conditions. Such view seems also to be in better agreement with the concepts of our new age, called the "atomic age," where boundary lines between matter and energy are gradually fading out.

A final word should be said about admissibility of patent monopolies for healing methods in view of public policy. Various objections have been raised. The danger of public deception and fraudulent misrepresentation can be efficiently overcome by an adequate examination in the Patent Office requiring solid and conclusive proofs of usefulness and operativeness. It is also feared that patents for therapeutic treatments would open the door to ruthless exploitation by excessive royalties thus depriving the average man of the benefit of the invention. The answer to this objection is that such reprovable practices may be checked easily and even without new legislation. The State associations of medicine and similar influential groups or agencies prove stronghanded enough to control professional misconduct of which abusive profits from patent royalties are but one feature. But on the other hand it is difficult to see why a physician or other scientific research worker should risk his time, efforts, money and frequently his professional responsibility to undertake the solution of an important medical problem, and then dedicate the fruits of his endeavors to the free use of the public, when a chemical or mechanical inventor may lay an outrageous toll of royalties upon the simplest every-day commodity. It may be that the hitherto one-sided approach to the question is also in some way responsible for the delays in successfully dealing with certain diseases, such as infantile paralysis and cancer,—in spite of the outstanding achievements in other medical domains.

Patents for therapeutic methods cannot be regarded as being contrary to public policy. They are rather helpful in promoting the play of inventive qualities in one of the most vital spheres of scientific activities, in the same manner as other patents have been up to now for the benefit of the American people.

Brunelleschi's Patent

By Frank D. Prager*

"THE MAGNIFICENT AND POTENT LORDS, LORDS MAGISTRATE AND STANDARD BEARER OF JUSTICE,

CONSIDERING that the admirable FILIPPO BRUNELLESCHI, a man of the most perspicacious intellect, industry and invention, a citizen of Florence, has invented some machine or kind of ship, by means of which he thinks he can easily, at any time, bring in any merchandise and load on the river Arno and on any other river or water, for less money than usual, and with several other benefits to merchants and others; and that he refuses to make such machine available to the public, in order that the fruit of his genius and skill may not be reaped by another without his will and consent, and that, if he enjoyed some prerogative concerning this, he would open up what he is hiding, and would disclose it to all;

AND DESIRING that this matter, so withheld and hidden without fruit, shall be brought to the light, to be of profit both to said FILIPPO and to our whole country and others; and that some privilege be created for said FILIPPO, as hereinafter described, so that he may be animated more fervently to even higher pursuits, and stimulated to more subtle investigations,

DELIBERATED on June 19, 1421

THAT NO PERSON in being, wherever born, and of whatever status, dignity, quality and grade, shall dare or presume, within three years next following from the day when the present provision has been approved in the Council of Florence, to commit any of the following acts on the river Arno or on any other river, stagnant water or swamp, or water running or existing in the territory of Florence: (a) to have hold, or use in any manner, be it newly invented or made in new form, a machine or ship or other instrument designed to import or ship or transport on water any merchandise or any things or goods, except such ship or machine or instrument as they may have used until now for similar operations, or (b) to ship or transport or to have shipped or transported any merchandise or goods on other ships, machines or instruments for water transport than were familiar and usual until now; and further that

*Attorney at Law, Chicago, Ill

ers of domestic woolens[7]. This Major Guild had large centralized plants for the storage of soap, alum and dyes, also for tools and the like, while the individual members owned the main producing plants, that is, factories as well as systems of home-work or putting out. Wool washing, carding and dyeing, and again the final wool dressing operations, were carried out in large establishments of modern, industrial type, while spinning-wheels and looms were rented out to scattered home-workers. A similar pattern was followed in *Arte di Seta,* the guild of silk, also called the guild of St. Mary's Gate, which had a separate section of gold embroiderers and goldsmiths[8]. Elaborate agreements were in force to divide certain markets between *Calimala, Lana* and *Seta.* On other markets the groups fought one another, with the result that *Calimala* lost much of its importance about 1350, and *Lana* was the strongest organization from then until about 1500. The furriers and the pharmacists formed the two remaining Major Guilds.

Young Brunelleschi had the choice of these guilds. Any citizen who could afford the entrance fees, the yearly contributions etc., was free to enter. Brunelleschi selected the goldsmiths' section of *Arte di Seta,* late in 1398. He was matriculated in 1404.

As master goldsmith, he was eligible to reponsible public positions. In the republican but highly undemocratic system of the time, the seven Major Guilds were constitutionally entitled to seven of the nine seats in the Supreme Council of State, while the fourteen Minor Guilds, that is, the blacksmiths, carpenters, masons, bakers and other small-scale artisans and traders had only token representation. No recognition whatsoever was accorded to the farmers, the ten thousands of proletarian home-workers, and the female slaves who generally did the household chores for the rich. The Supreme Council

[7] The constitution, technology and trade of this guild are discussed in the excellent book of Doren, Fl Woll., as cited above. The only unfortunate feature of the book is that citations from documents are too scarce and, like in Davidsohn, too much interspersed with comment

[8] U. Dorini, Statuti dell' Arte di Por San Maria, 1934, prints the statutes and essential supplements.

was known as *Signoria* or *I Priori,* and was composed of the nine "Lords Magistrate" or Councillors, one of whom was the "Standard Bearer of Justice" or President[9]. This was the authority which, in 1421, granted Brunelleschi's patent. Incidentally, Brunelleschi himself was one of the "Lords Magistrate" in 1425.

A very influential sector of Florentine society, and a primary field of Brunelleschi's professional endeavors, was provided by the descendants of the feudal aristocracy of former times. Feudalism had been abolished, and the governing class took pride in being composed of *Popolani* or commoners. To be a *Magnate* or nobleman was tantamount to being a traitor and a rogue. In the late 1200s, the last of the former nobles had either become merchants or sunk into obscurity, if they were not exiled or killed. Especially the Ghibellins, the White Guelphs and their partisans had suffered; Dante's fate is well known. The other faction, the Black Guelphs, were more successful. Many of them, under the cloak of Major Guild membership, continued to own important tracts of real estate, and to serve as top-flight administrative officials and judges, at home and abroad; being organized in the *Parte Guelfa*[10], a semi-official group which passed as non-aristocratic, by an absurd but generally accepted fiction. Occasionally a commoner was honored by being ceremoniously declared a member of this *Parte.* Such honors were dispensed by the "Magnificent Lords"; incidentally, by decrees reading quite similar to Brunelleschi's patent. This was an honor; but it was a penalty worse than lifelong exile for a commoner to be officially declared a nobleman. The implication was that all noblemen belonged to the hated Ghibellins, while on the other hand the members of the *Parte Guelfa* were particularly deserving commoners. The *Parte* together with the most prosperous bankers and members

[9] Schevill op cit. p. 339

[10] Davidsohn Band 4 Teil 1 p. 103-110 and 184-212; Band 4 Teil 2 p. 1-7; Forsch., Vol. 4 p 29-67, Doren, Fl. Zunft., p. 55, 56; Renard, vol. 1 p 1-142; vol. 2 p. 30-46; Schevill p. 142-144 and passim A decree accepting a commoner into the *Parte* in recognition of his merits as an artist was published by G. Milanesi, Giorn Stor. degli Arch Tosc, vol. 4 p. 203-205

of *Lana* and *Seta* furnished the actual rulers of Florence in Brunelleschi's time. Brunelleschi did not belong to this uppermost level; he merely had access to it, as a Major Guild member and artist, and he was one of those whose names appeared in the lists of persons eligible for public office. Since the lists were brazenly manipulated by those in actual power, the tenure of office as "Magnificient Lord" was purely nominal; furthermore such tenure was limited to the period of two months.

While Brunellesschi's political influence was insignificant he was a prime mover in a broader, cultural sense. He was an outstanding exponent of the then rising era of individualism. The 1300s had brought collective institutions such as the Major Guilds to the peak of their might. The same century had been the golden age of Florence as an industrial and financial power, in spite of frequent economical and political struggles. It had developed the merchant-adventurer; great fortunes had accumulated in the hands of a few, some of whom turned to new foreign trades, striving for monopoly positions. The guilds as regulating bodies were unable to control the more enterprising traders. In Brunelleschi's time the Major Guilds started to petrify into mere matters of form. On the other hand, the Minor Guilds gradually decomposed [11], due to the domination exerted by the Major Guild regime. Our goldsmith was destined to play a definite part in the guild-disintegrating process.

The era of individualism brought the freedom of thought to Florence and the Western world; it also brought the change from Major Guild plutocracy to the dictatorship of Cosimo de' Medici, the banker, and later on, the petty monarchy of his descendants. Under the dictatorial and monarchial regime the new freedom of thought found limits and boundaries again. A concept of "pure" arts and professions was redeveloped, for the

[11] Renard, vol 2 p. 19-20.

first time in a thousand years, denoting the status of professionally specialized, economically dependent Court servants.[12] This concept, which remained in existence up to the present day, put much more emphasis on specialization and resulting limitation of outlook than even the guild system had required. Brunelleschi was unconcerned as yet by professional qualifications, as he was unimpressed by the guild limitations of the Middle Ages. His thought was free, more so than that of his followers and biographers. Vasari, the leading historian of the arts, a sixteenth-century Court servant himself, was strangely ashamed to admit that our artist also was a watchmaker, shipping contractor, and seller of building materials; and some amount of an apologetic attitude was shown by all of Brunelleschi's biographers, on this account.[13] He himself had been at ease as an artist, artisan, engineer and businessman alike, in gold, bronze, lead, wood, stone and earth.

According to Manetti, his earliest biographer, Brunelleschi entered the profession of a goldsmith because he took an interest in Mechanics and Art. For a time he made or repaired clocks, probably of the kind that strike the hours or other subdivisions of the day. It is said, obscurely, that he studied "the various generations of springs."[14] Early in his career he was attracted to the bigger problems of shaping bronze and carving wood. Soon thereafter he turned to even larger works in stone, and studied the remains of ancient buildings. It is reported that he spent much time in Rome, digging, measuring, calculating and reconstructing. On his return to Florence, he had to enter on a long and hard fight against

[12] Renard, vol 2 p 215-217 Men like Leonardo da Vinci or Benvenuto Cellini, who refused to limit themselves to a specific field, were as unusua. then as now

[13] This is particularly true of Vasari as compared with the earlier Manetti In fact, Vasari "purified" the picture of his heroes between his two editions of 1551 and 1567. This hero-worship was checked by modern science, but too much remains as yet of the imaginary ideal of "pure" artists or scientists. For instance, Fabriczy. p. 350-351 feels he must criticize F. B. for accepting such a selfish deed as a monopoly patent.

[14] Manetti, ed. Milanesi, p 93

his initial rivals in the field of architecture. He prevailed; he finally attained greater individual authority than anybody had possessed for centuries, as a builder of public projects.

Architecture and sculpture, along with masonry and carpentry, formerly had been monopolized and were still regulated by the Minor Guild of the Masters of Stone and Wood. Since 1325, liberalizing decrees were in force; outsiders had entered the field, over the oft-repeated but fruitless protests of the Masters.[15] The relative freedom in this specific trade perhaps had something to do with early notions of freemasonry,[16] although it is more probable that competition simply was enforced by the ruling class in order to keep the cost of living and the proletarian wages low; the general process of Minor Guild disintegration was largely due to this tendency.[17]

Brunelleschi first worked as a sculptor in 1401. Three years later, during the very year when he was matriculated as a master goldsmith, he acted as architect for the first time, so far as we know. Together with others, he was engaged to render engineering advice about structural matters to the *Opera del Duomo,* or Dome Authority. This was a committee in charge of the most important public building programs, both clerical and secular, and supervised by the wool guild.[18] In early medieval times such guild committees had cared for relatively modest, devotional chapels, but when the guilds grew into cartels of industrialists their church committees became large and powerful organizations by themselves. The Dome Authority was the first and also the chief employer of Brunelleschi the architect; he finished the giant cathedral of his city. At the same time he worked for

15 Doren, Fl Zunft, p. 121-127.

16 Staley p 320.

17 Davidsohn. Band 4 Teil 2 p 26, 27 etc.; Doren. Fl Zunft, p 115-120; 572-574; same, Ital Wirtsch-Gesch, 1938 p. 106; Poehlmann p. 17-39, 47, 48; Renard Vol 1 p 307, 316-326; G. Arias, Il sistema della cost. ec e soc. Ital. nell' età dei comuni. 1905, p 55-59, 239-246.

18 C. Guasti, Santa Maria del Fiore, La Costruzione. 1887; Davidsohn Band 4 Teil 2 p 69, 70; Doren, Fl. Zunft, p. 703-715, K. Frey, Die Loggia dei Lanzi, 1885, p. 17 etc, 62-70 etc.

wealthy bankers, merchants and other clients, in his career as the most successful architect of his century.

His rise was not free from serious reverses. When his Dome, basically built in the then usual style, was almost complete, and he started to design the crowning "Lantern" in his personal manner, a manner which then must have seemed a most radical departure, the conservative Masters of Stone and Wood made a last attempt to assert their authority. In August 1434, at one of the many occasions when Florence was seething with political strife, they had Brunelleschi arrested. The statutes of this guild are lost, and only part of the process papers are preserved, but the situation is quite clear. The guild had ancient regulations, not technically abolished yet by the liberalizing decrees, and infringed by Brunelleschi. Indeed he had invaded their field with greater independence than anybody before, and it is understandable that the Masters scored a point against him. However, he was promptly released from his arrest, and the guild consuls in turn were punished for false prosecution; probably not without some political intervention by the party of Cosimo de' Medici, one of Brunelleschi's outstanding clients.[19] Cosimo himself was in exile in Venice at this time, informally holding Court with a retinue of artists and scientists. He returned to Florence on October 6, 1434 to establish his dictatorial rule.

Since all of Brunelleschi's inventions revolve around his Dome, it is worth while to note the salient facts about this building.[20] The front and the three long naves had

19 About this time in general see Gutkind. passim. For documents see Guasti, Cupola. doc. 116, 117, 118.

20 Complete documents are found in the two books of Guasti cited in Notes 4 and 18; also see Doren in Repert. f. Kunst-Wiss., Vol 21 p. 249 for the official text of F. B.'s specification for the Dome A complete set of drawings was made by G. B. Nelli, 1688 and published by Sgrilli, 1733 and by G. B. Nelli Jr., 1755; the essential drawings are also in Parsons, op cit., together with a modern, structural analysis, p. 587-607. Hundreds of authors have passed on this building; the most important discussions are by G. B. Nelli, Discorsi di Arch., about 1700, ed. G. B. Nelli Jr., 1753; C. Boito, Arch. del Medio Evo, 1880, p. 185-298; A. Nardini—Despotti—Mospignotti, F. B. e la Cupola, 1885; J. Durm in Zeitschr. f. Bauwesen, 1887, p 353-374. These authors were architects. The historians of art have little to add.

been started about 1296. The plans for the far end had been revised and enlarged in 1367, providing for a cupola which was to be at least as large as the heathen Pantheon in Rome, and stronger than Sta. Sophia's dome in Constantinople, the smaller christian counterpart, which had partly collapsed in 1346. The thought of such a new temple was exciting beyond comprehension to the people of Florence.

Brunelleschi built the body of this cupola, between 1420 and 1434. He faithfully executed the established contour and applied innovations only to technical matters, aside from design details such as the famous "Lantern," on which he worked till his death. The cupola like the earlier understructure is octagonal in plan view. It is formed by eight pointed and upwardly converging arches, double walled and ribbed between the walls. It is essentially built of brick, with reenforcements of stone, galvanized iron and wood. The details of the reenforcements are a matter of debate, being hidden and unknown in large part.

St. Peter in Rome, built more than hundred years later, followed the design of this dome. So did churches and state buildings of all later times. Most of them, including the Dome of the Capitol in Washington, are smaller. Until the most recent times, equally long periods of time were almost invariably required for the building of domes of comparable dimensions. Brunelleschi's achievement was an outstanding one.

Three engineering problems were involved in Brunelleschi's work on the dome: how to rapidly deliver the materials to the building site; how to raise them with a minimum of unskilled labor; and how to support them while in process of building, without preparations involving excessive delays and difficulties. The ship patent was intended to supply one of the means for delivering materials. The raising of these same materials was achieved by a system of winches of different diameter and speed, powered by oxen and horses, through a gear mechanism, the component parts and basic operation of

which we know, although no drawing or description exists. It was built by Brunelleschi, with a number of helpers; he claimed and obtained a complete refund for his material and labor costs, and a separate bonus for the invention as such, which was previously considered by a special commission of the Dome Authority.[21] A similar bonus was given to him for the structural dome design itself.[22] He built this large dome, and possibly some smaller vaults in other buildings, with improved building scaffolds and without rigid, wooden centering or formwork.[23] This method of building without centering had never been applied on such a gigantic scale; probably it was altogether unknown to the Florentine masters, although it had been used in the Orient, and perhaps in ancient Rome. It eliminated the costs, uncertainties and delays that would have resulted from the

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21 Guasti, Cupola, doc. 123, 124, 125 etc.

22 same, doc. 177 These two bonus payments amounted to 100 Gold Florins each. Smaller bonus payments to F. B. and others are recorded by Guasti also. As to the value of such a payment see note 45

23 Nelli, Discorsi, p. 53-74 describes in eloquent terms the continuous flow of bricks. lime, water etc. to the ten workers on each of the eight sides of the large cupola, all of whom had to work on one level simultaneously A rigid *armatura* or centering would have obstructed this flow, aside from other difficulties. Brunelleschi's *castello* or scaffold provided easy and rapid access Nelli also has a print of the scaffold, allegedly based on a drawing by F. B himself, and subsequently reprinted by many authors, for instance by Parsons The drawing is somewhat confused; Durm tried to clarify it, without spectacular success. It shows an eight-legged, upwardly converging frame, with a kingpost depending from the top center, obviously to serve as a support for the top pulley of the elevating machine. Another frequently illustrated and much debated element is the tie ring of wooden beams, circling the base of the cupola. Nelli discovered that it was much too weak to restrain any appreciable side thrust of the dome; also see Parsons to the same effect Even in Brunelleschi's own time, this ring was not generally understood as shown by the pertinent anecdotes told by Vasari and others. Some modern writers tried to justify the ring by saying it may have been more effective so long as the masonry had not hardened yet; actually, it then was less operative than ever to restrain the bursting stress. I believe this ring, as distinguished from one in a smaller, earlier cupola. was used to tie the building scaffold, not the building itself, together; it is a surviving part of the *castello.* Returning to the building method, it must be realized that brick-supporting wood forms were not completely absent; F. B. provided eight *centine* from the start, but only light, mobile affairs of fir wood, Guasti, Cupola, doc 171. He probably used similar mobile forms under some cylindrical or cloistered arches, in other buildings, where the forms had to be temporarily built in; see Billi and Ano Magl, op. cit, re Loggia degli Innocenti These short suggestions will illustrate the type of problems involved in an analysis of these early inventions.

building of such a tremendous formwork of wood, its possible shrinkage, and unpredictable effects upon the masonry. Brunelleschi's method caused such a sensation that for five hundred years, the people of Florence and the architects of the whole world have marvelled over it.

Brunelleschi died in 1446, admired as an inventor and artist. He was also popularly known as perpetrator of practical jokes. In dealing with others he had been shrewd and sarcastic, and not very sociable. He never married. He had a small group of artist and scientist friends. His epitaph, a Latin inscription on his tomb under the Dome, reads: "What Filippo the architect did in Daedalus' art,[24] not only the wonders of this celebrated temple witness it, but it is documented by various machines invented by him with divine ingeniousness. Therefore his body was buried in this ground by the grateful fatherland."

The Patent Venture

Brunelleschi's ship was claimed to "bring in any merchandise and load on the river Arno etc. for less money than usual, and with several other benefits."

The Arno connects Florence with Pisa and the sea. Pisa was one of the largest ports of the Mediterranean. For centuries it had been a prosperous, sea-faring town and a more or less independent republic. In 1406 it fell to Florence, exciting an extraordinary flurry for things maritime in this inland city. The river continued to supply power to numerous mills in the city of Florence, both municipal flour mills floating on the water itself and textile mills on the banks; but now an intensified traffic to and from Pisa wound its way between these quaint old establishments.[25] An office of six Consuls of the Sea was created, or rather taken over from the vanquished town,

[24] Invention

[25] Davidsohn Band 4 Teil 2 p. 270-272, Doren, Ital Wirtsch.-Gesch., p. 382; Gutkind p 179, 180, Heywood, Hist. of Pisa, 1921; Poehlmann p 48, 49; A Schaube, Das Konsulat des Meeres in Pisa, 1888, passim; same, Handels-Gesch. d Roman. Voelker d. Mittelmeer-Gebiets bis z Ende d. Kreuzzuege, 1906, p 55, 69-74, 645-656, Schevill p. 348.

to direct the development of commerce and traffic. All navigation, both inland and on the high sea, was put under a new State monopoly, resulting in expropriation of the wealthy Pisans. The mint of Florence embossed a galley on gold coins newly issued. Daily discussions around the Dome of Florence turned to the departures and arrivals of ships, touching places such as London, Antwerp, Alexandria and "Tana," that is, Azoff on the mouth of the Don. It probably was known that many of the goods went to and from these ports on large floats and ships, commuting on the rivers of the foreign lands.

Brunelleschi, as architect to the largest building concern, had close contact with these new activities. He frequently travelled down the Arno to purchase materials or to supervise the building of fortifications and other installations. His cargo ship idea was just one element in a broad pattern.

Nature was not very favorable to his idea. Florence lies 145 ft. above the sea, and 50 miles inland. The amount of water carried by the Arno is poor and the river is shallow, especially during the hot season. At Florence, the river was and is navigable only for a part of the year, and then only by small boats carrying a few tons at most, which had been used for the cathedral building program from the very start.[26] Obviously, Brunelleschi wanted to bring in bigger loads, during the better season.

No picture or description of the "newly invented or newly shaped machine or ship" exists. However, we know that it was actually built, and popularly known as *Badalone*. This word means a monster, and since it alludes to *battello* or ship, it might be translated as "Sea-going Monster." It probably was equipped with winches for pulling the marble blocks, and propelled by poles or by towing. We can guess that it looked utilitarian and ugly, and was much laughed about, as the name implies. Of course we do not know just what was new, or claimed

[26] Guasti, Costruzione, doc 30, 43, 60, 62, 68 and 70.

to be new, in the construction. Some types of marble transport boats had been used in remote, ancient times.[27]

We have better details about the commercial career of the *Badalone*. There were several years of delay in completing the ship; the affair became a matter of considerable irritation.[28] Among Brunelleschi's rivals, there was one Giovanni di Gherardo, called Acquettino, lecturer on Dante at the State University. Like Brunelleschi and others, he also worked in the field of the Masters of Stone and Wood; in fact he was employed by the Dome Authority as substitute for Brunelleschi. Acquettino opposed certain details of Brunelleschi's dome building method. He also composed a satirical poem on Brunelleschi's ship invention; not a masterwork of either poetry or tact. It runs as follows: "O ignorant soul, o poor and brainless beast, you who would like to make that visible which no one else can see; but there is no consistency in your concoctions. The ignorant masses, having lost their hope, now see it is incredible; it makes no sense that a windbag should make the impossible possible. But if your *Badalone*, flying over the waters, comes to perfection (which cannot be), I will not read on Dante in our school, but will take my life with my own hands; for I am sure that you are crazy: your loom is cracked and your weaving is crooked."

Brunelleschi, who considered himself a poet in his own right,[29] according to the custom of the times, answered in similar vein, calling his opponent a ridiculous beast, and maintaining that "Nothing is invisible to the wise, whose

[27] Plinius the Elder on Architecture, at the start. On river engineering in the Arno region, Parsons p. 323-365; sketch of a canal boat about 1500, ibid. p. 417. On the loading equipment of a Venetian ship of the 14th century: A. Jal, Archéologie Navale, 1840, vol 2 p. 13, 14, 78-83.

[28] The following is based on C. Guasti, Belle Arti, 1874, p. 109-128. However, Guasti obviously misinterpreted the term *Badalone* in Aquinetto's poem; see Guasti's own collection, La Cupola, doc. 110, 112. The error was repeated by Fabriczy p. 390-393. On the University of Florence in general see Davidsohn Band 4 Teil 3 p. 142-146; Gutkind p. 229-231.

[29] A humorous novel in verses, called Geta e Birria, is attributed to him Fabriczy overlooked this too. There were several editions in the sixteenth century, and there is a reprint by C. Arlia, forming vol. 169 of Scelte di curiosità letterarie, 1879.

vision is free from the fantastic fog blinding a lesser mind. Every fool cannot see how art creates realities when nature conceals them."

This acrimonious exchange took place considerable time after the start of work on the *Badalone,* as clearly implied in both poems. On the other hand it must have been before the end of 1425, the year when Brunelleschi was "Lord Magistrate," because in that year, the University budget was cut, and Acquettino actually lost his job as Dante expounder.

Preparations for the first trip of the *Badalone* took one or two years longer yet. In August and September 1426, Brunelleschi obtained two leaves of absence from his work at the dome, to negotiate with the Consuls of the Sea and with certain officials in charge of meat supplies,[30] conceivably about loading facilities that he needed, or shipping services that he could offer. In February 1427 he takes a leave "in his own affairs,"[31] and in April 1427 he makes a trip "in order to look after an enterprise which he is putting into operation for the greater honor of the community; also taking along a rope loaned to him by the Dome Authority."[32] On May 7, 1427 he obtains a letter of recommendation from the Dome Authority to the Mayor of Castelfranco di sotto,[33] a small village on the Arno 18 miles inland from Pisa, where a shipping franchise is to be had;[34] the letter asks for "aid, counsel and favorable consideration, since he continuously works for the benefit and honor of the community."

About this time, Brunelleschi contracted with the Dome Authority for a shipment of marble from Pisa to Florence. On May 14, 1427 the Dome Authority gave him an advance of 15 Gold Florins for this marble, which

[30] Guasti, Cupola, doc. 97, 98 Fabriczy's chronological synopsis on p. 378 is incomplete and partly erroneous, although better than that in Milanesi's Vasari edition of 1906.

[31] Guasti, Cupola, doc. 99

[32] Guasti, Cupola, doc. 100. The rope was not returned, doc. 111.

[33] Guasti, Cupola, doc. 105.

[34] E. Repetti, Dizionario Geografico Fisico Storico della Toscana, 1833, s. v.

then was lying in Pisa;[35] followed by a further advance of 40 Gold Florins on June 12, 1427.[36] On the latter day, a purchase order to Brunelleschi was authorized, calling for 100 Florentine tons of white marble; this was the equivalent of 37.5 short tons according to our present system, and was to be shipped by Brunelleschi "entirely at his expense, at 4 Lire, 14 soldi per ton."[37] This came to a total price of 470 Lire, which at that time was the equivalent of about 125 Gold Florins. Transactions of this kind were quite usual for architects; Brunelleschi as well as his predecessors in office under the Dome Authority had frequently contracted for brick, lumber, and other building materials. It was only hundred years later, in Vasari's and Michel Angelo's time, that such a practice began to come into disrepute for "pure" artists.

A book entry of May 2, 1428 reads as follows: "Said Filippo shall be required to have shipped, within 8 days, by small boats to the Dome Authority, said quantity of white marble which he had shipped from the city of Pisa to the castle in Empoli and Castelfranco by the *Badalone*".[38] Here we have evidence that the *Badalone* was operable, but failed to measure up to full expectations. Empoli is located between Castelfranco and Florence. It seems that Brunelleschi had been forced to unload some of the marble at Castelfranco in order to negotiate

[35] Guasti, Cupola, doc. 106. The marble probably had arrived by land, doc. 159

[36] Guasti, Cupola, doc 108. The total of 55 Gold Florins also appears in Brunelleschi's tax returns for 1427 and 1431, Fabriczy p. 510-529.

[37] Guasti, Cupola, doc. 107 For comparison: when marble was delivered with the usual small boats, in 1433, the delivered price was 7 lire 10 soldi per Florentine ton; when delivered by land, 9 lire 16 soldi; Guasti, Cupola, doc 164 Overland delivery was by carts of 2 Florentine tons capacity, Guasti, Cupola, doc 159 The relative values of Lire, soldi and denari (£, s, d) were the same as those of the present English Pound, shilling and penny. The basic standard of weight was the Florentine pound or *libra*, which equalled 339 5 grams or .7497 lbs av., Parsons p. 636; Schaube, Handels-Gesch., p. 814. A Florentine ton or *migliaia* equalled 1000 Fl. pounds, Parsons p. 635; Guasti, Costruzione, doc. 70. It is an error when Fabriczy p. 111 figures the Florentine ton at 1588, metric pounds. It might still be noted that the rope mentioned in footnote 32 weighed 240 Fl. pounds or 180 lbs. av; this may be taken as one item of evidence that it served for towing the ship. It might have measured one inch in thickness and 520 feet length, with a strength of well over 3 short tons net pulling force; or about 1½ inch and 250 feet length with a strength of 6 to 7 tons.

[38] Guasti, Cupola, doc. 110.

the shallow water up to Empoli, and that none of the blocks on the big ship got beyond Empoli.

Nor did the smaller boats make the deadline. It appears from still another document[39] that Brunelleschi lost marble "in the Arno" and that he had to pay 15 Florins, without recourse, to one Bertino, a vendor of marble.[40] It appears that some of the marble sank in the river, and could not be recovered. The 15 Florins was the equivalent of about 12 Florentine tons at the price paid by the Dome authority, and probably more at Brunelleschi's cost price. It is improbable that such an amount could be carried and lost on one of the small boats; it is more likely that the whole of the marble that was carried by the *Badalone* beyond Castelfranco or Empoli was lost by the sinking of the big ship itself; thereby further accounting for the fact that no further trip of this craft is recorded. According to final documents, portions of the marble ultimately reached Florence, partly by small boat and partly on land,[41] but Brunelleschi had to consent to a most unfavorable settlement of his accounts with the Dome Authority in December 1432.[42]

It is clear that the invention was not a commercial success. Brunelleschi lost at least a considerable part of the 125 Florins representing the value of the marble. He had substantial expenses, not only for starting the *Badalone* venture but also for salvaging some of the marble. We do not know how much his investment in the big ship was, but we can estimate it at several hundred Gold Florins; Brunelleschi's elevating machine, built within a few months, had cost a total af about 166 Gold Florins, and shipbuilding always was an expensive enterprise.[43]

We have Brunelleschi's tax returns;[44] they are based on his assets and debts in each tax period, according to

[39] Fabriczy p 510-529, Tax Return of 1431.

[40] Guasti, Cupola, doc. 164.

[41] Fabriczy p. 510-529 ,Tax Return of 1433

[42] Guasti, Cupola, doc. 112, 113

[43] Guasti, Cupola, doc. 125 is B.'s itemized invoice for the elevating machine. For shipbuilding costs see F H Byrnes, Genoese Shipping in the 12th and 13th centuries, 1930, and literature cited.

[44] Fabriczy p. 510-529. The return for 1427 is also in Gaye, op cit, vol. 1, p. 113.

the Florentine law at the time. They show net current assets of about 2,200 Gold Florins in 1427, mostly in form of State bonds. His income consisted of the typical earnings of a professional man in the Major Guilds, about 100 Gold Florins per year.[45] In addition he accumulated interest on his savings, at about 3½ to 5%, amounting to another 75 to 150 Gold Florins per year. By 1431 his net current assets had increased to about 3000 Gold Florins. They dropped almost one-third of this total, in the next return, of 1433. It is not easy to interpret the tax returns in all respects, but there is no doubt that a very substantial loss had taken place. A major portion of this loss may be traced to the liquidation of the *Badalone* venture; while the actual disaster had taken place in 1427 or 1428 it is clear that financial settlements, such as the bond forfeiture of 1432, required several years. Other losses, perhaps, were occasioned by the failure of still another large-scale "invention," of half military, half civil-engineering character, used by the Florentines against their neighbor town Lucca, in 1430. The next and last return filed by Brunelleschi, in 1442, shows about 3,100 Gold Florins, and the return for 1446, by his adopted son and heir, shortly after his death, shows over 3,400 Florins. The patent was a bad failure, but the inventor took it in his stride.

Significance of the Patent

Brunelleschi was not the first to obtain a limited monopoly in Florence, for technology newly disclosed. Shortly before the *Badalone* patent, issued by the State, a similar grant had been made by the State in conjunction with a guild.

[45] For other examples see Guasti, Costruzione, Doc. 151, Staley p. 92, 93. W. B Scaife, Fl Life, 1893, p 107, 108. Manetti felt that B.'s salary was much too low, op. cit ed Milanesi p 118-120. He compared it with the income of a master stone mason, which was about 60 Gold Florins per year, Staley p. 320. The absolute minimum of existence, as represented by wool workers' wages, was 5 Gold Florins per year, Staley p. 153. Yearly net profits of tenthousands of Gold Florins were sometimes made by industrialists and bankers, Davidsohn Band 2 Teil 2 p. 402-434; Band 4 Teil 2 p. 208, 209 For rates of interest see Davidsohn Band 4 Teil 1 p. 128-130, for prices of articles see G F Pagnini, Della Decima etc., 1765, vol. I p. 263-267

In 1404, a ten years tax exemption had been offered to anybody who would introduce the art of making and mounting steel wire bristles for wool carding machines.[46] This art was unknown in Florence but highly developed in Milan; and it was a Milanese, a certain Guerinus de Mera, who finally transplanted it. He came to Florence and demonstrated his process. In 1406 he made a contract with the *Lana* guild,[47] to the effect that he would exercise and teach the art, at the expense of the guild, with the understanding that those who learnt the trade from him were not at liberty, for some time, to exercise it; thereby giving him the equivalent of a patent monopoly. In 1409 the State, on petition of the guild, issued a decree,[48] impliedly approving this contract; further giving Guerinus the necessary permit to reside in Florence, to set up shop, and to operate free from matriculation in any guild; also exempting him from States taxes for twenty years. A previous scarcity of carding machines, which had troubled the guild for many years, was successfully eliminated by Guerinus' efforts.[49]

Guerinus' contract was remarkable since it united, in one set of transactions, elements of two different types of agreements known at the time: the monopoly grant, and the grant of various benefits for technical improvements. Trade monopolies had been sought by merchants, and occasionally sold by irresponsible rulers, from time immemorial;[50] very gradually it was realized that a monopoly, in order to be tolerable, must bring returns of a

[46] Doren, Fl Woll., doc 91.
[47] same, doc. 98.
[48] same, doc. 106.
[49] same, p. 380-382.
[50] For instance: Ancient state monopolies, about 300 B. C., for textile industries etc., with licenses to private firms, Pauly-Wissowa, Real-Encyclopaedie, Vol. 16. 1935, p. 177, 178, 1130 A. D. dyestuff monopolies of Jewish traders in Southern France, Schaube, Handels-Gesch., p. 585; iron monopoly in Pisa about 1200, same, p. 645-654; state monopolies for raw silk and for dyeing operations in the kingdom of Sicily, administered by Jewish traders, 1231 and 1245, same, p. 509; various early Italian monopolies, Doren, Ital. Wirtsch.-Gesch., p. 447, 473, 494, 549, 571; a 1377 dyestuff monopoly by *Lana* to a partnership, Doren, Fl. Woll., Doc. 61 a; a 1408 monopoly for English wool in a certain district of Florence, same, p. 90-95; a 1459 monopoly by *Lana* for an alum substitute "found" by an individual who preferred to stay anonymous, same, p. 371-372.

more substantial nature than a mere financial contribution. On the other hand, some relatively far-sighted governments and guilds had always tried to develop the arts and industries by offering incentives such as salaries, bonus payments, tax exemptions and the like;[51] they merely failed to realize the inherently arbitrary and inadequate nature of such grants, which indeed is not clearly understood by many persons even at present. Thus it was necessary for both institutions, monopolies and grants for new technology, to undergo considerable development before they could turn into successful tools of economic policy. A patent is a combination of these two elements. Guerinus' privilege was a first approach, in Florence, to such a combination.[52]

Brunelleschi's patent is more modern than that of Guerinus since it presents, exclusively and in a single document, the clear grant of a monopoly in return for a technological disclosure. It contains, in the preamble, a more enlightened statement of the reasons justifying such a transaction than is found in the documents of several centuries both previously and later. Substantially no stray elements such as tax exemptions etc. occur

[51] For instance: About 1240, establishment of the Humiliates, a semi-monastic cooperative, in Florence and other towns, with land grants etc. in return for the teaching of advanced methods of wool manufacture, Doren, Fl Woll., p. 29-41, also statutory evidence of 1322 in R. Caggese, Statuti della Rep. Fior., vol. I, 1909, lib. 4 cap. 72; then in 1314, establishment of silk manufacturers from Lucca in Florence, Bologna etc., Davidsohn Band 4 Teil 2 p. 74, 75; further a tax exemption in 1300, for Arnolfo di Cambio, the original designer of the Dome of Florence, Gaye op. cit., vol. I, p. 445 and Guasti, Costruzione doc. 24, in connection with the same Dome we may note bonus payments in 1371 and 1380 for inventions relating to a centering for the cupola (never used) and a horse-powered water-scoop for building foundations. Guasti, Costruzione, doc. 231 and 314. *Lana* agreements of 1418 and 1436 relating to the teaching of French weaving methods and machines, Doren Fl Woll., doc. 141 a and p. 383-385. Development of shipbuilding, Staley p. 27, of silk manufacturing methods, same p. 210.

[52] Occasional instances of such combined privileges are found elsewhere also. For instance, in 1236 a 15 year monopoly patent was issued by the city of Bordeaux and registered by Henry III, king of England and duke of Gascogne. It was granted to one Bonafusus from St. Columba, for "cloth of different colors, after the flemish, french and english manner." Like the subsequent patent of Brunelleschi, it contained a saving clause for prior art methods. "Calendar of Patent Rolls, 20 Henry III, Membrane 2, March 2, 1236. Woodstock," as cited by R. Meldau in Beitrage zur Gesch. der Technik u. Industrie, Vol. 26 p. 110, 112, 1937.

in Brunelleschi's patent; the final clause, which provides immunity from new taxes not previously imposed, is merely a safeguard against subsequent attempts to repeal the patent by an exercise of the "power to tax and destroy." In some respects, of course, it falls short of requirements established by subsequent experience. The three-year protection period is too short; even if the construction had not required so many years, and if disaster had not intervened on the first trip, the period still would have been inadequate for an enterprise of such large scope. On the other hand the grant goes too far; it does not stop at excluding the public from Brunelleschi's invention, but seemingly freezes the art by limiting the public to the prior art, encouraging further inventions only of Brunelleschi and not of others, for the three-year period of the patent. Finally an undue favor to the patentee lies in part (b) of the grant, which gives Brunelleschi a monopoly assertable against bona fide purchasers of shipping services on infringing ships, as well as against the infringing competitors themselves. These defects appear smaller when we consider the scarcity of pertinent experience and draftsmanship available at such an early date as 1421.[53]

While he was not the first, Brunelleschi definitely was the most celebrated inventor who ever received a patent in Florence; although his popularity stemmed from other achievements, the *Badalone* patent must have had the limelight of publicity, in its day. The Florence of the early 1400s, for its part, was one of the most civilized and astute communities of all times, and Brunelleschi appar-

[53] In one respect, Brunelleschi's patent may be considered *more* adequate than present American practice; the effect of the grant is more clearly expressed. It is in the nature of a prohibition to all, except the patentee. Modern patents say, confusingly, that they give the patentee a "right to make, use and vend," qualifying it as an exclusive right. Laymen often think the patent means what it says. As a matter of law, this is not so. No "right to make" etc. is granted. Insofar as a patentee ever has such a right he has it by Common Law, and a patent merely *withholds* such rights from his competitors. Even a patentee may not have the "right to make" etc., for instance as a result of special laws, dominating patents, or the like. Such is the clear holding in Patterson v. Kentucky, 97 U. S. 501, 24 L. Ed. 1115, followed by many other cases.

ently was the first to offer, in such a society, the basic idea of patents in substantially pure and complete form. One might expect, accordingly, that Brunelleschi's grant should have served as a pattern for subsequent cases. Actually, however, it failed to make a lasting impression, so far as we know.

Research into published records reveals no single recurrence of an institution patterned after Brunelleschi's grant, in the State of Florence, and no impressive number of grants bearing even remote similarity. It is well known that numerous inventions were announced and generally acclaimed in Florence, before and after Brunelleschi;[54] and a study of unpublished records in certain guild and state archives might bring a few more early patents to the light. However. it is obvious from what is published now that the grants to Guerinus and Brunelleschi were as exceptional as remarkable. Patents had no significant development in Florence. It was Venice that took the lead in establishing a regular patent

[54] As early as 1306, there were popular songs and sermons in Florence, commenting upon the abundance of inventions, Davidsohn Band 4 Teil 2 p 12. Leonardo da Vinci, about 1500, showered a firework of new inventions down on Florence and Europe. Galileo Galilei, about 1600, expanded human vision more than anybody ever had, by his discoveries and inventions in the fields of optics, mechanics, dynamics, and hydraulics, one of his contributions brought him a patent by the Republic of Venice, published at 8 JPOS 576, "with very great honor and profit to him," according to his pupil and biographer Viviani. Relatively minor inventions are found in almost every field of Florentine endeavor, for instance .see Doren, Fl. Woll, doc. 168 and p. 385; Dorini p. 621, 686; Gaye vol 1 p. 564, Nelli's book of 1755, p. 13. The status of mechanical engineering about 1550 is illustrated by Parsons, p. 105-153. A eulogy of Florentine inventions in the most varied fields is D. M. Manni, De Florentinis inventis, 1731, 114 pages, available in the Clemens Library at Ann Arbor and the Free Library of Philadelphia, otherwise somewhat rare in the United States. The first part deals with religious congregations and early annotators of the laws. Then follows a classified statement of technical inventions, some of which are quite remarkable; for instance, medicines and ointments, p. 29, 30, cross-breeds of fruit trees and flowers about 1640, p. 33-36, a new method of planting vines, about 1700, p. 36; a purple dye, about 1300, p. 36-38, clocks, p 63-67; a depth-sounding method later claimed by Robert Hooke, p. 68; musical instruments, p. 72-76; ceramics, p. 77, 78. The end of the book covers language, poetry, letters of exchange, and even a variant of the football game The famous Florentine invention of eyeglasses is briefly covered on p. 52-54, and more in detail in Manni's monograph Degli Occhiali da Naso inventati da Salvino Armati, 1738. Galilei is covered on p 43-52, 55-57, and Brunelleschi p 79-83, without details.

system, starting less than fifty years after 1421, the date of Brunelleschi's grant.[55]

It may never be possible to fully explain this strange failure of the patent institution in Florence, but at least one of the reasons can be traced. It lay in the existence of conflicting trends for and against monopolies, in the Florence of the Major Guilds and early Medici.

The Major Guilds had preserved and fortified their basic trade monopolies, of early medieval origin. While the Minor Guilds had suffered losses in this respect, the State and City had begun to claim and enforce commercial monopolies,[56] and individuals, as mentioned before, had sometimes been successful in obtaining exclusive grants in return for financial aid or the like.

In opposition to this network of exclusive rights, the Republic had a law in the nature of an Antitrust Act or Statute of Monopolies.[57] It had been enacted in 1290, and made a part of the organic law, the "Ordinances of Justice" of 1293. This statute prohibited monopolies broadly.

The interpretation of this antimonopoly law was more than restrictive, since it lay in the hands of a government controlled by the leaders of cartels. Strict compliance was enforced only against the unorganized workers, and against the lesser guilds, whose performance and price level affected the cost of living and minimum wages, such as the bakers, butchers, and Masters of Stone and Wood.[58] As applied to all other guilds, the antimonopoly idea at most had the effect that immatriculation was less restricted, and entrance fees lower than in most other

[55] See 26 JPOS 712-720 The statement on p. 720, relating to yearly taxes, is in error, the only taxes developed in Florence were levied on the taxpayer's income, calculated from his declared property, see Pagnini, op. cit., vol. 1. As to trademarks see Davidsohn. Forsch., vol. 3 doc 1095 and Doren, Fl. Woll., p 100 and errata

[56] Examples are cited by Poehlmann p. 32, 33, 68, 69, and 73-77

[57] The text as of 1322 will be found in Caggese, op cit., vol 1, Lib. 3, cap. 4. For the interpretation see Davidsohn Band 2 Teil 2 p. 445-447, Band 3 p. 77-79; Band 4 Teil 2 p 96-98; Doren, Fl. Zunft, p. 572-574, Poehlmann, passim; Schevill p. 265. An office of "Commissioners for the abolishment of monopolies" was instituted in 1332; Doren, Fl. Woll, p. 207. For antitrust statutes in Pisa see Schaube, Konsulat, p. 92; in France, see G. Renard, Guilds in the Middle Ages, 1919, p 18, 19.

[58] See above, Footnote 17.

cities and states.[59] The Major Guilds were monopoly groups pure and simple from their inception in the early Middle Ages to their end about the time of the French and American Revolutions. Every new guild member was required to rent a shop, in prescribed quarters, under terms and conditions fully dictated by the prosperous few, and outsiders were not allowed to open shop to compete in the trade.[60] As elsewhere, there was a sterile atmosphere about these permanently established, rigidly regulated monopolies, and much bigotry about the underlying law. Little more than lip service was rendered to antimonopoly policies where the big monopolists were concerned, but certain smaller monopolies were abated or repressed by virtue of the antimonopoly idea.

It appears that patents were among those smaller monopolies that suffered, while the big ones prevailed. Farsighted arrangements, such as that with Guerinus, had been exceptional in the plutocratic period; they were completely beyond the horizon of the court coterie that took over with the advent of the Medici regime.

Since the guilds continued to exist, at least as a matter of form, technical difficulties persisted, preventing the development of a patent system even in the face of frequent petitions for benefits to inventors. A State decree of 1447 shows that the legality or constitutionality of State patents was questioned. The decree related to an office of Treasury Commissioners who were responsible for promoting the arts. The decree could almost be called an Anti-Patent Law. As briefly digested on the books of the *Lana* guild,[61] it declares that the Commissioners "may investigate about any art and trade of which there is no artisan known in the city of Florence at present. And with any one who is an expert in such a craft they may agree that he shall exercise any of said arts and crafts in the city of Florence. And make agreements with such artisans, and have conceded to them

[59] Poehlmann p. 46, 145-148
[60] Poehlmann p. 44, 59-63; Doren, Fl. Zunft., p. 470-478; same, Ital. Wirtsch.-Gesch., p 288-291
[61] Doren, Fl. Woll., p. 382 Note 2; Davidsohn Band 4 Teil 2 p 12.

immunities from taxes only. And of immatriculation fees and other guild affairs, as may be deemed proper by said Commissioners together with the guild consuls." The State was made powerless to repeat a grant such as that to Brunelleschi, and the industrial system was forced back into the more stagnant condition that had existed before the Guerinus contract.

Of course, the thought was deeply rooted in the minds of men that the originator of a new structure or design has a natural right of property in the new idea, regardless of disclosures made by him to others. In 1474 this thought was crystallized in a decree, adopted by the guild of *Lana* as well as *Seta*[62], protecting ornamental designs in "figured serge," a special weave. The preamble is published; it said: "Whereas several weavers of figured serge by their endeavor invented artful designs of figured serge, and many other weavers of said art by means of fraud and deceit are trying to take away such designs from said weavers, against the form of the law, etc."; for these reasons the counterfeiting of such designs was expressly prohibited. However, the prohibition was not implemented by a design or patent examination; not even by a mere registration system.

The conflicting trends prevailing resulted in strange patent substitutes. For instance, in 1476 an importer of foreign technology relating to the weaving of veils secured, aside from salary payments etc., a contract with *Lana* and *Seta*[63], providing that he would teach the art to a group of men "so that none of them be in possession of the whole art, but it be partly with one and partly with others." This monstrosity shows how the legal development ran in reverse, in the Medici state.

Together with the trend of the State laws and guild statutes, the basic attitude of the Florentine public changed, after 1434. The previous plutocracy, in spite of all its imperfections, had represented a stage of civic development far in advance of the feudal system and

[62] Doren, Fl. Woll., p 386
[63] Doren, Fl Woll, doc. 181; Dorini, p. 653.

monarchy prevailing in adjoining States. Florence now sank back to this more primitive level. A permanent State bureaucracy, closely cooperating with one of the church, perpetuated all the injustices and maladjustments that it found. The Court philosophers debated ancient writers; merchant adventurers fell into disrepute. Conditions for admission of foreigners retrogressed from a mildly liberal to a most restrictive standard[64]. The few existing vestiges of political liberty disappeared. Certain arts and sciences flourished in a display of brilliance; that is, insofar as they were supported by the dictator or petty monarch. All others rotted away.

All this was not the tragic mistake of a few; it was supported, with a kind of scientific candor, by a large and popular school. Machiavelli, one of the leading representatives of this school, gave pointed expression to it in his political system, written in 1512. While he wanted dynamic action in politics, he saw the ideal of the arts in a kind of stable equilibrium; he wrote: "A ruler . . . should honor those who excel in an art. Next he should encourage his citizens to quietly exercise their occupations, in commerce, agriculture, and all other fields, so that no one be afraid to adorn his possessions for fear of theft or to start a business on account of taxes; he should give premiums to those who do these things and who in any manner amplify his city or state. At suitable times of the year he should keep the people occupied with festivals and spectacles. And since every city is divided into guilds or other groups he should take such societies into account, appear in their gatherings from time to time, showing himself humane and liberal; nevertheless maintaining at all times his majesty and dignity, since this wants to be remembered always."[65] Machiavelli's advice was heeded, in fact throughout Europe, with disastrous results for democracy, commerce and industry.

His followers in Florence were even more poorly advised. In 1765, the man who then passed as the foremost

[64] Gutkind p. 38
[65] Il Principe, chapter 21, many editions in all languages

economist of the town did not know any better than to quote the following from an obscure German writer of his period, with some added emphasis on picturesque expression: "The world is full of a kind of adventurers who, giving themselves as experts, are running from one city and court to another to propose establishments of new manufactures, until they find some good man who gives them privileges and money advances. They always fail miserably; they are charlatans, ignoramuses, no-goods and irregulars . . . Whoever has a good mind to start a new industry should take the director from a place where the industry is well established"[66]. This, of course, is ridiculous. However, it puts into bold relief what we can generally conclude from the strange career of Brunelleschi's patent experiment in Florence: that patents, like the other incentives of progress, have no inherent power of survival. They can live and function only in a society which by itself is truly progressive.

[66] Pagnini, op. cit., Vol. 2 p. 85

Retirement

MAURICE K. PECK

Maurice K. Peck, Principal Examiner of Division 53, retired on December 31, 1945 after 42 years of service in the Patent Office. Mr. Peck entered the Patent Office as a Fourth Assistant Examiner on February 26, 1903, from Franklin, Nebraska, and was assigned to Division 38. He was promoted to Principal Examiner in June of 1924 and placed in charge of newly-formed Division 53. He holds an A.B. degree from Grinnell College and an LL.B. from National University.