Yarn.
Manila Rope.
Sail Twine.

FERTILIZER FACTORIES

Buy: Manila Rope.
Millers' Twine.
Sail Twines.
Transmission Rope.
Wrapping Twine.

FISHING COMPANIES

Buy: Bolt Rope.
Fishermen's Hawser Laid Rope.
Net Rope.
Tarred Marlines.
Tarred Russian Hemp Goods.
Tarred Hawser Laid.

FLORISTS

Buy: Coarse Twines.
Fine Twines.
Finished Twine.
Jute Wrapping Twines.
Cotton Twines (Colored and White)

FLOUR MILLS

Buy: Bag String.
Millers' Twine.
Sail Twines.
Sisal Bag String.
Transmission Rope.

FRUIT MERCHANTS

Buy: Finished Twines.
Hide Rope.
Wrapping Twine.

FURNITURE MANUFACTURERS

Buy: Coarse India Twines.
Fine Twines.
B. B. and B. C.
Indias.
Jute.
Mattress Twine.
Tarred Sisal Yarn.
Stainless Sisal.
Unoiled Sisal Twines.
Wrapping Twines.
Jamaica Twine.

GLOVE MANUFACTURERS

Buy: Coarse Twines.
Fine Twines.
Papermakers'.
Transmission Rope.
Tube Rope.
Jamaica Twine.

GAS, ELECTRIC AND WATER COMPANIES

Buy: Manila Rope.
Packing and Rope Oakum.
Tarred and Untarred Jute Caulking.

GROCERS (Wholesale)

Buy: Clothes-Lines.
Cotton Rope.
Cotton Twine.
Indias.
Manila Rope.
Sash Cord.
Seine Twine.
Sisal Rope.
Staging.
Trot Line.
Wrapping Twine.

HALTER MANUFACTURERS

Buy: Manila Rope (Soft Laid).
Sisal Halter Rope.

HARDWARE DEALERS

Buy: Binder Twine.
Coarse Twine.
Fine Twine.
Fodder Yarn.
Manila Rope.
Sisal Rope.
Jamaica Twine.
Cotton Rope.
Cotton Sash Cord.
Cotton Seine Twine.
Cotton Trot Line.
Cotton Staging.
Cotton Twine.
Cotton Mops.
Cotton Clothes-Lines.

HARDWARE MANUFACTURERS

Buy: Fine Twines.
Finished Twines.
Jute Twines.
Tube.

HIDE DEALERS AND MANUFACTURERS

Buy: Coarse Twines.
Finished Indias.
Sisal Hide Rope (oiled and unoiled).
Wool Twine.
Jamaica Twine.

IMPLEMENT DEALERS

Buy: Binder Twine.
Manila Rope.
Sisal Rope.
Twines (all kinds).

LAUNDRIES

Buy: Cotton Twine.
Jute Twines.

LEATHER MANUFACTURERS

Buy: Finished Indias.
Hay Rope.
Sisal Bale Rope.
Sisal Hide Rope (both oiled and unoiled).
Wool Twine.
Jamaica Twine.

MACHINERY SUPPLY HOUSES

Buy: Clothes Lines.
Manila Rope.
Sisal Rope.
Tarred Sisal Yarn.
Wrapping Twine.

MANUFACTURERS (in general)

Buy: Transmission Rope.
Twines of different kinds.

MATTRESS MANUFACTURERS

Buy: Coarse India Twines.
American Twines.
Fine Twines.
Flax Twines.
Mattress Twines.
Wrapping Twines.
Jamaica Twines.

MILL SUPPLY HOUSES

Buy: Clothes Lines.
Manila Rope.
Sisal Rope.
Tarred Sisal Yarn.
Wrapping Twines.
Oakum

MOULDING MANUFACTURERS

Buy: Box Twines.
Ring Yarn (untarred Lath Yarn).
Tube Rope.

NEWSPAPERS

Buy: Jute Tube Rope.
Sisal Paper Twine.

NURSERIES

Buy: Jute Tubing.
Jute Wrapping.
Tarred Lath Yarn.
Tarred Sisal Yarns.
Wrapping Twines.
Jamaica Twine.

PACKING HOUSES.

Buy: Coarse India Twines.
Fine Twines.
Manila.
Sisal Hay Rope.
Sisal Hide Rope.
Transmission.
Wrapping Twines.
Seine Twine

PAPER BOX AND BAG MANUFACTURERS

Buy: Coarse India Twines.
Fine Twines.
Hemp Twines.
Sisal Hay Rope.
Sisal Twines.
Stainless Sisal.
Tube Rope.
Wrapping Twines.
Jamaica Twine.

PAPER AND PULP MANUFACTURERS

Buy: Paper Makers' Twine Jute.
Spun Yarn.
Transmission Rope.
Tube Rope.
Unoiled Sisal Twine.

PAPER AND TWINE DEALERS

Buy: Clothes Line.
Twines (all kinds).
Jamaica.

MANUFACTURERS

Buy: Bale Rope.
Manila Rope.
Manila Transmission.
Oakum.

PLUMBING AND MACHINERY SUPPLY HOUSES

Buy: A and B Italian Packing.
American Hemp Packing.
Plumbers' Spun Oakum.
Tarred Marline.
Tarred Packing or Rope Oakum.
Transmission.
Untarred Packing or Gasket Packing.

PORK PACKERS

Buy: Fine Italian and B. C. Twine.
India Ham Strings.
Jute Wrapping.
Sail Twine.
Seine Twine.
Staging.

OIL WELLS

Buy: Drilling Cables.
Bull Rope.
Plain Laid Rope and Packing.

POTTERIES

Buy: India Twines.
Papermakers'.

PRINTERS

Buy: Coarse Indias.
Fine Twines.
Tube Rope.
Jamaica Twine.

PUBLIC SERVICE CORPORATIONS

Buy: Manila Rope.
Transmission Rope.
Oakum.

PUBLISHERS

Buy: Finished Twines.
Paper Makers'.
Sisal Hay.
Sisal Hide.
Tube Rope.

RAILROADS

Buy: Bolt Rope.
Manila Rope.
Sash Cord and Bell Cord.

RAILWAY AND MILL SUPPLY HOUSES

Buy: Manila Bolt Rope.
Manila Rope.
Packings.
Sisal Rope.
Tarred Lath.
Sash Cord.
Oakum.
Waste.

RUBBER MANUFACTURERS

Buy: Coarse Twines.
Fine Twines.
Houseline.
Tarred Marlines, etc.
Transmission.

SAW MILLS — SASH MANUFACTURERS

Buy: Hay Rope.
Hide Rope.
Jamaica Twine.
Manila Rope.
Raft Rope.
Spun Yarn.
Stainless Jute Wrapping.
Sash Cord.

Tarred Lath Yarn.
Transmission Rope.
Tube.
Untarred Lath Yarn.
Wrapping Twine.

SHIP BUILDING COMPANIES

Buy: Manila Bolt Rope.
Manila Rope.
Tarred Marlines, etc.
Oakum

SHIP CHANDLERS

Buy: Fishermen's Rope.
Hawser Laid Rope.
House Lines.
Lobster Marline.
Hambroline.
Manila Bolt Rope.
Manila Rope.
Net Rope.
Sisal Rope.
Oakum.
Spun Yarn.
Tarred Hemp Rope.
Tarred Marline, etc.
Tarred Ratline.

SHOE MANUFACTURERS

Buy: Fine Twines in cut lengths.
Wrapping Twines.

SPOKES, HANDLES, STAVE AND HEADING

Buy: Finished Indias.
Lath Yarn.
Medium and Fine Rope.
Oiled and Unoiled Sisal.
Tube.
Jamaica Twine.

STATIONERS

Buy: Coarse Twines.
Fancy Twines.
Fine Twines.
Finished Cotton.
Linen Twine.
Paper Makers'.
Wrapping.
Jamaica Twine.

STEAMSHIP COMPANIES

Buy: Manila Rope of all kinds.
Sail Twines.
Tarred Marlines, etc.

STORES AND SHOPS

Buy: Various Twines, depending on character of store.

STOVE MANUFACTURERS

Buy: Bale Rope.
Paper Makers' Twine.
Tube.
Wool.

TANNERS

Buy: Finished Indias.
Hay Rope.
Sisal Bale Rope.
Sisal Hide Rope (both oiled and unoiled).
Wool Twine.
Jamaica Twine.

TELEPHONE COMPANIES

Buy: Houselines.
Tarred Marlines, etc.

TENT MANUFACTURERS

Buy: Jute Rope.

Jute Twines.
Manila (soft laid).
Nos. 1 and 2 Marlines.
Sisal (soft laid).
Sail Twines.
Tent Rope.
Cotton Rope.

TEXTILE MANUFACTURERS
Buy: Coarse India Twines.
Sisal Bale Rope.
Transmission Rope.

TOOL HANDLE MANUFACTURERS
Buy: Sisal Hay Rope.
Sisal Hide Rope.
Sisal Twine.
Wrapping Twine.
Jamaica Twine.

TRANSPORTATION COMPANIES
Buy: Manila Rope.
Marlines, etc.
Tarred Ratline.

TRUNK OR SUIT CASE MANUFACTURERS
Buy: Coarse Fodder Yarn in Balls.
Sisal Hay Rope in Balls.
Sisal Spun Yarn in Balls.

TUBE AND PIPE COMPANIES
Buy: Manila Rope.
Transmission.
Tarred and Untarred Jute Pipe Cord.
Tube Rope.

TWINE DEALERS
Buy: All kinds of Twine.
All kinds of Sisal Specialties.

UPHOLSTERERS

Buy: Mattress Twine.
Wrapping Twines.

VENEER MANUFACTURERS

Buy: Coarse American.
Coarse India Twines.
Coarse Twines (finished and unfinished).
Finished Wall Paper Twines.
Sisal Hay Rope.
Tarred Sisal Lath.
Jamaica Twine.

WAGON MANUFACTURERS

Buy: Jute Wrapping Twine.
Sisal Hay.
Tarred Lath Yarn.
Tarred Sisal Yarn.
Tube Rope.
Wrapping Twines.

WHOLESALE FRUIT DEALERS.

Buy: Millers' Twine.
Sail Twines.
Sisal Banana Rope.

WHOLESALE GROCERS

Buy: See Grocers, Wholesale.

WHOLESALE PAPER DEALERS

Buy: Baling Rope.
Sail Fine and Coarse Twines.
Sisal Hay Rope.
Sisal Hide Rope.
Tarred Sisal Yarn.
Tube Rope.
Papermakers' Cord.
Wall Paper Twines.
Wrapping Twines (finished and unfinished).

WHOLESALE PRODUCE AND FRUIT

Buy: Millers' Twine.
Sail Twine.
Single and Two-ply Sisal.

WIRE ROPE MANUFACTURERS

Buy: Manila Rope.
Sisal Rope (sometimes tarred).

WOOD COMPANIES

Buy: Tarred Sisal Yarns.

WOODENWARE DEALERS

Buy: All Twines.
Clothes Line.
Manila Rope.
Sisal Rope.
Jute Rope
Cotton Rope

WOODENWARE MANUFACTURERS

Buy: Ring Yarn.
Sisal Hay Rope.
Sisal Twine.
Tarred Lath Yarn.
Untarred Lath Yarn.

WOOLEN MILLS

Buy: Italian and B. C. Twines.
Sail.
Tube Rope.
Wrapping.

A METHOD OF TELLING ONE FIBRE FROM ANOTHER

ANY mixture of jute with hemp or flax yarn, in cords, ropes or woven fabrics, may be detected in the following manner:

Prepare a saturated solution of chloride of lime, get some hydrochloric acid and ammonia.

Untwist the cord or unpick the fabric and untwist the yarns or threads so that the fibres separate one from the other.

Place the threads thus prepared in a saucer, sprinkle and saturate with chloride of lime solution. A few drops of hydrochloric acid are then added, a slight effervescence is now produced. the liquid taking a yellow green color and the fibre bleaching almost instantaneously. The yarn or fibre is then at once washed with clean water, wrung out as dry as possible, placed on a clean saucer and moistened with a few drops of ammonia.

The color of the fibres must then be at once examined. The jute fibre will be found to take on a blue red color, while the flax or hemp takes a yellow tint streaked with pink.

Cotton may be distinguished from linen by burning the fabric. In the case of cotton the burnt end is tufted, in the case of linen the burnt end is rounded.

The test above described for telling the difference between jute or hemp or flax, can be used upon Manila, Sisal, Mauritius, New Zealand, and the colors show the different fibres plainly.

RELATIVE STRENGTH OF SOFT FIBRES

The strength of soft fibre is obtained by cohesion and on account of the retting or decomposition necessary to separate the fibre from the woody part of the plant to which it is adhesive by the natural gum which the act of steeping or retting dissolves away by bacteriological action, it will not stand long immersion in water or exposure to the weather without protection by tarring, tanning or coating with some protective material that will prevent further breaking down of the fibre by bacterial action.

Flax that is true flax is only used on a few of the extremely high priced mattress, broom, fishing lines, etc. Hemp is more generally used in the better grades of twines, Italian having the best appearance and strength, Russian coming next, American the most generally used next, the other grades, viz: Turkish and Bombay being used in specialties and as mixtures. Jute has

the greatest range of uses, being easy to make, cheap and usually plentiful, it lacks strength and durability, but on account of its cheapness is the most generally used. Cotton has its value and is used for retail trade when packages are small and of light weight.

RELATIVE STRENGTH OF HARD FIBRES

The relative quality of hard fibre is based on Manila as the standard, it being the best in general utility, Sisal coming next, with a ratio of 6 as to 7. New Zealand has approximately the same strength as Sisal. Mauritius strength is about 1-3 of that of Manila, is used but little by itself, principally as a mixing fibre to bring up the color of Manila. Istle is a generic name covering fibres grown in Mexico, from Agave and Pita, in contradistinction to Henequen Sisal, which comes from Yucatan and Sinaloa, Mexico. These are generally divided into three classes: Jaumave, Palma, Tula, the first two are used as cordage fibres, the last named, Tula, being used as a brush fibre almost exclusively. The strength of Istle is about ¼ lower than Sisal Hemp.

BINDER TWINE

In binder twine the largest production of twine is made. The consumption of binder twine in 1916 was approximately 200,000 tons.

Without binder twine the world would go hungry today, as there is not labor enough in the world today to cut the grain crops by hand in the short time that exists between the ripening of the grain and its being cut. Binder twine was first made in 1883 by Fitler, of Philadelphia, for Cyrus McCormick and W. Deering, and its use has increased by such leaps and bounds that it constitutes a history of its own.

The grades principally used are:

Sisal	500 feet to the pound
Standard	500 " " " "
Standard Manila	550 " " " "
Manila	600 " " " "
Pure Manila	650 " " " "

Sisal and Standard are made of Sisal with this difference that Standard is colored; this coloring is done by adding the color to the oil and is put on the fibre in the first preparation.

Standard Manila is a mixture of either Sisal and Manila or New Zealand and Sisal.

Manila is part Sisal and part Manila.

Pure Manila is what its name implies and on account of the fine yarn of which it is spun has to be of superior quality. Usually Good Current hemp is used for making pure Manila binder twine.

The International Harvester Co., and the Plymouth Cordage Co. are the two largest makers of binder twine, the International making about two-thirds of the twine used in the United States in their different plants.

The principle used in the spinning of all yarns is the same, be the material hard or soft fibre cotton, etc., and is known as the Arkwright principle, viz: drafting by means of rollers.

No further explanation or example of draft calculation need be given if it is clearly understood that the draft of a frame be it spreader, drawing, roving, gill, dry or wet spinning frame, is the ratio between the surface speeds of the drawing and feed rollers. It is easily formed by calculating how many revolutions the drawing roller makes for one of the feed roller, and then multiplying by the diameter of the former and dividing by the diameter of the latter roller.

The process of manufacture of rope and twine made of hard fibre is usually as follows:

After the bales of fibre have been opened by hand, they are placed in stacks ready to be put through the breaker. This machine consists of a fast and slow chain (a chain is a series of bars with heavy steel pins). The fibre is fed to the slow chain which carries it slowly forward, the speed of the fast chain varies with the grist of the yarn desired and is termed the draft. This fast chain acts as a comb or straightener of the fibre and carries the fibre to the delivery roll where the fibre in the form of a sliver is piled. This process is carried on through five to nine machines, each of which attenuates the sliver until the finisher delivers the sliver, now evened up by many

doublings and combings, in a good even ribbon of fibre, which ribbon or sliver is then taken to the automatic spinner where it is spun into a yarn and this yarn wound on a bobbin. The bobbins of yarn are then ready to be taken to the formers of the strand and layers that complete the rope of commerce.

The turn in the strand of a rope is designated the fore turn; the turn in the rope, the after turn. In a well-laid rope when put to use the turns balance, and the opposite turns acting against each other keep the strands of the rope together. The after turn can be thrown out of the rope. This is what is done when the end of the rope is taken up through the center of the coil. If this operation is repeated too much, the after turn will be thrown out of the rope and the fore turn, namely, in the strand, will kick back, the effect being to cause the strand to kink or knot up, thus destroying the lay of the rope.

A rope thrown repeatedly around a capstan in the same direction as with the sun will throw the turn out of the rope and produce this condition.

The weight of 1 fathom or 6 feet of 3-inch (Cir.) rope is approximately 31 ounces. The weight of the same length of any other size rope may be found by squaring the circumference of the rope, multiplying by 31, and dividing the result by 9. Thus the weight of 1 fathom, 6 feet of 6-inch Cir. rope is as follows:

$$\frac{6^2 \times 31}{9} = 124 \text{ oz.} \quad 7 \text{ lbs. } 12 \text{ oz.}$$

In making the yarns for hard fibre the following yarns are usually used:

$\frac{3}{16}$	No. 32	480 ft.	6 thread
$\frac{1}{4}$	" 28	420 "	6 "
$\frac{5}{16}$	" 28	420 "	9 "
$\frac{3}{8}$	" 28	420 "	12 "
$\frac{7}{16}$	" 28	420 "	18 "
$\frac{1}{2}$	" 26	390 "	21 "
$\frac{9}{16}$	" 26	390 "	24 "
$\frac{5}{8}$	" 26	390 "	27 "
$\frac{3}{4}$	" 20	300 "	45 "
1	" 20	300 "	60 "

EXPLANATION OF ROPE PRICES

The prices of Manila and Sisal products are always figured from a basis price per pound, one basis for each grade of Manila and one for each grade of Sisal. These basis prices fluctuate with the cost of raw material, so whenever using this price list BE SURE TO HAVE THE CURRENT BASIS PRICE.

The basis size is 3-strand rope $\frac{5}{8}$" diameter (2" Cir.). Three-strand rope this size and larger takes the basis price. Both 3 and 4-strand rope smaller than this size take advances as follows:

2" Cir. $\frac{5}{8}$" diam. or larger		Basis
$1\frac{7}{8}$" Cir.	30 thread	$\frac{1}{2}$c above "
$1\frac{3}{4}$" Cir. $\frac{9}{16}$" diam	27 thread	$\frac{1}{2}$c " "
$1\frac{5}{8}$" Cir.	24 thread	$\frac{1}{2}$c " "
$1\frac{1}{2}$" Cir. $\frac{1}{2}$" diam	21 thread	$\frac{1}{2}$c " "
$1\frac{3}{8}$" Cir	18 thread	$\frac{1}{2}$c " "
$1\frac{1}{4}$" Cir. $\frac{7}{16}$" diam	15 thread	$\frac{1}{2}$c " "
$1\frac{1}{8}$" Cir. $\frac{3}{8}$" diam	12 thread	1c " "
1" Cir. $\frac{5}{16}$" diam	9 thread	$1\frac{1}{2}$c " "
$\frac{3}{4}$" Cir. $\frac{1}{4}$" diam	6 thread	$1\frac{1}{2}$c " "
$\frac{1}{2}$" Cir. $\frac{3}{16}$" diam	6 thread fine	2c " "

Special charges as follows:

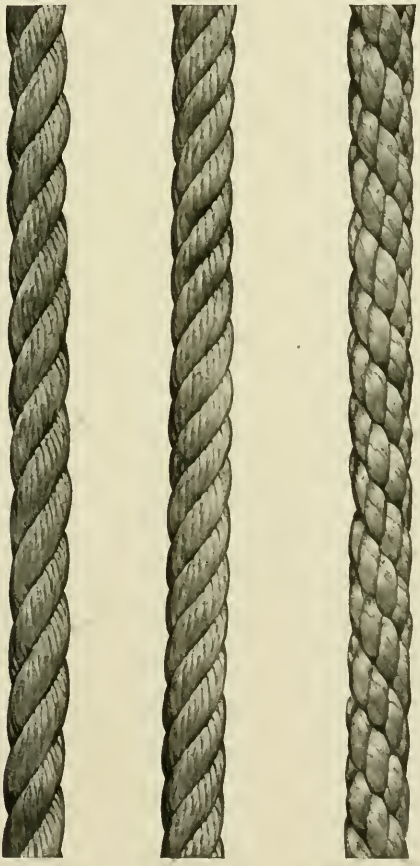
All 4-strand Rope except Bolt Rope and Transmission	1c advance
All Rope without oil	1c extra
Tarred Rope	Basis
Balling	$\frac{1}{4}$c extra

All quotations on Manila and Sisal products are gross weight basis. Terms 60 days net, or $1\frac{1}{2}$% discount for cash 10 days from date of invoice.

APPROXIMATE WEIGHT AND STRENGTH PURE MANILA ROPE

Coils, 1200 ft. Half Coils, 600 ft.

Cir.	Dia.	Weight and Length per Coil	Length of Manila Rope in 1 lb.	Strain Borne by New Manila Rope
1/2 in.	3/16 in.	35 lbs 2100 ft.	60 ft.	550 lbs.
3/4 "	1/4 "	50 " 2750 "	55 "	620 "
1 "	5/16 "	55 " 2250 "	41 "	1000 "
1 1/8 "	3/8 "	60 " 1620 "	27 "	1275 "
1 1/4 "	7/16 "	70 " 1260 "	18 "	1875 "
1 1/2 "	1/2 "	90 " 1200 "	13 " 4 in.	2400 "
1 3/4 "	9/16 "	125 " 1200 "	9 " 7 "	3300 "
2 "	5/8 "	160 " 1200 "	7 " 6 "	4000 "
2 1/4 "	3/4 "	198 " 1200 "	6 " 1 "	4700 "
2 1/2 "	13/16 "	234 " 1200 "	5 " 1 "	5600 "
2 3/4 "	7/8 "	270 " 1200 "	4 " 5 "	6500 "
3 "	1 "	324 " 1200 "	3 " 8 "	7500 "
3 1/4 "	1 1/16 "	378 " 1200 "	3 " 2 "	8900 "
3 1/2 "	1 1/8 "	432 " 1200 "	2 " 9 "	10500 "
3 3/4 "	1 1/4 "	504 " 1200 "	2 " 5 "	12500 "
4 "	1 5/16 "	576 " 1200 "	2 " 1 "	14000 "
4 1/4 "	1 3/8 "	648 " 1200 "	1 " 10 "	15400 "
4 1/2 "	1 1/2 "	720 " 1200 "	1 " 8 "	17000 "
4 3/4 "	1 9/16 "	810 " 1200 "	1 " 6 "	18400 "
5 "	1 5/8 "	900 " 1200 "	1 " 4 "	20000 "
5 1/2 "	1 3/4 "	1080 " 1200 "	1 " 1 "	25000 "
6 "	2 "	1296 " 1200 "	11 "	30000 "
6 1/2 "	2 1/8 "	1512 " 1200 "	9 1/2 "	33000 "
7 "	2 1/4 "	1764 " 1200 "	8 "	37000 "
7 1/2 "	2 1/2 "	2016 " 1200 "	7 "	43000 "
8 "	2 5/8 "	2304 " 1200 "	6 1/4 "	50000 "
8 1/2 "	2 7/8 "	2590 " 1200 "	5 1/2 "	56000 "
9 "	3 "	2915 " 1200 "	5 "	62000 "
9 1/2 "	3 1/8 "	3240 " 1200 "	4 1/2 "	68000 "
10 "	3 1/4 "	3600 " 1200 "	4 "	75000 "



3-Strand Rope | 4-Strand Rope | Hawser Laid Rope

The Three Common Forms or Kinds of Rope

MANILA ROPE

Bolt Rope ..... 8c above Basis

Differentials for small sizes, page 37

Standard full (1200 ft.) and half (600 ft.) coils.

All sizes, 3 or 4-strand.

For heavy hoisting, tow lines, dock ties, coal falls, warping lines, wheel ropes and every purpose requiring unusual strength, we recommend Bolt Rope. Made of an extra high grade of selected fibre.

Yacht Bolt Rope ..... Special

Differentials for small sizes, page 37

Standard full (1200 ft.) and half (600 ft.) coils.

All sizes, 3 or 4-strand.

Yacht rope is made of special Manila fibre, selected for its light color and silky lustre. It is the very finest Manila rope made. Used on private yachts, motor boats and places where fine appearance is required as well as maximum strength.

Tallow Laid Rope ..... Basis

Used as a cheap Transmission Rope for short temporary drives.

Net Rope ..... Basis

Differentials for small sizes, page 37

Standard full (1200 ft.) and half (600 ft.) coils.

Tarred and untarred, 3-strand.

Net Rope untarred is made with a special medium soft lay so as to have an even pliable rope when used in the water. Our Tarred Net Rope is the same lay as untarred and contains just the right amount of tar to protect the fibre, and makes the rope a light golden color.

Hawer Laid Fisherman's Cables

(tarred and untarred) ..... Special

Usually made 600 ft. Any length required can be furnished. Usual sizes 7″ and 9″ Cir.

Only the highest words of praise have been heard for this rope.

Lobster Marline ..... Special

Tarred and untarred. Bales 50 lbs. each, 5 lb. balls.

The uniformity of this twine is its distinguishing feature. Every fisherman who has used it thinks there is none like it. We have paid much attention to this twine and believe we make the smoothest Lobster Marline on the market. It is wonderfully strong and can be used for every purpose where great strength and small sized twine is desirable.

OIL WELL CORDAGE

Drilling Cables ..... Special

Any length required. Usual sizes $1\frac{1}{2}$" to $2\frac{1}{2}$" diameter.

Drilling Cables are composed of three special 3-strand ropes laid together. Our method of manufacture produces a rope of even tension on all parts, thereby producing a cable that will not draw, strand or cut in. Drilling Cables must be carefully lubricated to prevent internal friction. The lubricants we use are made from formulas developed after years of experience.

Sand Lines ..... Special

Usually made $\frac{5}{8}$" and $\frac{3}{4}$" diameter. Any length required. Cable laid.

Tubing Lines ..... Special

Any length or size required. Cable laid.

Bull Ropes ..... Special

Usual length from 60 ft. to 90 ft. each, usually 85 ft., and 2", $2\frac{1}{4}$", $2\frac{1}{2}$" diameter.

Large 3-strand ropes used to operate the Bull Wheels and are plain laid.

Raft Rope ..... 1c above Basis

Standard full (1200 ft.) and half (600 ft.) coils.

3-strand, 6 and 9-thread, special yarn.

Small sized ropes made of heavier yarns than regular rope of same size. Used for binding logs together to form rafts.

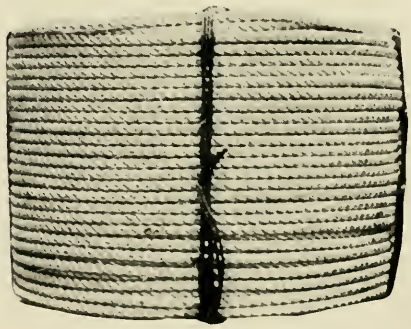
TRANSMISSION ROPE

Graphite Laid Manila Transmission Rope ..... Special

When a drive is exposed to the weather a full graphite laid rope should be used. The graphite makes the rope weather-proof.

Tallow Laid Manila Transmission Rope Special

Used as a regular Transmission Rope in place of belting.



LARIAT ROPE

Manila Lariat Rope

3-strand, hard laid ..... 4c above Basis
4-strand, hard laid ..... 4½c above Basis

Standard full (1200 ft.) and half (600 ft.) coils.

Usual sizes ⅜", 7/16", ½" diameter.

This is sold for cowboy use. Also made in Sisal with same differential.

Manila Yacht Lariat Rope

3 and 4-strand ..... Special

Standard full (1200 ft.) and half (600 ft.) coils.

Our Yacht Lariat is made of extra high grade Manila fibre, selected for strength, color and lustre. It has a silky finish due to the lustrous fibre used. The lay or twist has been developed after many months of experimental work. It is without doubt the best laid lariat rope on the market.

SISAL ROPE

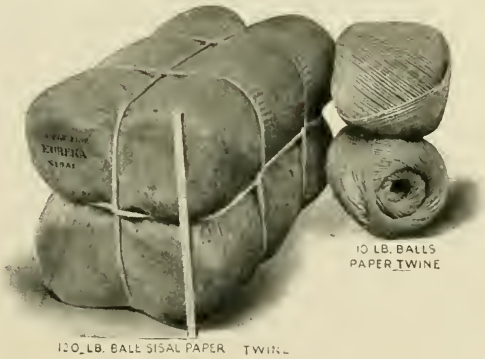
Sisal Hay Rope, Spun Yarn, Paper Makers' Twine

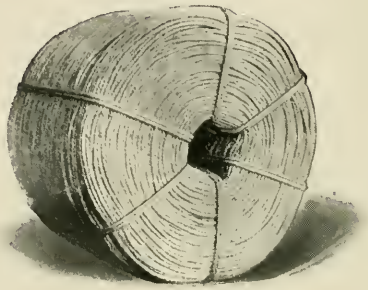
Sizes and prices are as follows:

Hay Rope, any ply	Medium	½c advance
Hide Rope, any ply	Coarse	½c "
Bale Rope, any ply	Fine	1c "
	Extra Fine	1½c "
	B or Coarse	½c advance
Spun Yarn, single end	C or Medium	½c "
Lath Yarn, single end	D or Fine	1c "
	DD or Extra Fine	1½c "

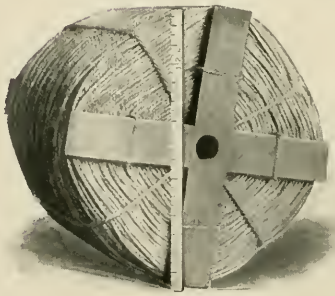
Usual extras for unoiled, laid twine and for balling will apply in addition to above as follows:

Unoiled	1c extra
If Laid, not Twisted	½c "
Balling	¼c "





50 LB COIL SISAL HAY ROPE



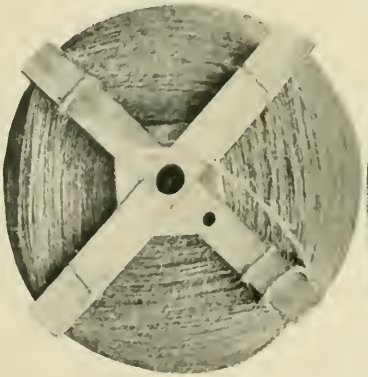
50 LB REEL SISAL SPUN YARN

Sisal Bale Rope

Sizes and prices as per table above.

Stocked in coils about 100 lbs. each. Larger coils can be furnished on order.

Sisal is a very satisfactory bale rope The light colored fibre makes this rope especially desirable for baling textiles, sole leather, etc., because is adds materially to the appearance of the package. Can be made in any ply to obtain whatever strength needed.



Sisal Hide Rope, Fish Twine, Banana Twine, etc.

Sizes and prices as per above table.

Stocked in coils, stranded many ends, 100 lbs. each as follows:

Extra Coarse	About 25 ends
Coarse	" 40 "

SISAL

	American			Fitlers		
Ply	Fine Ft. Lb. Brk.	Med. Ft. Lb. Brk.	Heavy Ft. Lb. Brk.	Fine Ft. Lb. Brk.	Med. Ft. Lb. Brk.	Heavy Ft. Lb. Brk.
2	195	120	90	240	150	120
3		75 425	55 500			
4						
5						380

Tarred Lath Yarn

Prices are as follows:

Coarse or B—110		Basis
Medium or C—130		"
Fine or D—200	½c above	Basis
Medium	" 50	"
Fine	" 100	"
Extra Fine	" 100	"

100 LB. COIL SISAL RING YARN
(HIDE ROPE SHAPE)

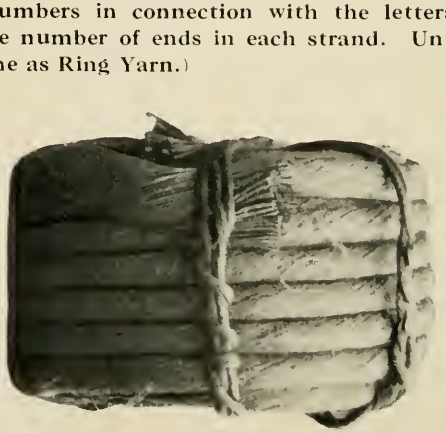
Tarred Sisal Lath Yarn, Wood Yarn, etc.

Stocked in coils, stranded many ends, 100 lbs. each.

Smaller and larger coils made to order.

Coarse size or B—100 thread	Special
Medium size or C—130 thread	"
Fine size or D—200 thread	"
Extra Fine or DD—200 thread	"

(The numbers in connection with the letters show the approximate number of ends in each strand. Untarred Lath Yarn is same as Ring Yarn.)



Tarred Sisal Fodder Yarn

Stocked in coils, stranded many ends, 100 lbs. each.

Coarse or B—110 threads ..... Special
Medium or C—130 threads ..... "
Fine or D—200 threads ..... "

Also furnished:

27 oz. (100 ends) ..... Special
21 oz. (100 ends) ..... "

Can also be furnished in 5 lb. balls, packed in 100 lb. bales, on special order.

The best known and most satisfactory brand on the market. Has exceptional strength and is the favorite of the farmer; a money maker for dealers.

COTTON ROPE

Reels, Coils or Tubes

No. 1, 2 and 3 Cotton Gill Rope, tubes, coils or reels.

Cotton Rope sells to tent and awning manufacturers and in the South is used for plow lines, there becoming an important item. The basis price is based on $\frac{5}{16}$" dia. It comes in coils or tubes weighing approximately 35 pounds.

It sells in the fall for spring delivery, from January to May.

COTTON ROPE

Extra Hard Laid

Sizes—Diameter	Feet per Pound	Tensile Strength Pounds
$\frac{1}{8}$ inch	240	130
$\frac{3}{16}$ "	105	300
$\frac{1}{4}$ "	60	520
$\frac{5}{16}$ "	35	780
$\frac{3}{8}$ "	20	1040
$\frac{1}{2}$ "	14	2220
$\frac{5}{8}$ "	9	3460
$\frac{3}{4}$ "	7	4450
1 "	$3\frac{1}{2}$	8910
$1\frac{1}{4}$ "	$2\frac{1}{2}$	12480
$1\frac{1}{2}$ "	$1\frac{3}{4}$	17810

JUTE ROPE

Jute Rope—No. 1, $\frac{1}{4}$" base; $\frac{3}{16}$", $\frac{1}{2}$c lb. over in coils.
No. 2, $\frac{1}{4}$" base; $\frac{3}{16}$", $\frac{1}{2}$c lb. over in coils.

Reels 50 lbs. and larger, $\frac{1}{2}$c less.

There are two grades of Jute Rope, one is called thread on account of being made from fine yarn, and possesses good strength; the second grade is made of regular Jute yarn heavy thread. This sells for a cheap clothes line and where a temporary rope is only needed. Also to tent manufacturers

OAKUM

This material is sold to plumbers, steam fitters and contractors, under the various gradings.

Plumbers put up loose in 50 lb. bales.

Jute packing is untarred while rope oakum is tarred, put up in coils varying in weight from 50 to 400 lbs., large trade buy small coils but the plumbers buy 300 to 400 lb. coils.

Navy and Best are but little used except at lake or river points. Advise quantity needed and will wire price.

PACKINGS

Italian	Jute Dry
American	Jute Tarred

MARLINE

Regular	Yacht
Jute	Spunyarn, 2 or 3 ply

Reels or coils, Hide Rope shape regular prices.
Small reels under 50 lbs. $\frac{1}{2}$c extra.
All broken packages 1c advance.

TARRED GOODS

	Pound Yarn	Ply	Av. Yardage	Av. Strength
Yacht Marline	40	2	350 ft.	90 lbs.
Fine Marline	65	2	200 "	120 "
Regular Marline	85	2	140 "	175 "
Fine Houseline	65	3	145 "	180 "
Regular Houseline	85	3	100 "	250 "
Spun Yarn	140	2	95 "	250 "
Spun Yarn	140	3	65 "	350 "
Jute Marline	85	2	140 "	150 "

DESCRIPTION OF THE MANUFACTURE AND LENGTH OF COMMERCIAL TWINES

THROUGH the courtesy of "Yarns," published in the interest of one of the largest twine manufacturers, the following description of twine manufacturers may be of value, as it epitomizes the system and does it clearly:

The first step in the manufacture of twine is the opening of the bales of fibre, and the work of assorting this fibre according to quality. As a result of compressing the fibre into bales for shipment, the individual fibres become pressed and caked together. To overcome this feature the fibre is fed into a softener, which makes it soft and pliable.

After passing through the softener, the fibre is taken to a machine called the breaker, where the fibre is disintegrated from any wood or pulpy matter that might be adhering to it; and much of the dirt and foreign matter with which it is laden is removed.

Leaving the breaker, the fibre is taken to a carding machine where the wire teeth comb the fibre and remove any dirt or substance that may be still clinging to it.

The fibre, as it leaves the carding machine, is taken to the drawing frames. Here it is drawn and straightened, all the kinks being smoothed out, and as it leaves the drawing frames it is known as the sliver.

This sliver, which has a soft, silky feel and appearance, is then taken to the roving machine, which converts it into rove, or a heavy yarn, which is wound on bobbins.

The bobbins containing the rove are then placed in the racks of the spinning machine and are spun into yarn of a required weight.

As the rove is spun into yarns, it in turn is also wound on to bobbins. The bobbins of yarn are then taken to the twisting machines and a number of yarns, depending on the ply desired, are simultaneously fed into the twister and made into twines.

There are two sets of twisters used. If the twine is to be formed, the yarns are fed into a machine, which gives them a sufficient amount of twist to make twine, whereas, if laid twine is desired, another machine is used which twists the yarns harder, thus making the finished product a laid twine. If the twine being made is unfinished, the process has now been

completed, all that remains being to put it up in either balls, coils or reels. However, if a finished twine is wanted, the twine is taken to the polishing room, where it is run over a series of polishers, each polisher giving it a coat of the preparation for the proper finishing of the twine. It is then wound on bobbins and either reeled, coiled or balled.

If the twine is to be put up in balls, it is placed into the balling machine by the operator. The balled twine is then packed into bales.

The manufacture of commerial twine is based on what is called a "Spinal," which is 43,200 feet, and the yarns are made in pounds, which are merely a division of a Spinal. These pound yarns run from 10 to 150. Below are given the pound yarns and the different weights and plys as far as you will require them.

As an example, 4 ply Jute Wrapping Twine is made from 20 pound yarn. Therefore, we divide the Spinal, 43,200 feet by 20, which gives 2,160 feet. The average allowance for twist is 5%, which amounts to 108 feet, and this is deducted from the 2,160 feet, which gives 2,052. In making a 4 ply twine we divide the 2,052 by 4, which gives us 513 feet and this is the approximate yardage of 4 ply Jute Wrapping.

In the event of the goods being finished or polished, a deduction of 10% should be made for this, as polishing adds to the weight of the goods.

Nos. 1 and 2 Jute Wrapping Twine 20 lb. yarn.
Fine Italian "A" and "AA" Flax Sail Twine 11 lb. yarn.
Other Sail Twines 15 lb. yarn.

2	ply	No.	12	Fine	Twine	11	lb.	yarn
3	"	"	18	"	"	11	"	"
3	"	"	24	"	"	15	"	"
3	"	"	36	"	"	21	"	"
4	"	"	48	"	"	21	"	"
5	"	"	60	"	"	21	"	"

10% off for polish.

Nos. 1 and 2 Tube Rope 50 lb. yarn.
X Jute Tube Rope 60 lb. yarn.
Wall Paper Twines 40 lb. yarn.

No.	4½	Coarse	Twines	300	ft.	to	the lb.
"	5	"	"	300	"	"	"
"	6	"	"	200	"	"	"
"	7	"	"	160	"	"	"
"	8	"	"	110	"	"	"
"	9	"	"	85	"	"	"

Size Yarn	Gross Ydge. Per Lb.	Net Ydge. 5% Twist	Yardage of Different Plies								
			2	3	4	5	6	7	8	9	10
10	4320 ft.	4104 ft.	2052	1368	1026	821	684	586	513	455	410
11	3927 "	3731 "	1365	1243	933	746	622	533	466	415	373
12	3600 "	3420 "	1710	1140	855	684	570	489	427	380	342
13	3323 "	3157 "	1576	1032	789	631	526	451	394	351	315
14	3086 "	2932 "	1466	977	733	586	488	419	366	326	293
15	2880 "	2734 "	1367	911	683	547	456	391	342	304	273
16	2700 "	2565 "	1282	653	641	513	426	366	321	285	256
17	2541 "	2414 "	1207	805	603	483	402	345	302	277	241
18	2400 "	2280 "	1140	760	570	456	380	326	285	253	228
19	2274 "	2160 "	1080	720	540	432	360	309	270	240	216
20	2160 "	2052 "	1026	684	513	410	342	293	356	229	205
21	2057 "	1954 "	977	651	488	391	326	279	244	216	195
22	1963 "	1865 "	932	622	466	373	311	266	233	207	186
23	1880 "	1786 "	893	595	447	357	297	255	223	198	178
24	1800 "	1710 "	855	570	427	342	285	244	214	190	171
25	1726 "	1642 "	821	547	410	328	274	235	205	182	164
26	1661 "	1578 "	789	526	394	316	263	225	196	175	157
27	1600 "	1520 "	760	507	380	304	255	217	190	170	152
28	1543 "	1466 "	733	489	362	293	244	209	183	163	148
29	1490 "	1415 "	707	472	354	283	235	202	178	157	141
30	1440 "	1368 "	684	456	342	274	228	195	171	152	136
31	1393 "	1323 "	661	441	331	265	220	187	165	147	132
32	1350 "	1283 "	641	428	321	257	214	183	160	142	128
33	1309 "	1244 "	622	415	311	249	207	167	155	138	124
34	1271 "	1207 "	603	402	302	241	201	172	151	134	120
35	1234 "	1173 "	586	390	293	234	195	167	148	129	116
36	1200 "	1140 "	570	380	285	228	190	163	142	127	114
37	1167 "	1109 "	554	370	277	222	185	152	139	123	110
38	1137 "	1081 "	540	360	270	216	180	154	135	120	108
39	1107 "	1052 "	526	351	263	210	175	150	131	117	105
40	1080 "	1026 "	513	342	255	205	171	147	122	114	102
41	1053 "	996 "	498	332	249	199	166	142	124	111	99
42	1028 "	977 "	488	326	244	195	163	139	122	108	97
43	1005 "	955 "	477	318	239	191	159	136	119	106	95
44	982 "	933 "	466	311	233	187	155	132	117	104	93
45	960 "	912 "	456	304	228	182	152	130	114	101	91
46	939 "	893 "	446	298	223	179	149	127	112	99	89
47	919 "	874 "	437	291	218	175	146	123	109	97	87
48	906 "	855 "	427	285	214	171	143	122	107	95	85
49	882 "	838 "	419	279	209	168	140	119	105	93	83
50	864 "	821 "	410	274	205	164	137	117	103	91	82

Size Yarn	Gross Ydge. Per Lb.	Net Ydge. 5% Twist	Yardage of Different Plies								
			2	3	4	5	6	7	8	9	10
55	794 "	754 "	377	251	188	151	126	108	94	84	75
60	720 "	684 "	342	228	171	137	114	98	85	76	68
65	663 "	630 "	315	210	157	126	105	90	79	70	63
68	635 "	603 "	302	201	151	...	...	...	...	...	...
70	617 "	587 "	293	196	147	117	98	84	73	65	58
75	577 "	549 "	274	183	137	110	91	78	69	61	54
80	540 "	513 "	256	171	128	102	85	77	64	57	51
85	508 "	483 "	241	161	121	97	80	69	60	54	48
90	480 "	456 "	228	152	114	91	76	65	57	51	45
95	455 "	433 "	216	144	108	87	72	62	54	48	43
100	432 "	411 "	205	137	103	82	68	59	51	46	41
110	393 "	373 "	185	124	94	75	62	53	47	...	...
120	360 "	342 "	170	114	85	68	57	49	43	...	...
126	344 "	327 "	163	109	82	...	...	...	...	...	...
130	332 "	315 "	157	105	79	63	52	45	39	...	...
140	309 "	294 "	147	98	73	60	49	42	37	...	...
145	298 "	284 "	142	94	71	...	...	...	...	...	...
150	288 "	274 "	137	91	68	5	46	39	34	...	...

EXPLANATION OF TWINE PRICES

The prices of Flax, Hemp and Jute Twines fluctuate with the cost of raw material. There is no general basis price for twines, so in figuring the cost of any twine it is necessary to have the current price list.

Terms—2% cash discount for payment 10 days from date of invoice or 30 days net.

Prices always apply to standard packages as listed. Orders calling for twine in less than original packages take an advance of 1c per lb. for half bale lots or more, and 2c per lb. for less than half bale lots.

Orders for balls, reels, coils, skeins or packages not standard are subject to an advance charge to cover the additional time and labor used in their manufacture and are not subject to cancellation after the mill has started upon their manufacture.

The cost of putting up certain packages is much greater than formerly due to extra paper, burlap and labor. Following out our policy of furnishing goods to our trade at the lowest possible price, considering the quality of our products, it has seemed wise to make certain advances or differentials for such packages rather than make a general advance on all packages. By so doing the customers using the simpler forms of package pay basis price, those requiring special bales or reels pay an advance covering the actual additional cost of material and labor. These special differentials or advances remain the same irrespective of the price of the goods.

Relative Sizes 1 lb., ½ lb., ¼lb. Balls Fine Twines

FINE TWINES

Fine India Twine	See current price list
Flax Twine	" " " "
B.C.Twine	" " " "
Italian Flax Twine AA	" " " "
Italian Flax Twine AB	" " " "

Stock packages as follows:

Barrel Bales, 160 to 170 lbs.
Wooden Bales, 160 to 170 lbs.
Bales, 168 lbs. 56 6-ball packages, $\frac{1}{2}$ lb. balls.
162 lbs. 54 12-ball packages, $\frac{1}{4}$ lb. balls.

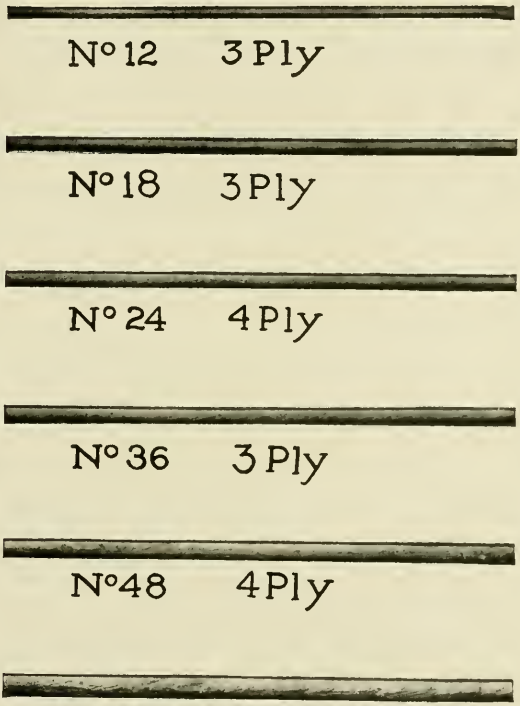
Also furnished as follows:

Reels, 10, 25, 50 and 100 lbs. single end.
10 lb. reels packed in 100, 150, 200 and 250 lb. bales.
Universal Wind. Tubes or cones, single end. 1, 2, 5 or 10 lbs. Packed in wooden barrels, or bales according to size of tubes.

Coils and reels, 50 to 100 lbs. Hide Rope Shape (many ends). Special charges as follows:

Nos. 12, 18, 24, 36 and 48 in. $\frac{1}{4}$ lb	$\frac{1}{2}$c advance
12 or 18 in. 2 oz. balls	5c "
168 and 162 lb. bales	$\frac{1}{2}$c "
Fine Twines in 10 lb. and 25 lb. reels	1c "
Fine Twines in 25 lb. reels and larger	$\frac{1}{2}$c "
No. 60 in $\frac{1}{2}$ lb. balls	$\frac{1}{2}$c "
Cut Twines	1c "

Any number of twine can be cut. The price being 1c over price for number desired. Standard size bales 150, 200, 250 lbs. made up of packages containing 12 cuts, each cut or bundle containing 1,000 strings cut to required length.



Approximate Sizes of Fine Hemp and Jute Twines

Size	Standard Size Balls
60	1 lb.
48	$\frac{1}{2}$ "
36	$\frac{1}{2}$ "
24	$\frac{1}{2}$ "
18	$\frac{1}{2}$ "
12	$\frac{1}{2}$ "

FINE INDIA FINISHED YARDAGE

No.	Lb. Yarn	Av. Yardage	Av. Strength	Ply
18	11	1150 ft.	30 lbs.	3
24	15	800 "	40 "	3
36	21	600 "	55 "	3
48	21	425 "	75 "	4
60	21	350 "	90 "	5

FINE TWINES

Size	Ft. per lb.	Ply	Ital.	AB Ital.	BC	Lt. Jute	D Jute
12	1650	3	40	35	33	30	24
18	1100	3	67	50	48	42	40
24	800	3	88	66	70	60	58
36	660	3	110	85	87	69	69
48	430	4	165	141	150	110	100
60	300	5	193	175	171	120	110

AA ITALIAN TWINES

Morice

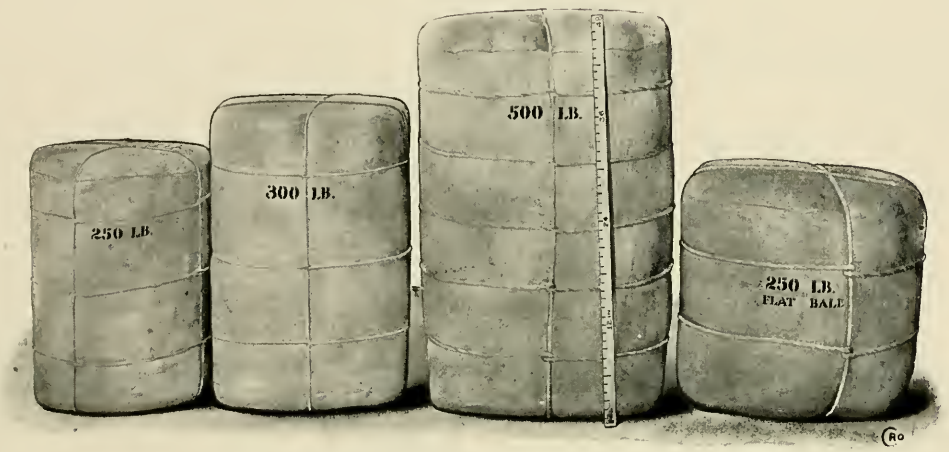
No.	Ft. per lb.	Strength Pounds
9	2200	25
12	1600	35
18	1150	55
24	850	75
36	640	110
48	430	140
60	340	165

FINISHED TWINES

Dolphin			Morice		
No.	Ft. per lb.	Strength Pounds	No.	Ft. per lb.	Strength Pounds
12	1600	25	12	1650	25
18	1100	40	18	1150	40
24	820	55	24	850	55
36	650	75	36	640	75
48	535	90	48	430	100
60	415	115	60	340	125
4-26	400	115			
5-26	300	130			
6-26	250	185			

168 lb. Bale of Fine Twine, Showing Paper Packages

Fine Twine Cut to Special Lengths



Relative Sizes of Bales of Coarse Twines.

COARSE TWINES—Finished

Light and Dark India Hemp—See current price list.
Stock packages.

Size	Standard Size Balls	Standard Size Bales	
4½	1 lb.	150-250-500 lbs.	..
5	1 "	150-250-500 "	..
6	1 "	150-250-500 "	..
7	1½ "	150-250-500 "	..
8	2 "	150-250-500 "	..
9	2½ "	150-250-500 "	..
10	3 "	150-250-500 "	..

Other forms of packing can be furnished as follows:

No. 4½ and No. 5, ¼ lb. balls, 1c advance.

No. 4½ in ¼ lb. balls, 3 lb. paper packages, 1½c advance. Made on order only.

No. 4½, No. 5, No. 6, ½ lb. balls, ½c advance; 5 or 10 lb. balls, no advance.

Reels, single end, 50 and 100 lbs., ½c advance.

Coils, 100 lbs. or larger, Hide Rope Shape (many ends), no advance.

Our Crown India Hemp is favorably known throughout the trade. Uniform in size, well polished, soft and flexible.

Relative Sizes of 2½ lb., 1½ lb. and 1 lb.
Balls of Coarse Twines (Finished)

N°4½ 2 Ply

N°6 3Ply

N°7 3Ply

N°8 3Ply

N°9 4Ply (R°

Standard Sizes Coarse Ball Twines in Jute Hemp and Jamaica

COARSE INDIA FINISHED, YARDAGE

No.	Lb. Yarn	Av. Yardage	Av. Strength	Ply
4½	70	280 ft.	90 lbs.	2
5	45	275 "	100 "	3
6	65	190 "	130 "	3
7	85	140 "	170 "	3
8	125	100 "	225 "	3
9	126	75 "	300 "	4

TWINES

Dolphin			Morice		
No.	Ft. per lb.	Strength Pounds	No.	Ft. per lb.	Strength Pounds
4½	300	120	4½–2 ply	300	120
5	260	160	5 3 "	275	160
6	200	200	6 3 "	210	200
7	150	250	7 3 "	160	250
8	125	325	8 3 "	115	325
9	95	400	9 4 "	90	400
10	75	450	10 5 "	75	500
11	60	500	.....	.....	.....

TWINES

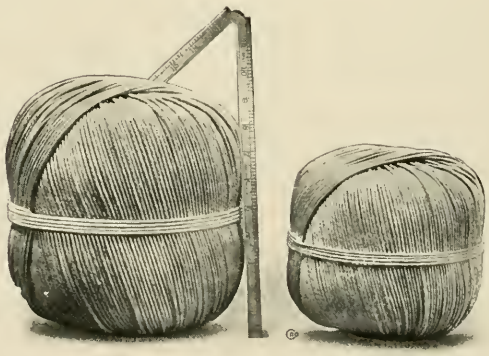
Size	Ft. per lb.	Ply	D Jute	L Jute	Cx Am	Jamaica	No. Yarn
4	450	2	.....	.....		90	...
4½	300	2	100	...	....	130	72
5	250	3	.....	.....	.....	..	54
6	200	3	175	.....	.....	180	72
7	150	3	210	.....	.....	250	90
8	110	3	250	.....	....	315	115
9	90	4	318	.....	..	420	115
10	70	5	400	.....	.....	.....	115

AMERICAN HEMP TWINES

No.	Lb. Yarn	Av. Yardage	Av. Strength
4½	70	300 ft.	125 lbs.
5	45	300 "	130 "
6	65	200 "	190 "
7	85	150 "	250 "
8	125	120 "	325 "
9	124	80 "	425 "

JAMAICA TWINES

No.	Lb. Yarn	Av. Yardage	Av. Strength
$4\frac{1}{2}$	70	280 ft.	150 lbs.
5	45	275 "	150 "
6	65	190 "	200 "
7	85	140 "	265 "
8	125	100 "	350 "
9	125	75 "	450 "
10	125	65 "	550 "



Relative Sizes of 10 lb. and 5 lb. Balls of Coarse Twine (Finished)

COARSE TWINE, UNFINISHED

Bales 150, 250, 500 lbs., 10 lb. balls. 1 and 5 lb. balls made to order, no additional charge.

Reels, 50 or 100 lbs., single ends, ½c advance.

Hide Rope Shape (many ends) reels or coils, 100 lbs. each, made to order, in lots of 1,000 lbs. or more, ½c advance.

Universal Wind Tubes, single end, 50 or 100 lbs.

Danker Coils, single ends, 50 or 100 lbs.

JUTE TUBE ROPE

Box Twine	2	50	400 ft.	80 lbs.
	3	50	270 "	130 "
	4	50	200 "	170 "
	5	50	160 "	200 "
	6	50	135 "	240 "
	7	50	115 "	280 "
	8	50	100 "	320 "
	9	50	90 "	360 "
	10	50	82 "	400 "

TUBE ROPE

Ply	American Ft. per lb.	Ludlow Ft. per lb.	Schlichter Ft. per lb.	Jackson Ft. per lb.	Bailey Ft. per lb.	Break
3	.....	.....	.....	.....	234	165
4	190	.....	215	.....	174	210
5	150	180	180	.....	124	264
6	130	150	150	200	101	360
7	.....	.....	123	.....	85	400
8	95	.....	115	.....	76	.....
10	.....	.....	86	.....	60	.....

REGULAR TUBE ROPE

Schlichter			Morice		
Ply	Ft. per lb.	Strength Pounds	Ply	Ft. per lb.	Strength Pounds
4	215	200	4	225	155
5	173	250	5	180	205
6	150	300	6	150	250
7	123	350	8	112	295
8	115	400	10	90	315
10	86	500	.....	.....	.....
12	72	600	.....	.....	.....
14	62	700	.....	.....	.....

Crown Tube Rope, 4-ply up, see current price list.
Crown Box Twine, 2 and 3-ply, see current price list.
Crown Paper Makers' Twine, see current price list.

PAPER MAKERS' TWINE

2	135lb. yarn	150 ft.	180 lbs.
3	135 "	100 "	275 "
4	135 "	75 "	350 "
5	135 "	60 "	435 "
6	135 "	50 "	625 "

PAPER MAKERS' TWINE

Dolphin			Morice		
Ply	Ft. per lb.	Strength Pounds	Ply	Ft. per lb.	Strength Pounds
2	170	130	2	170	130
3	115	200	3	113	200
4	90	325	4	85	325
5	65	400	5	65	400
6	50	500	6	55	500

JUTE WRAPPING TWINE

Crown Jute Wrapping Twine, 2-ply up, see current price list.

Cross Jute Wrapping Twine, 2-ply up, see current price list.

Scepter Jute Wrapping Twine, 2-ply up, see current price list.

Bales, 140 lbs., 2, 3, 4-ply, $\frac{1}{2}$ lb. balls.

5-ply up, $\frac{3}{4}$ lb. balls.

5 and 10 lb. balls made to order.

Reels, 50 lbs., single end.

Universal Wind. Tubes or cones S. E.

2-ply up to 5-ply can be put up in 1, 2, 5 or 10 lb. tubes or cones only.

5-ply up in any standard size tube.

Danker coils S. E., 50 lbs.

Crown Wrapping Twine is made from light colored fine long fibre Jute, stainless, very strong and especially desirable for use in connection with fine paper, leather or delicate fabrics.

Cross Wrapping is a fine yarn twine for use where high yardage and moderate strength is needed.

Scepter Wrapping is considered by the trade as the standard No. 2 grade. Many carload buyers refuse to accept any other brand.

Crown Jute Millers' Twine, 2-ply and up.

Cross Jute Millers' Twine, 2-ply and up, see current price list.

Reels and coils, 50 and 100 lbs., Hide Rope Shape (many ends). Reels, $\frac{1}{2}$c advance.

There are about 100 ends in the ready of all small plies of Millers Twine. In the larger plies the number is reduced to make a convenient size ready.

Crown Seaming Cord, see current price list.

Bales, 150, 250, 500 lbs., 3 lb. balls. Larger balls made on order, no additional charge.

Reels, 50 and 100 lbs. single end, $\frac{1}{2}$c advance.

Universal Wind Tubes, single end, 2, 5, 10, 25, 50 or 100 lbs.

Crown Jute Finished Seaming Cord made on order at same price as unfinished.

Unfinished Indias made in same sizes and packed in bales, reels and coils same as coarse finished twines,

No. 1 WRAPPING TWINE

CROWN BRAND

2	19	1080 ft.	35 lbs.
3	19	720 "	55 "
4	19	540 "	75 "
5	19	432 "	95 "
6	19	360 "	115 "
7	19	309 "	135 "
8	19	270 "	155 "

No. 2 WRAPPING TWINE

CROSS BRAND

2	21	975 ft.	35 lbs.
3	21	650 "	55 "
4	21	485 "	75 "
5	21	390 "	95 "
6	21	325 "	115 "
7	21	275 "	135 "
8	21	245 "	155 "

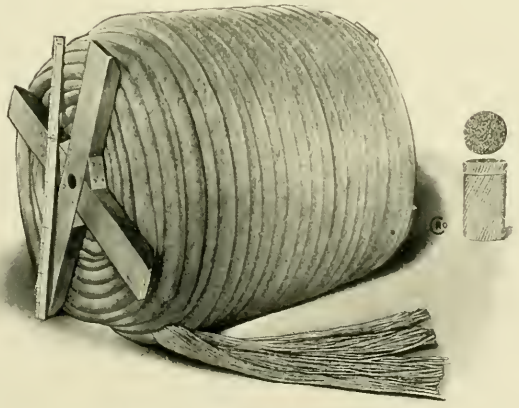
Ply	12 lb.	14 lb.	16 lb.	20 lb.	Av. Brk.
2	1710	1466	1400	1080	33
3	1140	977	900	720	50
4	855	733	680	540	62
5	684	586	520	432	80
6	570	488	450	360	110
8	427	366	330	270	160
10	342	293	250	210	215
12	.....	.....	220	175	235

YARDAGE AND STRENGTHS

Dolphin Schlichter Morice

JUTE WRAPPING

Ply	Ft. per lb.	St'gth lbs.	Ply	Ft. per lb.	St'gth lbs.	Ply	Ft. per lb.	St'gth lbs.
1	2400	15	2	982	44	2	1200	25
2	1200	25	3	655	66	3	800	40
3	800	40	4	525	100	4	600	60
4	600	60	5	400	140	5	480	80
5	480	80	6	328	132	6	400	95
6	400	95	.....	.....	.....	8	300	140
7	340	120	.....	.....	.....	10	240	185
8	300	140	.....	.....	.....	.....	.....	.....



Millers Twine or Sail Twine many ends

WOOL TWINE

Crown Wool Twine—3 or 4 ply, see current price list.
120 and 140 lb. bales, 1 lb. balls.
Made according to standards of the Boston Association.
No deductions are made on wool tied with our twine.

WOOL TWINE

Ply	Ft. per lb.	Strength Pounds
3	400	70
4	300	100
5	225	125
6	200	175

WALL PAPER TWINES JUTE

Ply	Ft. per lb.	Break	Strength
3	345	125	115
4	252	170	160
5	200	220	200
6	166	280	250
7	142	375	330
8	124	425	355
10	99	500	485

WALL PAPER—AMERICAN

Ply	Lb. Yarn	Av. Yardage	Av. Strength
2	40	500 ft.	90 lbs.
3	40	325 "	135 "
4	40	245 "	180 "
5	40	190 "	225 "
6	40	165 "	270 "
7	40	140 "	325 "
8	40	125 "	360 "
9	40	110 "	405 "
10	40	100 "	450 "

GRAY AND JAMAICA WALL PAPER

2	40	510 ft.	80 lbs.
3	40	340 "	125 "
4	40	250 "	170 "
5	40	200 "	220 "
6	40	170 "	260 "
7	40	145 "	310 "
8	40	125 "	365 "
9	40	112 "	420 "
10	40	100 "	475 "

JUTE CLOTHES LINE

Clothes Line, see current price list.

Our first grade Jute Clothes Line.

Jute Clothes Line, see current price list.

Stock lengths, 50 ft. hanks, gross bales, packed 12 hanks to paper packages, 12 packages to bale.

Other length hanks, coils and reels furnished on order.

50 lb. and 100 lb. reels and coils, standard.

Our Jute Line is the best made, most serviceable line on the market. Specially designed to stand changing and inclement weather conditions.

COTTON CLOTHES LINE

SOLID BRAIDED TWISTED

Cotton—Per gross 50 ft. lengths, other lengths proportionately, excepting those shorter than 40 ft., for which an additional charge of 10% is added to cover extra labor cost per pound.

HEMP AND JUTE CLOTHES LINES

Basis 50 ft. hanks.

Finished Jamaica
3-thd. Sisal
6-thd. Sisal
6-thd. Jute Unfinished
8-thd. Finished Jute
3-thd. Jute Unfinished
4-thd. Jute Finished

Special terms and prices on contracts upon application. Write for particulars.

SISAL CLOTHES LINES

Weights	3 ply to gross	6 ply
30 ft	26	
40 "	36	63
48 "	43	75
60 "	54	94
72 "	65	113

Clothes Line (all lengths)

3-thread, laid, $\frac{3}{16}$" diameter, in coils or reels	1c	above Basis
6-thread, fine, $\frac{1}{4}$" diameter, in coils or reels	2c	"
3-thread, laid, $\frac{3}{16}$" diameter, gross packages	2c	"
6-thread, fine, $\frac{1}{4}$" diameter, gross packages	3c	"

SAIL, SEWING OR BALING TWINES

Crown Extra Sail Twine, 3-ply up, see current price list.

Cross Sail Twine, 3-ply up, see current price list.

Scepter Sail Twine, 3-ply up, see current price list.

Sail Twines are valued for their strength, smoothness, and the fact that they will not roughen up under use. Yardage is also important, the first essential, however, is service.

B. C. Sail, 3-ply up, see current price list.

SAIL TWINE

Ply	Ft. per lb.	Breaking Strength	
2	1700	A Ital	AB
3	1150	59	50
4	850	63	60
5	700	75	65
6	575	90	70

	Pyramid	L M	Palmetto
3 ply	1200	1200	1200
	Flax	A A B	A A A
3 ply	1500	1800	2400

Standard packages and special charges:

Bales and double bales, 144 and 228 lbs. Double bales made on order only.

All stock plies of Sail Twine put up in ½ lb. skeins, 24 skeins to a package, 12 or 24 packages to the bale.

¼ lb. skeins put up on order.

Coils and reels, 50 lbs. standard Hide Rope Shape (many ends). Also furnished 100 lb. coils and reels.

Balls: ½, 1 or 5 lb. balls furnished on order, 1c per lb. additional.

2-ply Sail Twines, 1c per lb. additional.

BROOM TWINES

Colors—White, black, red, orange, blue, yellow, green, purple.

Balls, ½ lb. Standard size balls same as fine twines, page 56. ¼ lb. balls, ½c advance.

Skeins, 1½ lb. each, 72 in. long, put up in 18 lb. paper packages, 10 packages to bale, 180 lb. bale.

Reels, 10, 25 and 50 lbs., single end and 15 ends, parallel laid.

Our Broom Twine is recognized as equal to any goods on the market. The Broom Makers' prejudice is a serious barrier to any goods. The Broom Maker has a warm welcome for Crown Twine. Oue experience and the co-operation of our many Broom Maker friends have enabled us to get our colors, strength, finish and yardage just right. A strictly high grade Broom Twine that could always be depended upon has been demanded by the trade for many years and Crown Twine has satisfactorily supplied this want. The continually increasing demand for this twine is the best indication of its real worth.

MATTRESS TWINES

Standard packages:

168 lb. bale, ½ lb. balls, each ball in carton, 6 cartons to package, 56 packages to bale.

This twine is made of extra selected fibre of exceptional strength. Every known precaution is taken during manufacture to obtain fullest strength and uniformity, thus insuring good sewing qualities. Each bale is carefully inspected and packed in individual cartons.

Crown Mattress Twine, see current price list.

Standard packages:

Bales, 168 lbs., 56 6-ball packages, ½ lb. balls.

Wooden barrels, 170 to 180 lbs., ½ lb. balls.

TWINES—COTTON

Wrapping

White—3-ply and up, barrels or bales, balls, bulk, sacks, tubes or cones.

2-ply is $\frac{1}{4}$c lb. higher. Barrels, bulk, balls or paper sacks, tubes or cones same prices. 5 lb. muslin sacks $\frac{1}{2}$c extra.

The best No. 1 Cotton Twine is made of an 8's yarn, but many of the so-called No. 1 Twine is not better than 7's or even $6\frac{1}{2}$'s yarn, the yardage is necessarily shorter than the best made of 8's.

Butchers' Cotton Twine is usually 4's yarn and the yardage is given below. A comparison of yardage can easily be made on a gram or apothecaries scale. Measure off 10 feet of each and the balance will tell the tale.

Crown Brand is a strictly selected No. 1 grade Cotton Twine made of strict middling cotton and 8's yarn.

Cross Brand is a good quality of regular Cotton Twine that will meet general requirements.

Scepter Brand is a cheaper grade, made of 4's yarn; has good strength and is good for packers, etc., where strength is the main essential.

Variegated

Red and white, blue and white. Put up same as White Cotton Twine.

Cable Laid or Floss Sea Island Twines

Sea Island

Pink and assorted colors:

Sea Island Cable Laid in bulk, balls, tubes, cones.

Sea Island Cable Laid in 1 lb. boxes, 100 lb. cases.

Sea Island Floss, in bulk, balls, tubes or cones.

Sea Island Floss, in pound boxes of 12, also 70 balls to a box

Butchers'

White Cotton, cones, tubes or balls:

6 to 20-ply.

Sail

Put up in ½ lb. balls, 2½ lb. tubes or cones; 50 lb. reels, many ends, single end reels, 1c additional.

HOW TO FIGURE YARDAGE ON COTTON TWINE

Basis 840 yards to single strand of No. 1 Twine. Multiply basis (840 yards) by number of yarn (4-6-7-8-10-12-16, etc.) Divide by number of ply. 5% to be allowed for twist.

840 yds. Basis
8 No. of Yarn

No. of ply 4 | 6720

1680 No. of yds. to one lb. of 4 ply No. 1
1680 Yds.
3 No. of feet to yd.

5040 No. of lineal ft. to one lb. 4 ply No. 1

	8's	4's
3 ply	6440 ft.	3220 ft.
4 "	5040 "	2520 "
6 "	3000 "	1500 "
8 "	2100 "	1050 "
10 "	1700 "	850 "
12 "	1400 "	700 "
14 "	1250 "	625 "
16 "	1100 "	555 "
18 "	1000 "	500 "
20 "	850 "	425 "
24 "	700 "	350 "
30 "	575 "	288 "
40 "	435 "	218 "

SEINE TWINE

In Bulk or in 5 or 10 lb. Pads

Soft Laid

6 threads in skeins.
9 " "
12 " "
16 and larger skeins

Medium Laid

6 threads in skeins.
9 " "
12 " "
15 to 42 "
45 and larger skeins.

Hard Laid

No. 3 Hard Woodberry Seine Twine, per lb.
No. 4 " " " " "
6 threads in skeins.
9 " "
12 " "
15 to 42 "
45 and larger skeins.
Tubes, ½c lb. additional.
Balls, ½ lb. and larger, ½c additional.
" ¼ lb. " " 1c "
" 2 to 3 oz., 2c "

These following figures are not given as exactly correct, but only approximately so. They are given without guaranty as in any way applying to our goods. They are given only with a view of assisting customers in judging of what their wants may require. They are conservatively calculated and will approximately show what may reasonably be expected of first class goods of the kind named, made of 10's yarn, spun of good middling cotton skillfully handled.

SEINE

APPROXIMATE LENGTHS PER POUND AND TENSILE STRENGTH OF COTTON SEINE TWINES—ROPES AND ROUND BRAIDS

COTTON SEINE TWINES

Sizes—Thread No.	Hard Laid Ft. per lb.	Med. Laid Ft. per lb.	Tensile Strength Pounds
6	2880	3110	12
9	1920	2065	18
12	1440	1555	24
15	1150	1240	30
18	960	1035	36
21	820	885	42
24	720	775	48
27	620	665	54
30	570	615	60
33	520	560	66
36	480	515	72
42	410	440	84
48	360	385	96
54	310	335	108
60	285	305	120
72	240	260	144
84	200	215	168
96	180	195	192
108	150	160	216
120	140	150	240
132	130	140	264
144	120	130	288
168	100	110	336
198	85	90	396
210	80	85	420
240	70	75	480

Trot Lines

Packed in Barrels 150 to 200 lbs

Smallest Size	000	Put up in $\frac{1}{2}$ lb Ball	
"	00	$\frac{3}{4}$ "	"
"	0	1 "	"
"	1	$1\frac{1}{4}$ "	"
"	2	$1\frac{1}{2}$ "	"
"	3	$1\frac{3}{4}$ "	"
"	4	2 "	"
"	5	3 "	"

STAGING

All sizes, 2 and 4 oz. balls in 5 lb. sacks. 150 lb. barrels also lbs. packed loose in barrels.

Sizes 24 and 27 base.

Sizes 15, 18 and 21, 1c extra.

CORDS

Cotton-Braided Sash Cord

No. 1 Standard, Nos. 8, 9, 10 and 12.....
No. 7.....
No. 6.....
No. 2 " No. 8.....
No. 7.....
Solid Dyed Drab and Mahogany, Nos. 8, 9, 10 and 12.....
Solid Dyed Drab and Mahogany, No. 6.....
Drab and Mahogany Wire Centre on application.
Prices for other colors on request.
Trolley Water-Proof:
Nos. 8, 9, 10 and 12.....
No. 6.....

Above prices based on lots of one bale or more of 6 dozen each.

Put up on coils or reels if desired.

No. 14 and 16 Cost 1½c above basis of No. 8.

WICKING

Miners' and Candle-Twisted

In balls, 5 or 10 lb. sacks or 3 to 4 lb. tubes, 100 lb. bales.

Caulking Cotton

MACHINERY WIPING WASTE

Packed in 1 lb. bundles, 50 or 100 lb. bales.

Pressed in bales weighing about 50, 100 and 500 pounds.

Also in small bales weighing 25 and 50 lbs., ¼ and ½c per lb. respectively extra.

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