AGRICULTURAL INVENTIONS.

Mr. John P. Smith, of Claverack, N. Y., has patented an improvement in thrashing machines for which letters patent No. 53,694 were issued to him April 3, 1866. The improvement consists in so combining a perforated apron and concaves with the rotary cylinder of a thrasher as to create an upward blast through the apron to lift and assist in carrying the straw to the cylinder.

An improvement in cotton scrapers, choppers, and dirters has been patented by Messrs. Samuel A. De Force and William V. McConnell, of Crockett, Texas. The object of this invention is to furnish an improved machine for cultivating cotton which shall be so constructed as to bar off, scrape, chop, and dirt the cotton upon both sides of a row at one passage.

Mr. William R. Iles, of Fairmount, Ill., has invented an improved check-row planter, of that general form in which a cord or chain is provided at regular intervals with lugs, tappets, or knots, which cord is staked upon opposite sides of the field, and which knots or tappets, as the machine is drawn across the field, successively operate the dropping devices to cause the corn to be dropped in perfect check row. The improvements consist in the novel construction of the device upon which the cord or chain acts to impart the motion to the seed slides, and in the peculiar construction of guides from which the rope or chaiu passes out to the front and rear of the machine.

NEW SYSTEM OF DIGGING AND CURBING WELLS.

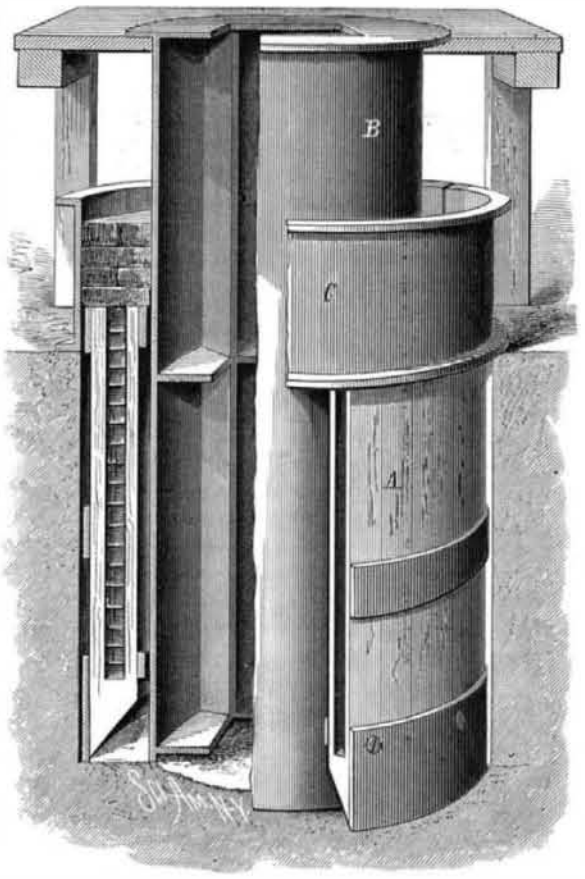
The annexed engraving represents a novel method and apparatus for digging and curbing wells, recently patented by Mr. Christopher C. Hackett, of Floyd, West Carroll Parish, La. The invention is intended to secure accuracy in the shape of the well and in the direction of digging; it permits of proceeding simultaneously with the two operations of digging and curbing, and it prevents the caving in of the well. In the engraving, which is partly broken away to show the internal construction, the sand box, A, which is shown as just entering the shaft, forms the foundation of the wall, and follows the shaft as it is dug by the workman. This box is made of wood, and is hollow from the top nearly to the bottom. Below the hollow portion the staves are chamfered off from the inside to give a narrow bearing edge. The staves are held together by iron hoops upon the outside, and wooden hoops on the inside, and the annular chamber formed between the staves is filled with masonry. A platform is erected over the well shaft at the proper height to enable the workman to lay the well curb or wall underneath.

An inside guide, B, consists of segments forming a cylinder, of a diameter just sufficient to allow it to fit inside the sand box. The wall is supported by an outside guide, C, a little larger than the sand box, which rests on the earth at the edges of the mouth of the shaft. For the sake of convenience in placing and removing, it is divided diametrically.

The invention is applied by sinking the sand box, A, into the shaft its full depth, then the platform is erected over it, and the sectional inside guide, B, is passed down in the sand box. The workman then proceeds with the digging, and as he deepens the shaft the sand box sinks, and the wall or curb is built on top of the sand box between the walls of the inside guide, B, and those of the outside guide, C.

The thickness of the curbing or wall equals the thickness of the walls of the sand box, and the inside and outside guides supply a sure guide for building it. As the shaft deepens, the sand box, and with it the finished curb built upon it, sinks.

In this way the digging and curbing are carried on at the same time. The chamfered lower part of the sand box permits the workman to reach with his tools to the edge of the box, so that he can dig evenly all around and underneath it, and thus let it descend evenly. Above the platform an ordinary derrick is erected, with a windlass, pulleys, etc., for lowering the sections of the inside guide, and hauling up the detritus. If, after the well is dug, the water should fall below the top of the sand box, and thereby expose it to decay, the brick filling or masonry contained in it will remain as the foundation of the well or curbing, and thus prevent it from caving in.



HACKETT'S IMPROVEMENT IN DIGGING AND CURBING WELLS.

The inventor informs us that wells made on this plan are free from surface water, and are shut out from contamination by the infiltration of sewage, as the walls may be made perfectly tight by the use of cement, and no water can enter that does not come from the fountain head. This is a very essential feature where wells are still in use in the larger towns and cities, and it is not less so in the country, where now, in a large proportion of cases, foul water from the cattle yards finds its way into the wells.

LIGHT LOCOMOTIVES.

Persons who are familiar only with the ponderous locomotives that are used on the great through freight and passenger lines would hardly recognize their kinship to the many varieties of light locomotives that are used for all kinds of special service. We present illustrations and descriptions of a few of these light locomotives, built by H. K. Porter & Co., of Pittsburg, Pa., whose shop, we are informed, is the only one in this country exclusively occupied by this kind of work.

MINE LOCOMOTIVES.

The adaptation of the light locomotive to use inside of mines involves modifications which change its outward appearance without specially affecting the working machinery. The smoke stack is shortened, the roomy wooden cab is replaced by a low iron canopy, the steam dome is reduced in height, and a special throttle valve used to secure dry steam; and the sand boxes and whistle are placed out of the way. Some of these mine locomotives never see the light of day; they are sometimes little more than four feet in height, so that a man can easily look down the smoke pipe while standing alongside of the track, and if he has tolerably long legs he can ride the locomotive sitting astride the water tank. In spite of their diminutive size these little turtle-shaped machines are very powerful. One engine does the work of ten to thirty or more mules, at about the daily expense of operating two to four mules, while the cost of the engine is usually rather less than that of the animals it replaces. Its life is longer, and it consumes nothing while standing still during any suspension of mining, for it only needs a few cents' worth of white lead and tallow to keep it in good condition while standing in its stall; mules, on the other hand, do not have diminished appetites when not at work. Another important advantage of the locomotive over animal power is its ability to haul extra heavy loads and make more frequent trips whenever an increased output is desired, and this is done without any additional investment beyond a trifle more coal and water used. To increase the output by animal power involves an increase in their number, for flesh and blood have not the capacity possessed by iron and steam to endure overwork.

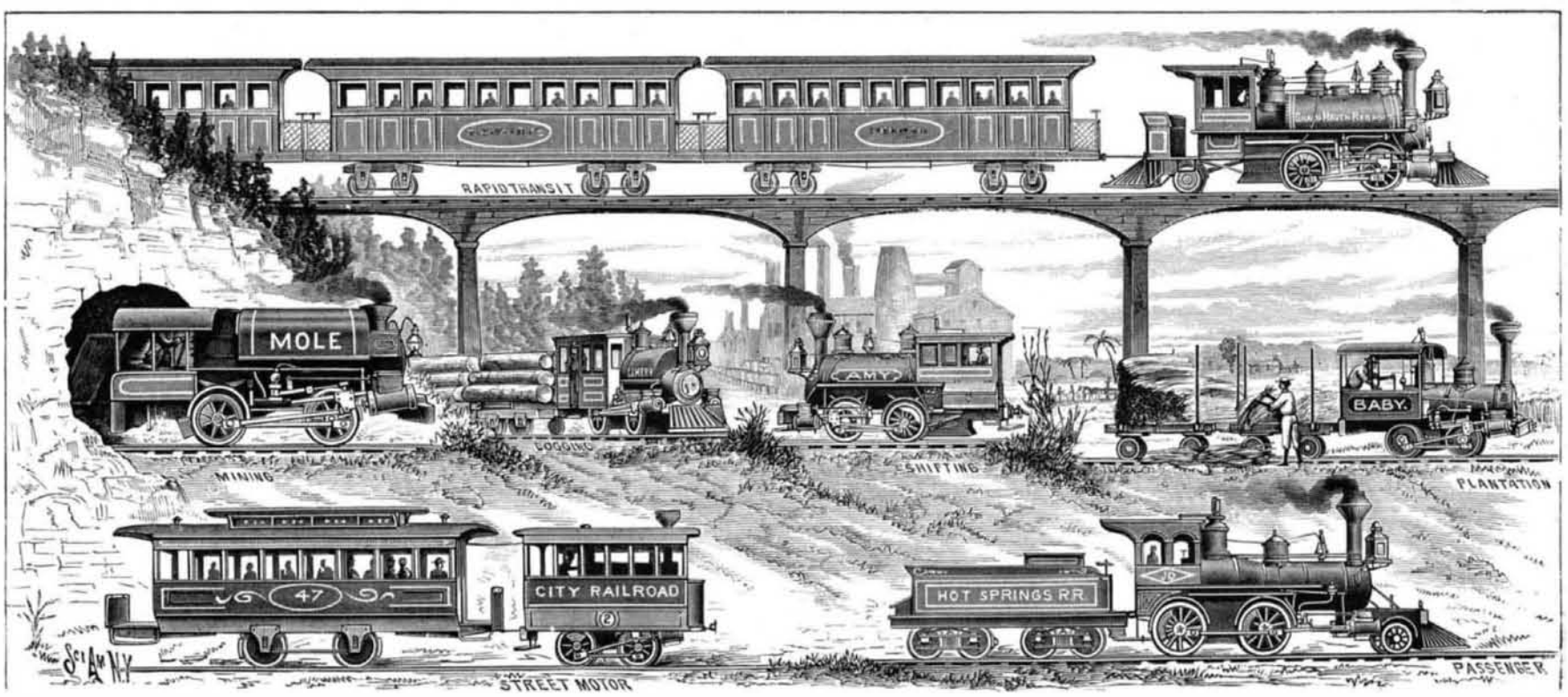
Mine locomotives are not only valuable in coal mining, but are also well suited to the mining of precious metals, where they effect such a saving as to bring into the market great quantities of low grade ores which are not rich enough to pay for hauling by animals.

The economy of locomotive over animal power applies of course to all kinds of surface tramways as well as to underground hauling.

LOGGING LOCOMOTIVES.

The quantity of lumber used annually in the United States is enormous, and one large item in the cost is the expense of hauling the logs to where they may be floated or carried by rail to the mills. This is now done to a great extent by light locomotives on cheaply built railroads. In the northern districts logs are also hauled on sleds over the snow. This is impracticable for long distances and is expensive in all cases, and is liable to interruption in mild or open winters, in which case the logs left in the woods till the next season are often destroyed by boring worms, fire, and decay. The locomotive is independent of the season of the year, and is capable of hauling immense quantities of logs and to run twenty-four hours a day when the price of lumber makes this desirable. The hauling is done so cheaply that "culled" or poorer grades of logs, which would otherwise be left to rot in the woods, can be profitably marketed, and a logging operator can make a handsome profit when selling at what are cost prices to others who haul by animal power. The size and style of the locomotive, and the weight of the rail used depend on the amount of business and the length of the haul. The whole outlay for a steam logging railroad is about fifty cents to one dollar for each thousand feet of lumber readily reached by it, or considerably less for large tracts. When the tract is all cut off, the railroad may be shifted to another tract at slight expense.

One of the most important logging railroads in Michigan is some thirteen miles long and uses four locomotives, each of eight tons weight. Several square miles are annually cut off to furnish it with freight, which runs up to about a half million tons each year. Like many of these roads it has no railroad connection, and the only communication



LIGHT LOCOMOTIVES BUILT BY H. K. PORTER & CO., PITTSBURG, PA.

with civilization is by a wagon road some fifteen miles long. Over this road, which for most of the distance is hardly more than a cart track of the roughest description, the rails and rolling stock were hauled. The locomotives were taken in pieces, with the exception of one, which was so urgently needed that, to save time it was fired up and run by its own steam, without any rails at all, over the dirt road to its destination. A force of men, equipped with levers to steer the engine round corners, went ahead, and wagons carrying water and fuel followed. The journey was made without accident and much to the amazement of the lumber choppers, who were not accustomed to see locomotives traveling through pine forests in search of a railroad.

Lake Tahoe, California, is a beautiful body of water surrounded by mountains. It is noted for its clearness and depth, and it is said that the bodies of those drowned in it never rise. It is now utilized for logging purposes, being reached by a chute one third of a mile long, down which the logs, weighing from five to ten tons each, slide in less than half a minute, followed by a track of smoke and flame. The report made when a log strikes the water is heard a mile away, and the spray is thrown into the air as high as a church steeple. These immense logs are all carried along the mountain sides to the top of the chute by a little logging locomotive whose weight is less than many of the logs it hauls.

At Dutch Flat, Cal., a novel and ingenious application of locomotive power is in use. The track of the logging railroad runs high up along the mountains, and a great part of the timber grows on the sides and bottoms of precipitous cañons. An inclined plane, 1,200 feet long, with a perpendicular descent of 600 feet, runs from the railroad down the mountain, and the locomotive is run on to a siding where friction rollers are set in the track. Resting on these rollers the locomotive driving wheels turn twenty miles an hour without advancing an inch, but the motion is communicated from the rollers by gear wheels to a drum on which is wound a steel wire rope. By this simple device a twelve-ton locomotive pulls up a load much heavier than itself. When enough logs have been hoisted to make a train load, the locomotive is run on to the main track again, and pursues the even tenor of its way just as if it had not been transformed into a stationary engine. The same attachment may be used to supply power to a sawmill or other machinery.

PLANTATION LOCOMOTIVES.

In tropical countries, where the soil is very soft and the sun's heat excessive, light locomotives have been introduced lately for carrying sugar cane from the fields to the crushing mills, hauling fuel and supplies, and doing other work as desired. For such roads the rails and cross ties are usually furnished by the manufacturer all put together ready to lay, so that the track is more or less of a portable character. Rails of about sixteen pounds weight per yard are used, and the track is not often kept in good order, especially in the rainy season, when it may be so covered with mud as to be invisible. Farm hands, coolies, Chinese, or negroes are likely to be pressed into service as engineers, and under such circumstances the simpler and stronger the machinery the better, while on the other hand the locomotive must be as light as possible. The manufacturers inform us that the plantation locomotive shown in the illustration meets the conflicting requirements of this service admirably. The cylinders of the smallest size are only five inches in diameter and ten inches in stroke, the driving wheels twenty-two inches diameter, and the entire weight, in running order, only about three tons. The water tanks are placed under the engineer's seats, and either coal or wood, or "bagasse" (the dry-pressed cane), may be used for fuel. Larger sizes, requiring heavier rails, are also built. Sometimes a pair of pony wheels support a water tank placed at the rear end, nd sometimes the tank is placed over the cylindrical parts of the boiler. These locomotives are used on the sugar plantations of the Southern States as well as in the West Indies. The gauge of track varies from two to three feet.

SHIFTING LOCOMOTIVES.

Nowadays almost every large establishment situated on a railroad, and having sidetracks for receiving and shipping by car loads, owns its own shifting locomotive. Some of the larger iron and steel works operate as many as a dozen locomotives of this class. Compared with shifting cars by a gang of men with pinch bars or by teams of horses, or with depending on the railroad company for placing cars where they are wanted, the economy and convenience of owning a shifting engine is very marked. Where a narrow gauge track is also used for hauling coal, ore, lumber, or other supplies, a third rail is often laid on the wide gauge siding, and the narrow gauge engine does the shifting and work for both tracks. One remarkable feature of these shifting locomotives is their great power as compared with their small size. This is due to the fact that all their weight is placed on the driving wheels, and is used for traction. They have repeatedly hauled trains that larger engines of usual construction could not move. This, to an ordinary observer, seems impossible, but is readily understood by a mathematical comparison of the proportions between the size of the driving wheels, the useful weight, and the cylinder capacity.

SPECIAL SERVICE LOCOMOTIVES.

Light locomotives of the same general styles of those made for logging railroads, plantations, and for shifting are also put to a great variety of uses, as, for instance, hauling mud from dredging machines to fill up low and worthless lands; pushing white-hot ingots of Bessemer steel at rail mills; carrying the crude material of the well known superphosphates; for moving stone and earth at great engineering works, such as the Hoosac and Musconetcong Tunnels, the Rapids Improvements near Keokuk, and the government works at Mussel Shoals; for removing cinder at blast furnaces, and for miscellaneous hauling at coal and iron works, quarries, and other places.

We present, also, illustrations of light locomotives specially designed for rapid transit on surface or elevated roads, for street railroads, and for narrow gauge railroads.

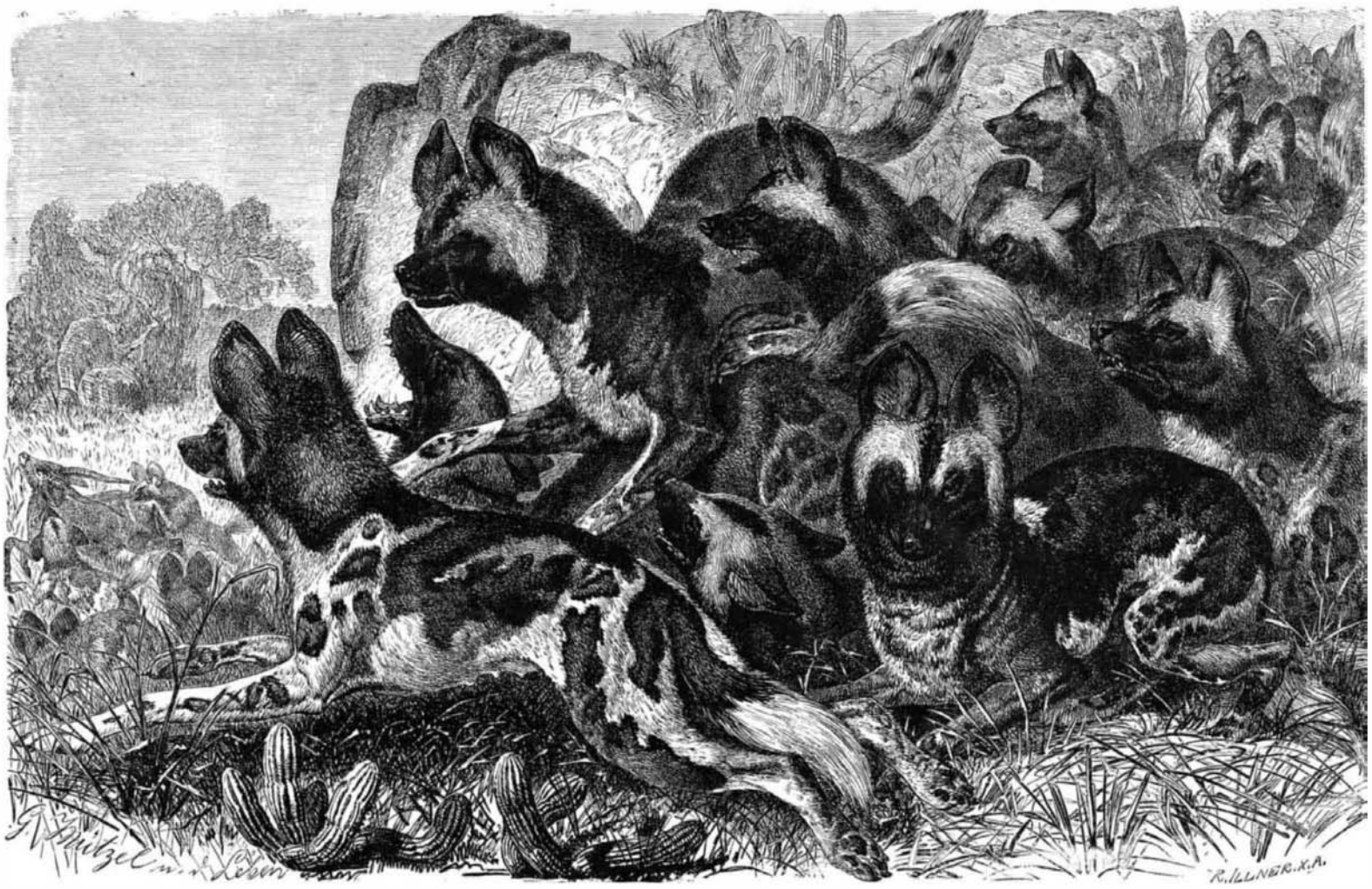
For more detailed description of the performances of light locomotives, their weight, dimensions, and general construction, and other items of general interest connected with their use, the reader is referred to the illustrated catalogue of Messrs. H. K. Porter & Co., of Pittsburg, Pa.

THE HYENA DOG.

Just as the Aard wolf appears to form the link between the civets and the hyænas, being with some difficulty referred to either group of animals, so the hunting dog seems to be the connecting link between the dogs and the hyænas. Its position, however, in the scale of animated nature is so very obscure that it has been placed by some zoologists among the dogs and by others among the hyænas. As, however, the leading characteristic of its formation appears to tend rather toward the canine than the hyænine type, the hunting dog has been provisionally placed at the end of the dogs rather than at the end of the hyænas.

In its general aspect there is much of the hyænine character, and the creature has often been mistaken for a hyæna, and described under that name. There is, however, less of the hyænine type than is seen in the Aard wolf, for the peculiar ridge of hair that decorates the neck of the hyæna is absent in the hunting dog, and the hinder quarters are not marked by that strange sloping form which is so characteristic of the hyæna and the Aard wolf itself. The teeth are almost precisely like those of the dogs, with the exception of a slight difference in the false molars, and therefore are quite distinct from those of the hyænas. But the feet are only furnished with four toes instead of five, which is a characteristic of the hyænas, and not of the dogs. Several other remarkable points of structure are found in this curious animal, some of them tending to give it a position among the dogs, and others appearing to refer it to the hyænas.

The general color of the hunting dog is a reddish or yellowish brown, marked at wide intervals with large patches of black and white. The nose and muzzle are black, and the central line of the head is marked with a well-defined black stripe, which reaches to the back of the head. The ears are extremely large, and are covered on both their faces with rather short black hairs. From their inside edge rises a large tuft of long white hair, which spreads over and nearly fills the cavity of the ear. The tail is covered with long bushy hair, which is for the greater part of a grayish-white hue, but is strongly tinged with black near its insertion. In nearly all specimens there is a whitish patch below each eye. These tints are somewhat variable in different individuals, but preserve the same general aspect in all.



HYENA DOG.—*Lycaon venaticus.*

There are many names by which this animal has been called; in the writings of some authors it is mentioned under the title of the painted hyæna, while by others it is termed the hyæna dog. The Dutch colonists of the Cape of Good Hope, where this creature is generally found, speak of it by the name of wilde hund, or wild dog; and it is also known under the names of simir and melbia.

Its title of hunting dog is earned by its habit of pursuing game by fair chase, and uniting in packs of considerable numbers for that purpose. As is the case with the generality of predaceous animals, it prefers the night for its season of attack, but will frequently undertake a chase in broad daylight. For the purpose of the chase it is well fitted, as it is gifted with long and agile limbs and with great endurance of fatigue.

A successful and practical sportsman, who has witnessed the performances of fox hounds and hunting dogs, is inclined to give the palm to the latter animals, for their almost in